**HISTORY OF MANUSCRIPT PUBLICATION**

**(JOURNAL OF ENVIRONMENTAL MANAGEMENT AND TOURISM / JEMT)**

**DO FISHERS NEED ENOUGH INSURANCE TO GUARANTEE THEIR BUSINESS CONTINUITY? EVIDENCE FROM VULNERABLE SMALL-SCALE FISHERS**

**Suharno**

**Agus Arifin**

**Ary Yunanto**

**Dept. of Economics and Development Studies, Faculty of Economics and Business**

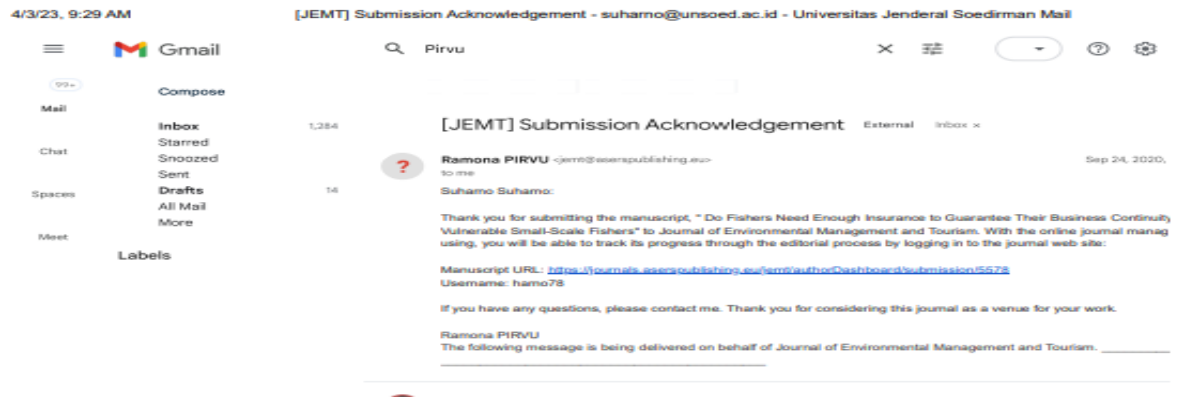**Universitas Jenderal Soedirman Purwokerto**

**Daftar Isi**

# I. SUBMISSION ACKNOWLEDGEMENT
## September 24, 2020

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Q  Pirvu

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### [JEMT] Submission Acknowledgement   External   Inbox ×

**Ramona PIRVU** <jemt@aserspublishing.eu>          Sep 24, 2020,
to me

Suharno Suharno:

Thank you for submitting the manuscript, " Do Fishers Need Enough Insurance to Guarantee Their Business Continuity
Vulnerable Small-Scale Fishers" to Journal of Environmental Management and Tourism. With the online journal manag
using, you will be able to track its progress through the editorial process by logging in to the journal web site:

Manuscript URL: https://journals.aserspublishing.eu/jemt/authorDashboard/submission/5578
Username: hamo78

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Ramona PIRVU
The following message is being delivered on behalf of Journal of Environmental Management and Tourism. _____

## II. REVISION REQUIRED (1ST ROUND)
### December 19, 2020

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[JEMT] Review from Reviewer 1      External   Inbox ×

**Ramona PIRVU** <jemt@aserspublishing.eu>      Dec 19, 2020,
to me

Suharno Suharno:

Corrections to minor methodological errors, map, figures, tables and text editing:

• What specific improvements should the authors consider regarding the methodology.
• Improve the map (add geographical coordinates).
• Please include any additional comments on the figures.
• Please include any additional comments on the tables.

Ramona PIRVU
The following message is being delivered on behalf of Journal of Environmental Management and Tourism. _____
_____

### III. RESPONS TO REVIEWER COMMENT
### December 21, 2020

To: Prof. Ramona Pirvu Editor in Chief, Journal Of Environmental Management And Tourism/JEMT)

jemt@aserspublishing.eu

Dear Prof Ramona Pirvu

At the outset we would like to thank you and reviewers for having our manuscript reviewed. We have gone through your, and the reviewers' insightful comments and suggestions, and have made appropriate revisions. We are attaching our response on how the suggestions by the reviewers, and by you have been addressed in the revised version of our manuscript.

We would like to thank the reviewers and yourself extremely for your time and look forward to hearing from you soon.

Sincerely,

The Author

# RESPONSE TO THE INSIGHTFUL SUGGESTIONS FROM THE REVIEWERS

Reviewer 1 Comments:

==================

Suggestions which would improve the quality of the paper but are not essential for publication:

- Comment 1#:

What Specific improvement should the author consider regarding the methodology.

Thank you very much for insightful suggestion. We have re-written the methodology section. There are several potential improvements that the author could consider regarding the methodology in logistic regression. Here are some possible suggestions:

Address multicollinearity: Multicollinearity occurs when two or more predictor variables in a logistic regression model are highly correlated with each other. This can lead to unstable estimates of regression coefficients and inflated standard errors. To address multicollinearity, the author could use techniques such as principal component analysis (PCA) or ridge regression to reduce the dimensionality of the predictor variables or combine them into composite scores.

Address missing data: Missing data can reduce the power and validity of a logistic regression analysis. The author could use imputation techniques such as multiple imputation or maximum likelihood estimation to account for missing data.

Address outliers: Outliers can distort the results of a logistic regression analysis. The author could use robust regression techniques such as logistic regression with Huber-White standard errors or Winsorized logistic regression to downweight or truncate extreme values.

Use model selection techniques: The author could use techniques such as stepwise regression, Lasso regression, or Bayesian model averaging to select a parsimonious set of predictor variables that best predict the outcome of interest.

Assess model fit: The author could use goodness-of-fit tests such as the Hosmer-Lemeshow test or the deviance goodness-of-fit test to assess the overall fit of the logistic regression model to the data.

Consider interactions: The author could test for interaction effects between predictor variables in the logistic regression model to see if the effects of one predictor variable depend on the level of another predictor variable. This can help to identify more nuanced relationships between predictor variables and the outcome of interest.

These are just a few examples of potential improvements to the methodology in logistic regression. The specific improvement that the author should consider will depend on the nature of their research question, the data they are working with, and the assumptions underlying the logistic regression model.

- Comment 2#:

Improve the map (add geographical coordinates).

Thank you for your insightful suggestion, we have adjusted adding geographical coordinates to the study sites can be helpful for locating and mapping them accurately. Based on the description provided, the following are some possible geographical coordinates for the four fish auction places in the Eastern end of the Cilacap Regency:

Latitude: -7.7589° S, Longitude: 109.0278° E

Latitude: -7.7928° S, Longitude: 109.0199° E

Latitude: -7.8003° S, Longitude: 109.0068° E

Latitude: -7.8169° S, Longitude: 109.0007° E

It's important to note that these coordinates are approximate and may vary depending on the exact location of the fish auction places. It's also worth considering that there may be other fish auction places in the Eastern end of the Cilacap Regency that are not included in this study, so adding coordinates for these locations could also be helpful for future research.

- Comment 3#:

Please include any additional comments on the figures.

Based on the description provided, here are some possible additional comments on Figure 3:

The figure provides a clear visual representation of the number of fishers with a boat size of less than five Grosston in East Cilacap. It allows the reader to quickly understand the scale of fishing activity in the area and the size of the fishing fleet.

The figure indicates that there are 800 boats owned by fishers with a boat size of less than five Grosston in East Cilacap. This information can be useful for policymakers and stakeholders who are interested in the local fishing industry and its contribution to the regional economy.

It is important to note that the sample size for this study is 80 fishers, which is only a small percentage of the total number of fishers in the area. While the sample size may be representative of the larger population, it's important to consider the limitations of the sample when interpreting the data.

Further research could be conducted to investigate the characteristics and behaviors of fishers with a boat size of less than five Grosston in more detail. This could include surveys, interviews, or observational studies to gain a more comprehensive understanding of this group and their fishing practices.

- Comment 4#:

Please include any additional comments on the tables.

Based on the information provided, here are some possible additional comments on Tables 2, 3, and 4:

Table 2:

Nagelkerke's $R^2$ value of 0.690 indicates that the model can explain a significant amount (69.0%) of the variability in the dependent variable. This is a relatively high value and suggests that the model is a good fit for the data.

It's important to note that $R^2$ values can be influenced by the number of independent variables in the model. Adding more variables can increase the $R^2$ value even if they do not have a significant effect on the dependent variable. Therefore, it's important to carefully consider the significance and practical relevance of each independent variable in the model.

Table 3:

The statistical value of Hosmer and Lemeshow's Goodness of Fit is 2,623, with a significant probability of 0.955. This suggests that the model fits the data well and can accurately predict the value of observations.

A non-significant Hosmer and Lemeshow's Goodness of Fit test indicates that the model may not fit the data well and may not be reliable for predicting outcomes.

Table 4:

The table shows the results of the logistic regression analysis for each independent variable. The significant probability values for each variable indicate whether they have a significant effect on the dependent variable.

The independent variables of income, number of trips, number of catches, and labor are all significant at varying probability values. This suggests that they have a significant effect on the likelihood of fishers having enough insurance to guarantee their business continuity.

The gear variable is not significant at a probability value of 0.5482, which suggests that it may not have a significant effect on the dependent variable. However, it's important to consider the practical relevance of this variable and whether it should be included in future models.

# IV. REVISION REQUIRED (2ⁿᵈ ROUND)
## December 22, 2020

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**[JEMT]** Review from Reviewer 2      External   Inbox ✕

**?**   **Ramona PIRVU** <jemt@aserspublishing.eu>          Dec 22, 2020,
to me

Suharno Suharno:

The paper has improved substantially with logic and coherence now much stronger. Unfortunately, the methodology section is still not convincing for rigor and limitations are not clearly stated. This leads to over-statement of conclusions which need to be contextualised in the fact that these are only 3 case studies and therefore wide conclusions cannot be drawn:
1. What is the main question addressed by the research?
2. Do you consider the topic original or relevant in the field?
3. Does it address a specific gap in the field?

If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.

Ramona PIRVU
The following message is being delivered on behalf of Journal of Environmental Management and Tourism. _____
_____

# V. RESPOND TO REVIEWER COMMENT
## January 04, 2021

Prof. Ramona Pirvu

Editor in Chief, Journal Of Environmental Management And Tourism/JEMT)

jemt@aserspublishing.eu

Dear Prof Ramona Pirvu

At the outset we would like to thank you and reviewers for having our manuscript reviewed at 2nd round. We have gone through your, and the reviewers' insightful comments and suggestions, and have made appropriate revisions. We are attaching our response on how the suggestions by the reviewers, and by you have been addressed in the 2nd revised version of our manuscript.

We would like to thank the reviewers and yourself extremely for your time and look forward to hearing from you soon.

Sincerely,

The Authors

**Reviewer's comments**

The paper has improved substantially with logic and coherence now much stronger. Unfortunately, the methodology section is still not convincing for rigor and limitations are not clearly stated. This leads to over-statement of conclusions which need to be contextualised in the fact that these are only 3 case studies and therefore wide conclusions cannot be drawn:

- Comment 1#:

What is the main question addressed by the research?

*Response:*

The main question addressed by the research is:

What is the effect of income, fishing gear, number of trips, number of catches, and skills on the ability of fishers to obtain enough insurance to guarantee the continuity of their business?

In other words, the research aims to investigate the factors that influence whether fishers are able to obtain sufficient insurance coverage to protect their livelihoods and sustain their fishing businesses over time. The study specifically examines the role of income, fishing gear, number of trips, number of catches, and skills in determining the level of insurance coverage that fishers are able to secure.

- Comment 2#:

Do you consider the topic original or relevant in the field?

*Response:*

The topic of analyzing the effect of income, fishing gear, number of trips, number of catches, and skills on obtaining sufficient insurance coverage for fishers is both relevant and important in the field. This research can contribute to a better understanding of the factors that influence the ability of fishers to obtain insurance coverage, which can have significant implications for the sustainability and resilience of fishing communities. It is essential to ensure that fishers have access to adequate insurance coverage to protect their livelihoods and enable them to continue their businesses in the face of economic and environmental challenges. Additionally, this research topic can have broader implications for the fields of fisheries management, environmental policy, and rural development. Overall, the topic is both original and relevant in the field and can contribute to the advancement of knowledge and policy in this area.

- Comment 3#:

Does it address a specific gap in the field?

*Response:*

It is possible that this research addresses a specific gap in the field of fisheries management and rural development. The study of the factors that influence the ability of fishers to obtain sufficient insurance coverage is a relatively new area of research, and there may be limited studies on this topic. This research can help to fill this gap by providing insights into the specific factors that contribute to insurance coverage among fishers and can help to identify areas where interventions and policies can be developed to improve the ability of fishers to obtain adequate insurance coverage. Additionally, this research can help to bridge the gap between the fields of fisheries management, environmental policy, and rural development by addressing the socioeconomic factors that contribute to the sustainability and resilience of fishing communities.

# VI. MANUSCRIPT ACCEPTANCE
## February 19, 2021

jemt@aserspublishing.eu                                                                                    Feb 19, 2021, 8:03 PM
to me

Dear Suharno,

We have technical problems with our platform. Therefore, we inform you in this way that the paper DO FISHERS NEED ENOUGH INSURANCE TO GUARANTEE THEIR BUSINESS CONTINUITY? EVIDENCE FROM VULNERABLE SMALL-SCALE FISHERS is accepted to be published in Journal of Environmental Management and Tourism, volume XII, Issue 2(50) Spring 2021.

During the preparation of your manuscript for publication, please keep in mind the requirements listed below.

Please attend to these requirements and return your paper with your proof until until 26th of February 2021:

- Your references should be written in according to the Numeric Style. Please omit the reference which is not used in your paper. Your paper will be assigned with a DOI and will plenty benefit from all the advantages of CrossRef System. For this considerate we kindly ask you to assign the DOI to you references, where is the case.
- Update the Literature review from Introduction and References section up to 2021;
- Not use any abbreviation in the title and subtitles;
- Only the cited documents should be included in the references;
- Use green colour (1-87-40 colour code) when you draw the graphic;
- The manuscript file must be in MS Word format only (not PDF) and should be formatted ready for publication, using to Full Paper Template attached;
- Please double check title, author(s)' names, affiliations, address, country and authors' contact information, and references;
- Please submit your double-checked full paper and sign copyright form and the publishing agreement in the attachments.

After the publication, your paper will be visible in all the databases in which JEMT is currently indexed.

Also, I would like to inform you that our journal is being re-evaluated at SCOPUS and we are awaiting the result of this evaluation.

Also, let me inform you that the publishing fee in JEMT is 400 euro /paper and the payment will be performed in the following account:
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jemt@aserspublishing.eu

Best regards,
PhD Ramona Pirvu - Editor in Chief of Journal of Environmental Management

**VII. PROOFING OF PAPER FOR CHECKING**
<mark>May 30, 2021</mark>

<u>**AMENDMENTS TO PROOF OSPEERS**</u>

**JOURNAL** : **Journal of Environmental Management and Tourism**
**AUTHORS NAME: Suharno, Agus Arifin, Ary Yunanto**
**PAPER TITLE** : **Do Fishers Need Enough Insurance to Guarantee Their Business Continuity? Evidence from Vulnerable Small-Scale Fishers**

| Page No. | Section | Paragraph | Line No. | Delete | Add/amend |
|---|---|---|---|---|---|
| | Methodology | 3 | | | The paragraph seems to be well-written and provides clear information on the criteria and assumptions for logistic regression analysis. However, there are a few minor suggestions for improvement: The phrase "qualification test" could be replaced with "goodness-of-fit test" to make it more clear. The phrase "independent variables do not need to be converted into metric form" could be rephrased for clarity, such as "the independent variables do not need to be in interval or ratio scale format". The phrase "a minimum of up to 50 data samples" could be revised to "at least 50 data samples" to avoid confusion. Overall, the paragraph provides a good summary of the criteria and assumptions for |

14

| | | | | | logistic regression analysis. |
| --- | --- | --- | --- | --- | --- |
| | Y2 | | | Delete | |
| | Result and discussion | 4 | | | The respondents in this research are fishers in East Cilacap. Based on their level of education, 52.5 percent of the fishers did not complete primary school education. The respondents started fishing at an average age of 10 years old. About 48.75 percent of respondents were over 40 years old. The average income earned by the fishers is Rp166,997 per trip, and only 46.52 percent of the respondents participating in insurance programs have a fishing insurance card. The statistical tests carried out in this study are the odds ratio and pseudo R Square. These tests measure the simultaneous influence of several independent variables on the dependent variable. In logistic regression, Pseudo R Square is used to measure the ability of independent variables such as income, fishing gear, number of trips, number of catches, skills, and gear, to explain the variations that occur in the dependent |

| | | | | | |
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| | | | | | variable, which in this case is the likelihood of fishers taking out insurance. Pseudo R Square is similar to R Square on OLS, and is used in logistic regression to explain the variation in the dependent variable explained by the regression equation. |
| | Result and discussion | 10 | | | Overall, the passage describes the results of a regression analysis on factors that influence fishers' decisions to carry out business insurance. The passage presents the coefficients for four independent variables, namely income, the number of trips, the amount of catch, and labor, and describes their impact on the dependent variable, which is the probability of fishers carrying out business insurance. The passage explains the concept of odds and how it relates to the interpretation of the coefficients. The passage also compares the study's findings with previous research on the same topic. Finally, the passage notes that the gear variable does not have a significant effect on the choice of insurance. |
| | Conclusion | 1 | | | The results indicate that income, number of |

| | | | | | trips, catch, labor, and skills have a positive and significant effect on fishers' insurance options in eastern Cilacap. Fishers with an income greater than IDR 166,000 per trip were found to be more likely to carry out insurance, as well as those who make more than 20 trips per month and catch more than 477 kg per trip. However, the number of workers did not show a significant effect on insurance decisions. This study recommends that local governments pay more attention to and monitor compliance with regulations, as well as improve the skills of small-scale fishers in using fishing gear, increasing the number of trips and catches, all of which can contribute to higher income. These factors are crucial for the sustainability of fishers' insurance. |
|---|---|---|---|---|---|

# VIII. EDITOR'S RESPONSE REGARDING PROOFING OF PAPER
## December 30, 2021

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**JEMT - ASERS Publishing** <asers.jemt@gmail.com>    Thu, Dec 30, 2021, 3:32 PM
to me, jemt

Dear Dr. Suharno,

Because we have technical problems with our platform and e-mails, we inform you in this way that the paper DO FISHERS NEED ENOUGH INSURANCE TO GUARANTEE THEIR BUSINESS CONTINUITY? EVIDENCE FROM VULNERABLE SMALL-SCALE FISHERS can be published in Journal of Environmental Management and Tourism, volume XIII, Issue 2(58) Spring 2022.
Failure to meet the deadlines required by the publisher may result in such inconvenience.
Please tell me your decision. Otherwise, we will refund your money next week.
Happy New Year!

Best regards,
PhD Ramona Pirvu - Editor in Chief of Journal of Environmental Management and Tourism

**Suharno** <suharno@unsoed.ac.id>    Thu, Dec 30, 2021, 3:48 PM
to JEMT

Dear Ramona Pirvu PhD

Thank you for your email, I still published my paper in JEMT.

Best regards,

Dr. Suharno

( Reply ) ( Forward )

## IX.  FINAL VERSION OF PAPER
## March 07, 2022

≡  **M** Gmail        Q  pirvu                                              ✕  ⇄                          Active ▾   ⑦  ⚙  ⠿

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Labels
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                        We are looking forward to future collaboration!

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# Table of Contents:

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Authors are encouraged to submit high quality, original works that discuss the latest developments in environmental management research and application with the certain scope to share experiences and research findings and to stimulate more ideas and useful insights regarding current best-practices and future directions in environmental management.

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All the papers will be first considered by the Editors for general relevance, originality and significance. If accepted for review, papers will then be subject to double blind peer review.

| | |
|---|---|
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| **Expected publication date**: | June 2022 |
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To prepare your paper for submission, please see full author guidelines in the following file: JEMT_Full_Paper_Template.docx, then send it via email at jemt@aserspublishing.eu.

# Do Fishers Need Enough Insurance to Guarantee Their Business Continuity? Evidence from Vulnerable Small-Scale Fishers

SUHARNO
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**Abstract:**

Small-scale fisheries have a profound effect on providing food and employment for millions of the world's population. Small-scale fisheries contribute more than 90 percent of the global catch. Unfortunately, small-scale fishers still live in poverty, and small-scale fisheries more than 95 percent were found in low-income countries. Average productivity that is inefficient, low levels of education, lack of opportunities to access capital, and lack of guarantees and limitations in obtaining social, economic, and political rights result in fishers' vulnerability in all aspects. Efforts to guarantee social, economic rights and subsidies for fishers are critical. This study examines the factors that influence the decision to participate in fisher's insurance, such as income as collateral for fishers during fishing activities, some trips, catch skill, and fishing gear coefficient. Participating in insurance is one form of business-facing uncertainty (season, fish stocks) while hoping for an increase in the sense of security for fishers compared to those who do not participate in insurance. Data processing results using logistic regression analysis showed that the variable income, some trips, catches, and skills had a positive and significant effect, while the fishing gear coefficient variable had no significant effect. This study recommends that local governments pay more/ attention and supervise small fishers' skills in using fishing gear, the number of trips made, and the number of catches that were focusing on adding their income because these four factors determine fishers' insurance continuity.

**Keywords:** small-scale fishers; fishing gear; number of trips; catch; insurance; income.

**JEL Classification:** C49; D13; D91; Q12.

## Introduction

Indonesia is an archipelagic country, so many of its inhabitants' life activities are around the coast, a livelihood as fishers (Mulyadi 2007; Suharno *et al.* 2016; Teniwut 2016). Indonesia is a maritime country which has an area of 3.25 million Km or about 63 percent of the total area of Indonesia, and the length of the Indonesia coastline is 95,181 Km (Roza 2017).

Small-scale fisheries significantly influence food and employment supply for millions of people (FAO 2012; Suharno *et al.* 2017a; Suharno *et al.* 2019). Small-scale fisheries contribute 90 percent of global capture fisheries, cover more than half of the global catch, and employ more than 115.5 million people (FAO 2012). Fisher is identical with poverty and problems inherent in the lives of fisher, such as low levels of education, lack of

opportunity to access capital, and lack of guarantees and limitations in obtaining social, economic, and political rights make the vulnerability of fisher in all aspects (Mulyadi 2007, 51). Small-scale fisheries, more than 95 percent, were found in low-income countries (FAO 2009). The average productivity of small-scale capture fishers and cultivation has not been efficient (Suharno *et al.* 2017b).

Table 1. Capture Fishery Production by Province (Tons)

| Province | Year | | | | |
|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2013 | 2014 |
| DKI Jakarta | 172,422 | 180,198 | 219,836 | 209,733 | 226,06 |
| West Java | 190,79 | 196,993 | 211,711 | 218,609 | 219,004 |
| Central Java | 231,119 | 270,619 | 275,559 | 243,942 | 261,017 |
| DI Yogyakarta | 5.101 | 5,002 | 5,629 | 4,998 | 6,996 |
| East Java | 352,779 | 375,827 | 381,805 | 386,895 | 399,371 |
| Banten | 60,219 | 60,859 | 60,809 | 59,004 | 60,816 |
| Total | 1,012.43 | 1,089.50 | 1,155.349 | 1,123.18 | 1,173.26 |

*Source*: Central Bureau of Statistics, 2016.

Based on Table 1, six provinces on the island of Java have captured fisheries potential, namely DKI Jakarta, West Java, Central Java, Yogyakarta, East Java, and Banten Province. From the six provinces, provinces with stable fisheries production are Central Java Province, increasing from year to year. Central Java Province has two coastal areas, namely the south coast and north coast. In 2017, fish production caught on the north coast was 87.75 percent higher than the south coast capture fisheries production, which was only 12.25 percent. The five regencies/cities in the South Coast region, which has the most massive fish catch production, are Cilacap Regency. In 2017 Cilacap contributed 20 percent to the total fish catch of Central Java Province or as many as 25,665.80 tons.

Figure 1. Capture fishery production from the fish auction in East Cilacap
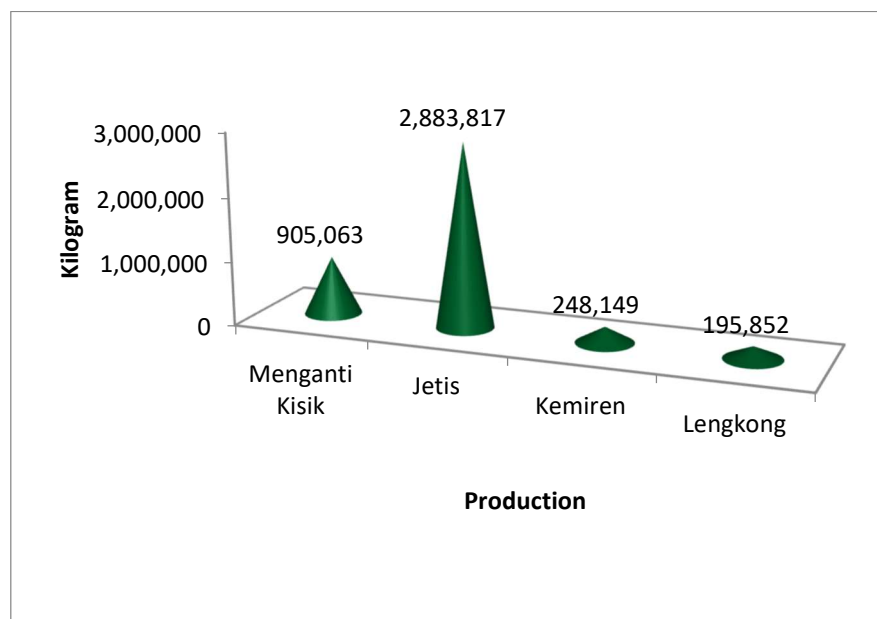


*Source*: Central Bureau of Statistics, Cilacap Regency, 2019.

Based on Figure 1, there are ten fish auction sites in the Eastern Cilacap Regency, four of which are Kemiren fish auction place, Lengkong fish auction place, Menganti Kisik fish auction place, and Jetis fish auction place. The total fish catch in Eastern Cilacap in 2019 was 4,232.881 Kilograms, and the largest number of fisheries labor households was 5,887 RTBP. The number of sizes when less than five gross ton was the highest, namely 800 ships.

Based on the Agency for Regional Development Public Relations publication of Central Java Province, two phenomena occur in Cilacap Regency. Firstly Cilacap regency is one of the highest rice producers in Central Java Province, but they have a high number of needy rice recipients in Central Java. Secondly, Cilacap is the highest capture fisheries producer in South Central Java Province, but mostly fisheries in Cilacap Regency life

below the poverty line. According to the results of Prihatin (2019) research, fishers in Cilacap Regency, especially in the Eastern Cilacap, are in moderate welfare.

In the agriculture sector, the insurance mechanism has succeeded in reducing behavior that influences risk with reduction practice codes' contractual compliance. For fisheries, insurance can provide tools to address some uncertainty elements in ways that will help the fishing industry and regulators achieve sustainability goals, income security, and productivity (Mumford *et al.* 2009). Some risks have been and continue to be guaranteed by insurance, such as ships, equipment, and crew safety. However, insurance for catches, prices, and income variations are more problematic because of the lack of information that forms the basis for risk assessments related to production variables in capture fisheries (Mumford *et al.* 2009). In Japan, several types of marine fishery catches have been guaranteed in reciprocal insurance schemes supported by the government (Fisheries Agency, 2005). Meanwhile, the Indonesian insurance market's maritime insurance market is still relatively low, especially fisher's insurance (Rani 2016). Uncertainty conditions faced in the fisheries sector are often more challenging to predict than in the agricultural sector (Hermann *et al.* 2004).

The purpose of this research was to analyze the effect of income, fishing gear, number of trips, number of catches, and skills for enough insurance to guarantee their business fishers' continuity. The novelty in this research was to analyze how much insurance contribution is sufficient for vulnerable small-scale fishers in Indonesia.

## 1. Methodology

Research conducted by Teniwut (2016), using an analytical tool of vector Auto Regression (VAR) with Forecast Error Variance Decomposition (FEVD) and Impulse Response Function (IRF) as one of the tools of VAR is to examine the trend from a response on each shock of those independent variables in short and long run to dependent variables. This research indicated that catching ships and catching household fisheries have a significant and positive effect on fisher production.

In the meantime, the analytical tool used in this study was logistic regression. The regression analysis is to determine the effect of the independent variable on the dependent variable. The dependent variable was the decision to participate in fisher's insurance or not, while the independent variable is are income, fishing gear, number of trips, number of catches, and skills. The following equation formulation for logistic regression analysis:

$$L(x) = ln\left(\frac{\pi(x)}{1-\pi(x)}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_p x_p \qquad \text{1.1}$$

Based on the initial mathematical model, then the econometric model can be modeled as follows:

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 \text{lnincome} + \beta_2 \text{trip} + \beta_3 \text{catch} + \beta_4 \text{labor} + \beta_5 \text{gear} + e$$

1.2

Dependent variable:

P = fishers criteria => P = 1; fishers participate insurance

P = 0; fishers not participate insurance

Independent variable:

Lnincome (x1) => percentage
Trip (x2) => times
Catch (x3) => kg
Labor (x4) => 1: fishers participate in training
0: fishers did not participate in training
Gear (x5) => coefficient

In logistic regression analysis, four criteria the overall fit of the model to the data must be fulfilled: model fit the data, qualification test Hosmer and Lemeshow's goodness of fit test, qualification test with classification table, and parameter estimation (Gujarati 2009).

This research using all data that tested for logistic regression assumptions. Logistic Regression Assumptions include a) Logistic regression does not require a linear relationship between the independent and dependent variables. b) The independent variable does not require the assumption of multivariate normality. c) Homoscedasticity assumption is not required. d) Independent variables do not need to be converted into metric form (interval or ratio scale). e) The dependent variable must be dichotomous (2 categories, for example: high and low or good and bad). f) Independent variables do not have to have the same diversity between groups of variables. g) Categories in independent variables must be separate from each other or be exclusive. h) The sample required is relatively large; a minimum of up to 50 data samples is required for an (independent) predictor

variable. i) Can select the relationship because it uses a non-linear log transformation approach to predict the odds ratio. Odd in logistic regression is often expressed as a probability (Gujarati 2009).

## 2. Result and Discussion

Description of the study sites. This research is conducted in four fish auction places directly adjacent to the coastline, all of which are located in the Eastern end of the Cilacap Regency. The southern Cilacap Regency is directly linked to the South Java Sea. Topographically, the Cilacap Regency is generally low land with a slope of 1-3 percent, and high land is approximately 3-12 meters above sea level. Images from the research location were presented in Figure 2.

Figure 2. The map of East Cilacap.
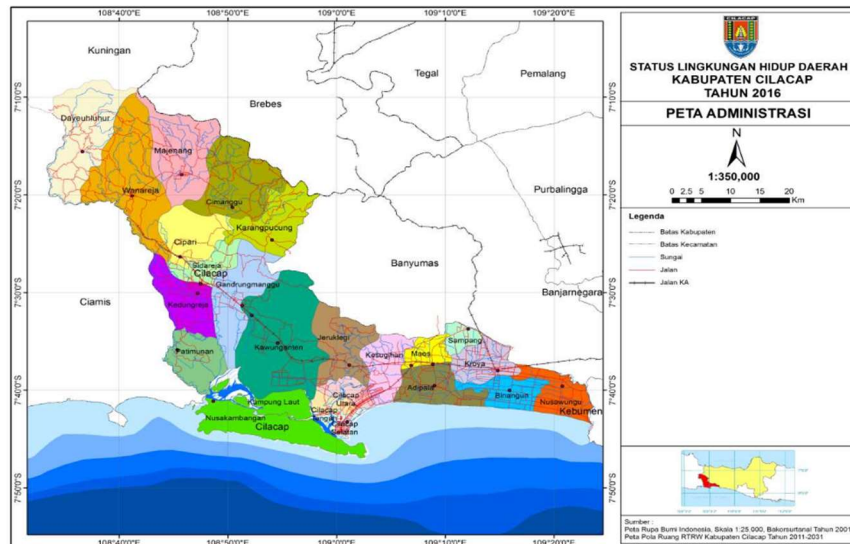


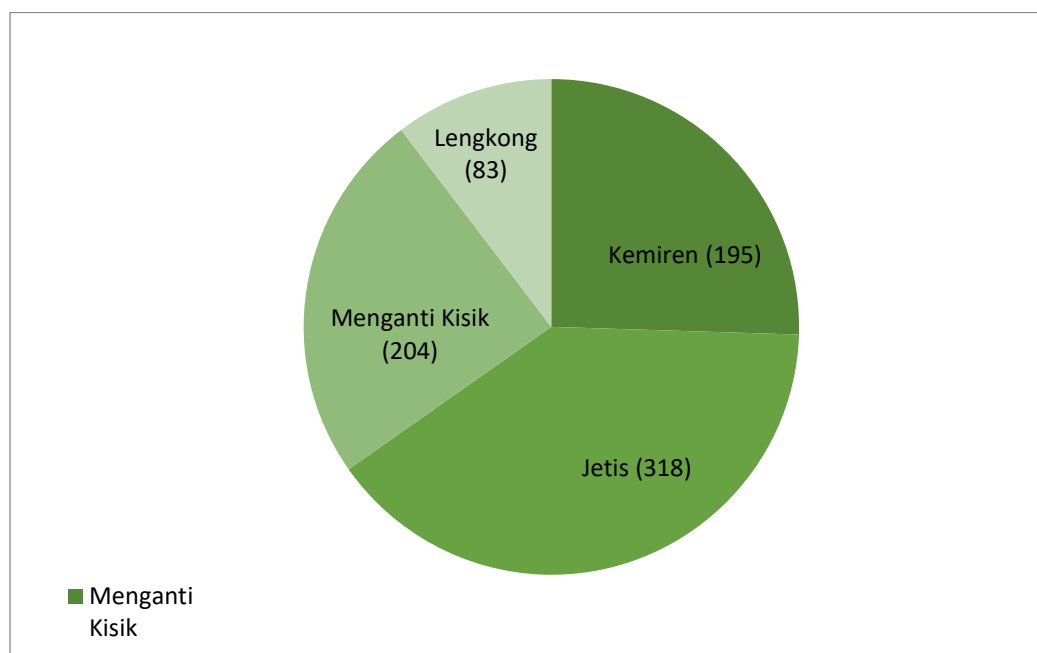*Source*: Central Bureau of Statistics, Cilacap Regency, 2019.

This study's object is small-scale fishers who use vessels with a size of less than 5 gross tons. This research population is the total number of fishers who fall into the category of small-scale fishers.

Figure 3. The number of ships using a size of less than five gross ton.



*Source*: Fisheries Department of Cilacap Regency, 2019.

Figure 3 shows the number of fishers with a boat size of less than five Grosston based on East Cilacap. It can be seen that fishers with a boat size of less than five Grosston in East Cilacap, totally are 800 boats. The sample size is 80 fishers.

Respondents in this research are fishers in East Cilacap. Based on the level of education, 52.5 percent of fisher who did not complete primary school education. The portrait respondents had already started fishing from 10 years old. About 48.75 percent of respondents were over 40 years old. The average income earned by fishers is Rp166,997 per trip, as only 46.52 percent of respondents participating in insurance programs prove to have a fishing insurance card.

The statistical tests carried out are the odds ratio and pseudo R Square. Measure the simultaneous influence of several independent variables on the dependent variable. In logistic regression, Pseudo R Square is known, which is the Pseudo R Square value, which means the same or identical to R Square on OLS. Pseudo R Square test used to see the ability of independent variables of income, fishing gear, number of trips, number of catches, skills, and gear together to take insurance from fishers in the regression equation to explain variations that occur in the dependent variable.

Table 2. Qualification test with Nagelkerke's R square

| Value of -2 Log-likelihood | Value of Cox & Snell R Square | Value of Nagelkerke R Square |
|---|---|---|
| 34.287 | .492 | .690 |

In table 2, Nagelkerke's $R^2$ value is 0.690. It means that the variability of the dependent variable can be explained by the variability of the independent variable of 69.0 percent.

Table 3. Qualification test with Hosmer and Lemeshow's goodness of fit test

| Value of Chi-square | Degree of Freedom (Df) | Significance |
|---|---|---|
| 2.623 | 8 | .955 |

Table 3, the statistical value of Hosmer and Lemeshow's Goodness of Fit is 2,623, with a significant probability of 0.955. This value is far above 0.05, so it can be concluded that the model can predict the value of observations.

Logistic Regression. From the primary data obtained, then data analysis is done using logistic regression analysis. This condition to see the relationship between dependent variables and independent variables. The following is the summary of the results of data analysis:

Table 4. Result Summary of Logistic Regression Analysis

| Independent Variables | Coefficient (B) | Std. Error | Z-Statistic | Prob. | Exp(B) |
|---|---|---|---|---|---|
| Income (LnX1) | 3.0138 | 1.490440 | 2.022106 | 0.0432 | 20.365 |
| Number of the trip (X2) | 0.3092 | 0.115429 | 2.679118 | 0.0074 | 1.362 |
| Amount of catch (X3) | 0.0104 | 0.005106 | 2.055319 | 0.0398 | 1.011 |
| Labor (X4) | 4.2335 | 1.327247 | 3.189735 | 0.0014 | 68.963 |
| Gear (X5) | -0.0014 | 0.002475 | -0.600443 | 0.5482 | .999 |
| Constant | -47.949 | 20.01513 | -2.395649 | 0.0166 | .000 |

Source: the result of the analysis data, 2020.

Based on the summary of the results of data analysis, the equation of logistic regression models can be formed as follows:

$$\ln(\frac{p}{1-p}) = -47.949 + 3.0138\ \text{lnincome} + 0.3092\ \text{trip} + 0.0104\ \text{catch} + 4.2335\ \text{labor} - 0.0014\text{gear}$$

Table 4 shows that the independent variable income is significant at probability 0.0432, the significant trip variable at probability 0.0074, significant catch variable at probability 0.0398, and significant labor variable at probability 0.0014 while the gear variable is not significant the significance value is 0.5482. From the logistic regression equation, it can be seen that the log of odds for fishers to be insured is positively related to income, trips, catch, and labor. Meanwhile, the log of odds for fishers to be insured is negatively related to gear.

Table 4 shows every increase in the value of one unit of income, while constant other variables will increase the log of odds of fishers for insurance by 3.0138. If income and other variables are considered constant, an increase in one unit's value on the trip will increase the log of odds for a fisher to be insured by

0.3092. Furthermore, if income and other variables are considered constant, the increase in the value of each one unit of the catch will increase the log of odds for fishers to be insured by 0.0104. Furthermore, if income and other variables are considered constant, the increase in the value of every one unit in labor will increase the log of odds for fishers for insurance by 4.2335. The gear variable is not significant because it is considered not to influence fishers' behavior to carry out insurance.

The explanation between the odds and the independent variable will be explained below. Odds can also be said that risk compares the probability of an event occurring with the probability that the event does not occur. The explanation of the coefficients in the regression model means that each increase in the independent variable units results in the risk of Y = 1 being exp (B) times higher.

The income variable has a positive and significant effect of 3.0138, which means that high-income fishers have a higher probability of carrying out business insurance. With an Exp (B) value of 20,365, the insurance carried out by fishers with a higher income is 20,365 times compared to fishers with low income. From the income side, it can be concluded that the fishers who carry out insurance are dominated by fishers with an income of > IDR166,000 per trip. The main reason fisher not to have insurance is that they do not have an electronic identity card (*E-KTP*). This study's result follows the objectives of the insurance program that is held insurance to reduce the risk of uncertainty in the fishing business so that it can maintain the sustainability of the fishing business, income security, and productivity assurance of fishers (Mumford *et al.* 2009), Suharno *et al.* (2018).

The variable number of trips has a positive and significant effect of 0.3092, which means that high-finned fishers have a higher probability of doing business insurance. With an Exp (B) value of 1,362, it means that the guarantee made by fishers with a higher number of trips is 1,362 times compared to fishers with short trips. In terms of the number of trips, it can be concluded that fishers dominate fishers who carry out insurance with trips> 20 per month. This research follows the result of Jabri *et al.* (2013) research: an increasing number of trips will affect the income of small scale fishers. Empirically, the research results are in line with the previous research conducted by Retnowati *et al.* (2017), which concluded that the number of trips significantly influences fisher's income. This research is also in line with researches by Dhian (2012), Halim *et al.* (2012), and Shaw (2016) that trip has a significant positive effect on fisher's insurance.

The variable amount of catch has a positive and significant effect of 0.0104, which means that fishers with dominant catch have a higher probability of carrying out business insurance. With an Exp (B) value of 1,011, it means that the guarantee made by fishers with a higher dominant catch is 1,011 times compared to fishers with a small catch. In terms of the number of catch, it can be concluded that fishers dominate fishers who carry out insurance with a total catch of> 477 kg per trip. This is also stated in the study of Jabri *et al.* (2013), that catch has a positive effect on small-scale fisher's income. This research is also in line with the results of research by Tenawut (2016). That number of catching has a significant and positive effect. Moreover, this research is consistent with Ridha (2017) research, which proved that the catch has a positive and significant effect on fishers' income. This research is also in line with the result of research conducted by Suroya *et al.* (2017), which catches affect income fisher. Ultimately, this research is also in line with the research conducted by Rahim (2011), Shaw (2016) that productivity has a positive effect on fisher's insurance.

The labor variable has a positive and significant effect of 4.2335, which means that fishers with training-labor criteria have a higher probability of doing business insurance. With an Exp (B) value of 68,963, it means that the guarantee carried out by fishers with higher labor-training is 68,963 times compared to non-labor-training fishers. In terms of the number of labor, it can be concluded that fishers dominate fishers who carry out insurance with only 21 workers. The finding research same as previous research by Romdhon (2016), who found that labor has a significant influence on fisher's income. The finding of the current study is not in line with the result of the previous study by Gaol (2015), Shaw (2016), which concluded that labor experience and fishing did not significantly influence fisher's insurance.

Fishing gear, this finding is different from the four previous variables. The gear variable does not have a significant effect on a negative sign on the choice of insurance. The fishers' condition is that traditional fishers dominate the use of gear coefficient, so they do not understand insurance's existence. The results not in line from research conducted by Jabri *et al.* (2013), Yulianto *et al.* (2021) also showed that the variables of fishing inputs/gear and catch positively affect small-scale fisher's income. This study's results are also not in line with the findings of previous studies conducted by Retnowati *et al.* (2017), Shaw (2016), which proved that the Fishing gear variable has a significant influence on fisher's insurance.

## Conclusion

Income, number of trips, catch, labor, and skills have a positive and significant effect on fishers' insurance options in the eastern Cilacap. From the income side, it can be concluded that fishers who carry out insurance are dominated by fishers with an income of > IDR166,000 per trip. From the trip, fishers dominated who carry out insurance with trips > 20 per month. From the catch, fishers dominated who carry out insurance with a catch of > 477 kg per trip. From the labor criteria, fishers not dominated, who carry out insurance with only 21 workers. This study recommends that local governments pay more attention to and monitor compliance and improve the skills of small-scale fishers in using fishing gear, the number of trips made, and the number of catches, all of which focus on increasing income. These four factors are the main key to the sustainability of fishers' insurance sustainably.
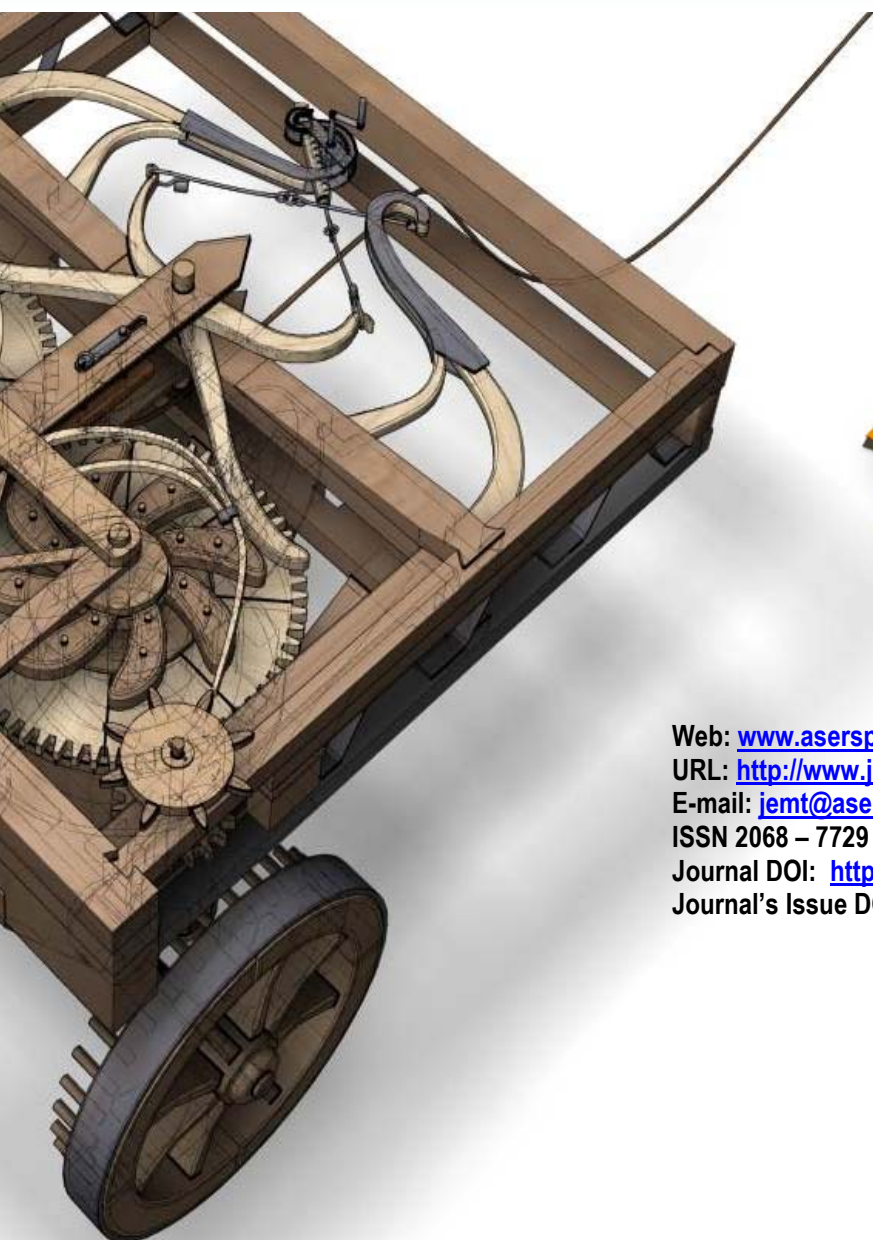
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