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# An Ethnozoological Study: Utilization of Sharks Fishermen's Community of Brondong Village, Lamongan Regency

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**ABSTRACT** The problems studied focus on the influence of ethnozoological knowledge and family economic Status on the use of endangered sharks by the people of Brondong village. The Data were taken in the form of (1) ethnozoological knowledge of the community, (2) Family economic status, (3) Attitudes, and (4) Shark utilization behavior. Data collection is done by survey method with the help of questionnaire, structured interview, and direct observation. Path - analysis is performed to determine the relationship of the proposed variables. Not only that, the relationship of variables can also be explained by descriptive analysis. The results showed that the Brondong ethnic community still adheres to Airlangga and Majapahit culture by maximizing fishing activities, one of which is the behavior of shark utilization for sale and consumption. While the results of Block 1 path analysis showed a significant influence of ethnozoological knowledge on attitudes, amounting to 0.446. While the results of Block 2 showed the influence of attitudes towards shark utilization behavior, had a significant path coefficient of 0.253. It is concluded that ethnozoological knowledge affects indirectly the utilization of shark behavior by passing attitude.

**Keywords:** Brondong; etnozoologi; path- analysis; shark

## INTRODUCTION

The existence of sharks plays a role as top predators in maintaining and regulating the balance of marine ecosystems, if sharks become extinct, the balance of marine ecosystems will be disturbed (Maulina, 2020). Overfishing by fishermen can affect the number of shark populations, leading to extinction. The cause of sharks vulnerable to extinction due to slow growth time, gonad maturity period quite long, as well as the amount of low fecundity (Salinas-de-León *et al.,* 2017). So that overfishing can lead to a high population decline (Hanifa *et al.,* 2019). Therefore, since 2000 International Union for Conservation of Nature (IUCN) categorizing sharks into the red list protected by law (Easteria *et al.,* 2018). One of the countries that regulate shark fishing is Indonesia (Hardiningsih *et al.,* 2018).

The form of regulation that has been enacted is Government Regulation No. 59 of 2014 regarding the expenditure sharks of Cowboy sharks, thresher sharks, and hammerhead shark from Indonesia to outside the country, as well as the decree of the Minister of Maritime Affairs and Fisheries No.18 of 2013 on the full protection of whale sharks. Although regulations have been enforced, Indonesia remains the top ranking shark fishing (Jaiteh *et al.,* 2017). This indicates that the Indonesian government needs to take further action on the issue of shark exploitation, as well as take various preventive measures.

The Indonesian government's efforts to prevent shark exploitation are not easy, because it has become the main source of livelihood for fishing communities that depend on shark catches. Viewed from the side of culture that is inherited from generation to generation (Husain *et al.,* 2017), people catch and use Sharks to be consumed into processed fish soup which is useful as a drug in dealing with anti-angiogenesis helps prevent tumors and cancer cells (Hardoko, 2002; Yusrina *et al.,* 2019). While economically, fisherman still chose to catch sharks because all parts of sharks have a higher economic value, exported mainly on the fins are in great demand in recent years (Mopay *et al.,* 2021).

Based on observations at one of the Nusantara fishing ports (PPN Brondong) in Brondong village, Brondong district, Lamongan regency, it was found that sharks were caught and traded. This is in line with the news about shark fishing in Brondong fishing ports b (Ahmad, 2017; Karuru & Cahyadi, 2016) and is a port where 30% of the catch is in the form of endangered sharks (*Sphyrna lewini, Stegostoma tigrinum, paragaleus tengi, Scoliodon laticaudus*) (Harlyan *et al.,* 2021). This arrest was made because of the behavioral factors of shark exploitation by the people of Brondong.

The behavior of the Brondong community in utilizing sharks is manifested in the form of real actions, such as: trading in meat and processed products from sharks (dried fish fins for consumption, liver and fish offal used as oil, and fish skin used as chips or raw materials for making accessories). Data on the number of shark catches in Brondong are 3061 scallop hammerhead, and 835 Blacktip sharks (Fuad *et al.,* 2015). Optimum utilization behavior of shark products occurs in areas that have high trade access and become the center of the economy, it can support the economy of people who use Sharks (Fahmi & Dharmadi, 2013). A very tempting opportunity to make Brondong community unwise in addressing the use of sharks go towards exploitation. The behavior of the community has a relation (direct or indirect) with the results of perception, based on the results of consideration of an object, or what can dibe called an attitude (Riduwan & Kuncoro, 2012).

Attitude can control a person's behavior in catching and

utilizing sharks, which is useful as a determinant in acting or responding to factors from outside. Attitude can also be a belief that translates into action on the desired object (Palupi & Sawitri, 2017), because the behavior must be influenced by the attitude by wearing the background of each individual. This is in line with the opinion of Setyawan *et al.,* (2015), a person's perception of looking at their environment will be determined according to their needs. These needs lead to use of sharks to sufficient the economic needs of families.

The family economy can be characterized by the existence of financial capabilities and material equipment that can support the needs of life. Family economy is closely related to the status of the work being done and will affect the way of thinking and acting in the utilization of something. Family economic Status will affect a person in social life (work), attitudes and behavior of a person (Indrawati, 2015) the use of sharks to meet the economic needs of fishermen is one of negative action that plunges sharks into extinction. This unwise attitude is a result of the lack of knowledge of fishermen about the importance of sharks in marine ecosystems (Damsy *et al.,* 2014). Therefore, the level of knowledge about sharks can also be considered by someone in addressing the use of sharks.

Knowledge can change a person's perspective in addressing a problem. People's attitudes toward sharks depend on what they know (Damsy *et al.,* 2014). If the knowledge of fishermen about the importance of sharks in nature is low, then in addressing the problem of sharks must be low as well. The statement shows that knowledge is very important for a person to have before acting. Community knowledge is identical to the educational background pursued, both formal and non-formal (Dharmawati & Wiraya, 2016). The educational process requires learning resources to help the process of transferring knowledge, and make it easier for teachers and students to achieve learning goals (Winarti *et al.,* 2018).

Research based on Shark Ethnozoology has not been done much, especially regarding catches in Brondong village. Previous research in line with Ethnozoology, has been conducted by Setyawan *et al.,* (2015), discusses the hereditary habits- of the Hadiwaarno people who still use step Turtle animals by reviewing the relationship of Utilization with knowledge, educational background, economy, and community attitudes, as well as research Audina *et al.,* (2015) which discusses the ethnozoology of the Geni Langit community in utilizing animals around, in the context of cultural treatment for generations. The latest research by Prihandini & Umami, (2021), namely looking for the background of the Kuningan people in interpreting the horse as an icon of the Kuningan city.

The novelty of the previous study was that the animal object of research was different from the previous study, namely Sharks, the variables used were more specific describing the situation that developed in the community regarding community relations in the use of sharks in Brondong, as well as the coverage of specific research areas in one village, by offering solutions to stakeholders on the problem of shark exploitation, especially in the village of Brondong. The advantages of this study is to use path analysis, so it can be seen that a variable directly or indirectly relation to the utilization of sharks.

## METHODS

The approach of this study was done in a descriptive quantitative using surveys that are processed into numerical data. This type of research uses correlational-causal analysis using two analytical techniques, namely: Descriptive analysis that aims to describe the studied causal relationship and path analysis is a technique that talks about the pattern of causal relationships, it is known that the variable Eksogenous and endogenous variables (Sarwono, 2011).

The population in this study is the number of Heads of families (KK) Brondong, who work as fisherman a number of 1,681 KK. The sampling technique used Random Sampling. the number of samples used Taro Yamane calculation as much as 94.38 rounded to 95 KK.The study was carried out in Brondong village settlement and Nusantara Fishery Port (PPN) Brondong village, Brondong district, Lamongan Regency Fig. 1, with the help of instruments.

The instruments were organized based on the proposed variables, namely: Ethnozoological knowledge, economic status, attitudes and behaviors. Preparation of instruments to measure ethnozoological knowledge by making inquiries with empirical indicators C1 (knowing), C2 (understanding), and C3 (applying). The instrument that measures the economic status of the family is determined by the possession of valuables to know the economic class index of the family. The instrument that measures attitudes is prepared with the parameters of cognition, affection and conation assessment. The instrument to measure behavior is direct observation and interview related to Shark utilization behavior by stating a positive or negative behavior. Instruments are developed by formulating logical validity and assigning weighting values to measurement scales.

The data collection process begins with the preparation and observation of the place (place orientation), to know directly the source of the data studied, both culturally, socially and environmentally. Second, the data retrieval step was carried out by structured interviews (questions from instruments that measure ethnozoological knowledge, measure attitudes and measure behavior), direct observation (especially on community behavior variables) and providing status family economic status instruments to respondents.

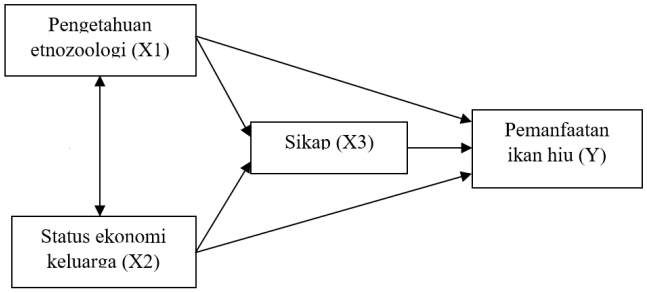


Figure 1. Model of the path analysis

Data analysis using 2 ways, namely; 1) Data description, revealing data variables ethnozoological knowledge, family economic status, attitudes, and behavior of the people of Brondong village processed by descriptive statistical techniques, in the form of frequency tables and graphs. 2) Causal correlational relationship test using path analysis by making a path diagram of the relationship between variables and continued by determining the model into 2 blocks, model of the path analysis can be seen in the Figure 1.

Before performing the path analysis, it is necessary to perform an assumption test, carried out with the help of the SPSS for Windows version 25 program.

## RESULTS AND DISCUSSION

### *Descriptive analysis results*

The people of Brondong village adhere to the ethnicity (Mataram) which was previously occupied by the Airlangga and Majapahit Kingdoms. During the Majapahit empire, the economy of the people of Brondong had a job engaged in fisheries and trade (Husain *et al.*, 2017). So much cultural heritage passed down by their ancestors on fisheries and trade. Some people still embrace that culture. Cultures that are still preserved such as alms of the sea or famous for picking the sea (*Petik laut*). This tradition is done as a form of gratitude and gratitude to the sea community, which has provided them with safety and abundant catches, as long as they sail. Therefore, this Petik Laut activity is commemorated at the end of the sailing season. It is the *Baratan* (the season when the strong winds blow from the West) (Pratiwi, 2014). In addition, there are beliefs circulating in the community about the myth of shark fishing. Shark fishing is believed to bring various bad luck and bring danger. Some people also believe, that small children who often eat shark fins can make them more intelligent.

### *Path analysis results*

Prerequisite test showed that there was no shift between variables in the path analysis framework, then it can be continued by looking for relationships between exogenous variables only.

### *Relationship between exogenous variables*

The contents of Block 1, containing ethnozoological knowledge (X1) and family economic status (X2) to attitude (X3), are found in the calculation coefficients table which is provided in the following table:

Then the diagram has a pattern of causal relationships as in Figure 2.

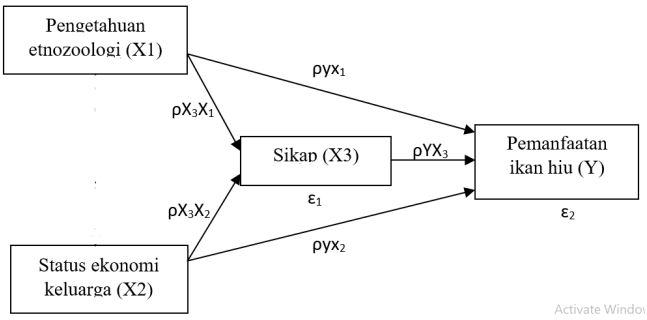


Figure 2. Reconstruct model of the path analysis.

### *Test block 1*

The contents of Block 1, namely ethnozoological knowledge (X1) and family economic status (X2) to attitude (X3), are found in the calculation coefficients table which is provided in the following table:

Table 1. Matrix correlation (X1) with (X2).

| | | ethnozoological knowledge (X1) | family economic status (X2) |
|---|---|---|---|
| Ethnozoological knowledge (X1) | Pearson Correlation | 1 | 0.183 |
| | Sig. (2-tailed) | | 0.076 |
| | N | 95 | 95 |
| Family economic status (X2) | Pearson Correlation | 0.183 | 1 |
| | Sig. (2-tailed) | 0.076 | |
| | N | 95 | 95 |

Table 2. Coefficients of individual calculations X1 and X2 to X3.

| Blok[a] | | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | | | |
| 1 | (Constant) | 87.027 | 4.319 | | 20.148 | 0.000 |
| | ethnozoological knowledge (X1) | 1.133 | 0.239 | 0.446 | 4.739 | 0.000 |
| | family economic status (X2) | 0.002 | 0.004 | 0.062 | .660 | 0.511 |

a. Dependent Variable: Attitude (X3).

The effect of ethnozoological knowledge (X1) on attitude (X3) has a path coefficient of ρ3x1 = 0.446, in the sig column. obtained value of 0.000. the value of 0.000 is smaller than the probability value of 0.05 (0.000 < 0.05), then Ho is rejected and Ha is accepted. This means that the path - analysis coefficient is significant. So ethnozoological knowledge has a significant effect on attitudes.

Different from the economic Status in society. The effect of family economic status (X2) on attitude (X3) has a coefficient value ρ3x2 = 0.062, in the sig. column obtained a value of 0.511. the value of 0.511 is greater than the probability value of 0.05 (0.511 < 0.05), then Ho is accepted and Ha is rejected. The path-analysis coefficient is not significant, So the economic status of the family does not significantly affect the attitude. In each test block there is a residual value, that is, by looking at the value of $R_{square}$ can be seen in the model summary block – 1. To find the value of ρx3ε1 (Residual variable) is determined by the following formula:

$$\rho X_3\varepsilon_1 = 1 - R_{square}$$

If depicted in the structural framework can be seen as in the Figure 3.

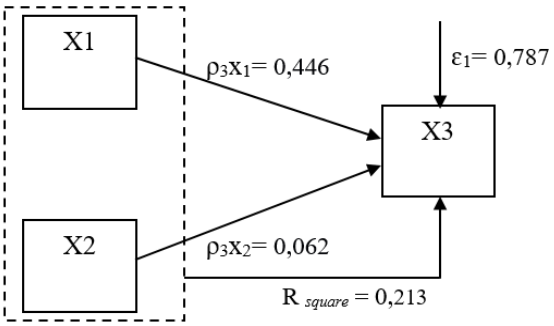


Figure 3. Block- 1 framework.

*Test block 2*

Individual tests were conducted between ethnozoological knowledge (X1), family economic status (X3) and attitude (X3) to the utilize of sharks (Y), it is found in the table coefficients calculations are in the following table:

The effect of ethnozoological knowledge (X1) on the Behavior utilize of sharks (Y) has a path coefficient value of ρyx1 = 0.159, in the Sig. column obtained a value of 0.163. the value of 0.163 is greater than the probability value of 0.05 (0.05< 0.163), then Ho is accepted and Ha is rejected. The path-analysis coefficient is not significant. So ethnozoological knowledge (X1) does not significantly affect the utilization of sharks (Y). while in the family economic status (X2), the influence of family economic status (X2) on the utilization of sharks (Y) has a value of the path coefficients ρyx2 = 0.194, in Sig. column obtained a value of 0.059. the value of 0.059 is greater than the probability value of 0.05 (0.05< 0.059), then Ho is accepted and Ha is rejected. The path-analysis coefficient is not significant, So the economic status of the family (X2) does not significantly affect the utilization of sharks (Y). then tested attitude (X3). The effect of attitude (X3) on Shark utilization behavior (Y) has a path coefficient of pyx3 = 0.253, in Sig. column obtained value of 0.027. the value of 0.027 is smaller than the probability value of 0.05 (0.027 < 0.05), then Ho is rejected and Ha is accepted. This means that the path - analysis coefficient is significant. So, attitude (X3) has a significant effect on Shark utilization behavior (Y). Finally, to find the residual value, the value of $R_{square}$ can be seen in the Model summary table. To find the value of ρyε2 (Residual variable) is determined by the following formula:

$$\rho_y\varepsilon_2 = 1 - R_{square}$$

If depicted in the structural framework can be seen as in the Figure 4.

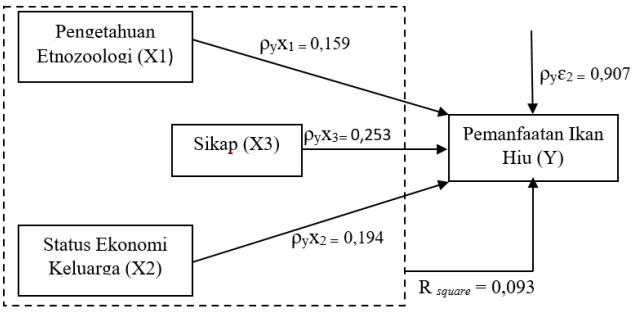


Figure 4. Block- 2 framework.

*Discussion of block 1*

Based on the results of research that has been obtained, there is a direct influence of ethnozoological knowledge (X1) significantly on attitudes (X3). While the economic status of the family (X2) does not significantly affect the attitude (X3). This is in accordance with the conditions that develop in society. Fishing communities have a high-

Table 3. Coefficients of individual calculations X1, X2 and X3 to Y.

| Blok [a] | | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | | | |
| 2 | (Constant) | 66.197 | 6.115 | | 10.826 | 0.000 |
| | ethnozoological knowledge (X1) | 0.229 | 0.162 | 0.159 | 1.408 | 0.163 |
| | family economic status (X2) | 0.004 | 0.002 | 0.194 | 1.911 | 0.059 |
| | Attitude (X3) | 0.143 | 0.063 | 0.253 | 2.252 | 0.027 |

a. Dependent Variable: Behaviour (Y).

er standard of living. According to data from the Ministry of Maritime Affairs and Fisheries, (2018) the prosperity of the people of Brondong village is helped by the existence of a Fish Auction Center at the Nusantara fisheries port (PPN). So that the economic status of society has little influence on attitudes. However, the economic status yang of a prosperous family still has a small effect on the basis of community attitudes by 0.062, although not significant. So that only ethnozoological knowledge variables (X1) that can affect the attitude (X3) significantly amounting to 0.446.

Ethnozoological knowledge variable (X1) became the main influence of attitude variable (X3) in this study. According to frequency data, the highest score is 19 out of 30 with a frequency of 13 respondents. While the lowest value of 7 out of 30 with a frequency of 1 respondent and the highest value of 24 out of 30 with a frequency of 1 respondent. The results show that public knowledge about sharks in the lower middle limit, seen from the minimum value of 24 out of 30 with a frequency of 1 and the results of categorization (if the value of 30 = 100% then the value of 17.02 = 56.73% is). Then the attitude of the community about sharks is determined by the size of a person's knowledge of sharks. Because the attitude is determined by the low level of knowledge in looking at an object (Setyawan *et al.*, 2015). In The Block-1 test, explaining ethnozoological knowledge is directly proportional to the value of people's attitudes. If people's ethnozoological knowledge of sharks is low, then the attitude shown is not wise in addressing the problem of sharks.

### *Discussion of block 2*

Block-2 test results obtained, the attitude variable (X3) which significantly affect the utilization of sharks (Y). While ethnozoological knowledge (X1) and family economic status (X2) significantly affect the Behavior utilize of sharks (Y). This means that attitude (X3) has the greatest coefficient value of 0.253 than ethnozoological knowledge (X1) and family economic status (X2). Because attitude is a form of consideration that is done before doing something. Attitude as a positive and negative predictor of a person's consideration of the problems faced (Zuchdi, 1995). In contrast to the knowledge of ethnozoology, which affects the utilization of sharks directly by 0.159. This means that people use sharks not because they do not know, they already know but still use Sharks only in paling the smallest strength of 0.159. Therefore, the direction of the greatest influence on knowledge must pass through attitude first (Indirectly). While the utilization of sharks that are influenced by the economic status of the family is 0.194 and has the greatest influence number 2 because the community Brondong is more prosperous popcorn, because of the popcorn VAT, so the effect is not significant only 0.194 direct effect. Significant influence on the utilization of shark fish is the attitude of 0.253.

### *Integration of block - 1 and block - 2 structural frameworks*

After testing the two blocks, it is known the magnitude of the coefficient value each path. Researchers need to reunite the structural framework as before. The result of combining blocks can be seen in the Figure 5.

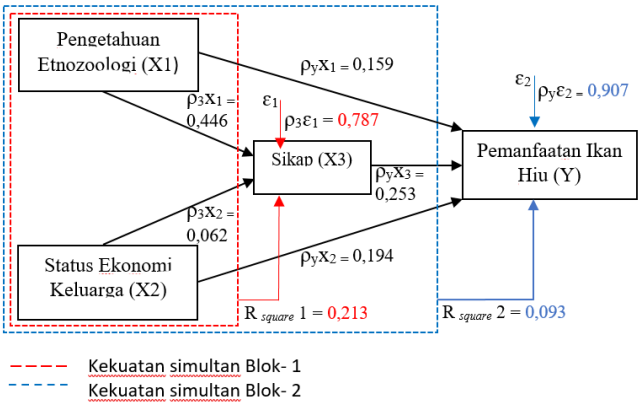


Figure 5. Integrating Block- 1 and Block- 2.

According to the results of Block-2, in considering a problem before acting, there must be predictors that require decisions in taking attitudes, then according to the results of Block - 1, attitudes are most influenced by knowledge of a problem. So that the three variables are directly proportional in the problem ikan of shark exploitation. If people's ethnozoological knowledge of sharks is low. So, the attitude shown is less wise (low). If the attitude of society regarding sharks is low, so the excessive use of sharks is still done. The relationship of these 3 variables can be described in a simple structural framework such as Figure 6.

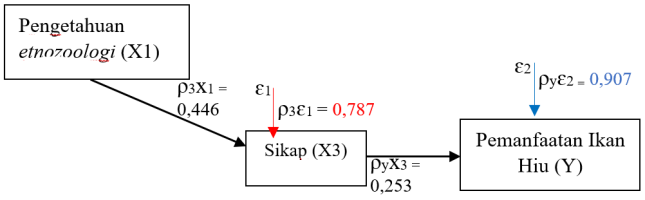


Figure 6. The significant framework of path- analysis.

Solutions offered to stakeholders in the village of Brondong, in the problem of exploitation of protected sharks. Therefore, it is necessary to improve the attitude of the Brondong community, by providing education or knowledge about the ethnozoology of the community against Sharks.

## CONCLUSIONS AND RECOMMENDATION

### *Conclusion*

There is no direct relationship between ethnozoological knowledge of the Brondong village community and the economic status of the Brondong village.There is a significant relationship (direct) ethnozoological knowledge of the people of Brondong village to the attitude of the people of Brondong village of 0.446.There is no significant relationship status between the economic status of the family of the people of Brondong village to the attitude of the people of Brondong village. amounted to 0.062. There is no significant relationship between ethnozoological knowledge of the people of Brondong village to the Behavior utilize of sharks by the people of Brondong village of 0.159. There is no significant relationship be-

tween the economic status of the family of the people of Brondong village to the use of sharks by the people of Brondong village of 0.194. There is a significant relationship between the attitude of the people of Brondong village to the use of sharks by the people of Brondong village of 0.253.

*Recommendation*

It is necessary to experiment using new variables, which are expected to affect the utilization of sharks, because based on the residual coefficient value (1 and 2) has a large value in a row (0.787 & 0.907) if used as a percentage of strength in a- row (61.9% & 82.2%). The value cannot be explained by this study.

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## AUTHORS' CONTRIBUTIONS

DS is doing research and ideas; SAF nad SH is doing data generation; FHP is written manuscript and data analyze; WP is doing manuscript preparation and written manuscript.

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