The correlation between daily fisherman’s demographics and their catching behaviors in Tegal, Indonesia

Nizar Aulia Alharizmi¹, Fauzan Romadlon², Achmad Zaki Yamani³
1,2,3 Industrial Engineering Department, Institut Teknologi Telkom Purwokerto, Indonesia

ABSTRACT

The majority of people in Tegal City work as daily fishermen. However, in the handling process, there are incompatibilities between fish caught quality and wholesaler standards. The causes are lack of experience, knowledge and less training about fish handling. Therefore, it needs to find the correlation between fisherman’s socio-economic (demographic) and their catching behavior. This study uses quantitative methods. The collected data were statistically tested using ANOVA. The results showed income factor has significant correlation with poor fishing technique and fish slime. Departure time has significant correlation with poor fishing technique and wet ice handling. Fish damage percentage has significant correlation with stock of cooling media and fish quality decline. Thise factor is due to the lack of daily fishing capital and catching knowledge. Therefore, it needs cooperation from various parties to facilitate daily fishermen to gain optimal yields.

Keywords:
Behavior
Catching Fish
Demographics
Fishermen
Tegal

1. INTRODUCTION

Most of the people of Tegal City work in the fishery sector (Sudarmo et al., 2016). These marine products have the nature of commodities that are easily damaged, so it is necessary to pay attention to how to catch and handle them (Nugroho et al., 2016). Improper handling of post-catch fish will result in defects and accelerate the declining quality. One of the factors is the lack of knowledge of post-catch fish handling (Litaay et al., 2020). Fish caught using vessels that are incomplete in storage facilities will experience a decrease in quality before the fish reaches the mainland by around 20-30% (Deni, 2015).

Low-quality fish can be seen in the eyes of the fish being cloudy, the eyes of the fish are not bright red, and the gills of the fish are not fresh (Naiu et al., 2018). Meanwhile, quality fish has the characteristics of more chewy meat, the meat is not separated from the bones, the eyes are brighter, and the fish does not smell bad (Naiu et al., 2018).

One of the main activities of fish handling on the sea is storage in styrofoam boxes in lower temperatures (Pandit, 2017). In addition, post-catch fish handling activities on board can affect the income and quality of fish caught (A’yun, 2017). The low income and fish quality are due to fishermen’s low level of experience and knowledge (Wiyono & Mustaruddin, 2016). The problem also happened to daily fishermen in Tegal City. Furthermore, catching behavior is one of the cause of low quality of
caught fish. Behavior is an activity that begins with the process of inputting information from each individual (Jahi et al., 2011). Personal behavior is the result from learning process. In the case of daily fishermen, the lack of catches and improper handling indicates the required additional information to improve the quality and quantity of yields. Thus, the behavior of fishermen in fishing activities can be used as an entry point to develop a learning process.

Departure hours for daily fishermen in Tegal City are carried out from morning to evening, with uncertain departure times such as from 05.00-12.00 WIB, 04.00-13.00 WIB, 04.00-16.00 WIB. It depends on the readiness of the fishermen who will sail. The number of daily fishing members per boat is about 1-3 people.

Daily fishermen still have limitations such as working time, type of boat, equipment used, and skills (Rimawati, 2019). Based on this description, a study is needed to determine the effect of daily fishermen's socio-economic (demographic) on catching behavior. Daily fishermen mean fishermen who have simple equipment but have relatively more trips. The correlation between the socio-economic and behavior will give an insight to daily fishermen to improve their performance. Good performance will increase income and maintain the quality of the catch. The study area is this study focuses on daily fishermen, who are the majority in Tegal City.

2. RESEARCH METHOD

The research was conducted in Tegal city. The method used is quantitative. The number of respondents were 104. The collected data included demographic data and daily fishermen behavior. Demographic data stated age of fishermen, the number of damaged fish, income, fishing capacity, and the cost of departure. Furthermore, the behavioral attributes of fishermen were summarized in Table 1.

| Behavior (Pianusa et al., 2015) | Code | Description |
|--------------------------------|------|-------------|
| Handling                        | P1   | The storage area above is too small |
|                                | P2   | Using an inappropriate cooling medium |
|                                | P3   | Fish storage time |
|                                | P4   | Tools used to catch fish |
| Catching method (Prabowo et al., 2019) | P5   | The length of time of fishing affects the quality of the fish |
|                                | P6   | Weather factors affect the number of catches |
|                                | P7   | The capacity of the boat affects the number of catches |
| Storage (Alhuda et al., 2016)   | P9   | Storage media using hatch |
|                                | P10  | The estimation of the cooling media stock is not accurate |
| Factors Causing Fish Quality (Palawe et al., 2017) | P11  | Poor fishing technique |
|                                | P12  | Poor post-catch fish storage techniques |
|                                | P13  | There are a lot of declining quality of fish |
| Physical Damage (Lestari et al., 2015) | P14  | Un-fresh fish eye |
|                                | P15  | Fish gills |
|                                | P16  | Slime on fish’s body surface |
|                                | P17  | Fish flesh with a paler color |
| Cooling Media (Mboto et al., 2015) | P18  | Handling uses wet ice |
|                                | P19  | Handling uses dry ice |
|                                | P20  | Handling uses cold water |
|                                | P21  | Handling uses ice and salt |
|                                | P22  | Handling uses sea water ice |
The correlation between daily fisherman’s demographics and their catching behaviors in Tegal, Indonesia (Nizar Aulia Alharizmi, et al)

Based on Table 1, the handling aspects include P1, P2, P3, and P4 on fish handling techniques on board to maintain the quality of the catch up to the TPI. In the aspect of fishing methods, including P5, P6, and P7, where daily fishermen still use traditional equipment to catch fish, determining where to catch fish is still using instinct and the capacity of the boat is limited or the size of the boat is relatively small. The storage aspect covered by codes P9 and P10 focuses on fish storage media and media estimates to maintain the quality of the above fish. Furthermore, aspects of the factors that cause fish quality consist of P11, P12, and P13 where there is a decrease in fish quality at TPI, caused by poor fishing, storage, and handling of fish. In the aspect of physical damage including P14, P15, P16, and P17 focused on damage that often occurs in the physical part of the fish, resulting in a decrease in the quality of the catch. Furthermore, the cooling media aspect is included in the codes P18, P19, P20, P21, and P22 where the cooling media used by daily fishermen varies.

The measurement of fishermen’s behavior used a Likert scale with a value range of one to five, where one means strongly disagree and five means strongly agree. Then, collected data will be tested normality, validity, and reliability. ANOVA was conducted to test the hypothesis using Minitab 19 software. The hypothesis as follows,

H1: The demographics of fishermen affect the behavior of daily fishermen in Tegal City.

3. RESULTS AND DISCUSSIONS

3.1 Respondent Demographics

The demographics of fishermen can be seen in Figure 1. Figure 1(a) shows the most age of daily fishermen are more than 45 years old with a percentage of 77%. Figure 1(b) shows the amount of damage fish when arrives at wholesaler. The majority is less than 1 kg (53%) and the rest is more than 1 kg. Figure 1(c) depicts the daily income of fishermen. The majority is between IDR 150000-25000 per day (65%). Furthermore, Figure 1(d) presents the fishing cost and the majority is around less than IDR 100000. The last figure is catching capacity and the majority of daily fishermen catch around 4-8 kg per day (97%) (Figure 1(d)).

![Fisherman’s Age](a)
![Broken Fish](b)
![Income Type](c)
![Total Depature Fee](d)
![Fishing Capacity](e)

Figure 1. Demographics of daily fishermen in Tegal City

3.2 Validity, Reliability, and Normality Test Results
Validity test, reliability test, normality test was used to test the feasibility of the data before testing to ANOVA. The results of the validity, reliability, and normality tests can be seen in Table 2.

| Code | Validity (p-value) | Code | Validity (p-value) | Cronbach's Alpha | Kolmogorov Smirnov (p-value) |
|------|--------------------|------|--------------------|------------------|-----------------------------|
| P1   | 0.000              | P12  | 0.000              |                  | 0.7197                      | 0.221                       |
| P2   | 0.000              | P13  | 0.000              |                  |                             |                             |
| P3   | 0.000              | P14  | 0.000              |                  |                             |                             |
| P4   | 0.000              | P15  | 0.000              |                  |                             |                             |
| P5   | 0.000              | P16  | 0.001              |                  |                             |                             |
| P6   | 0.100              | P17  | 0.000              |                  |                             |                             |
| P7   | 0.01               | P18  | 0.003              |                  |                             |                             |
| P8   | 0.599              | P19  | 0.007              |                  |                             |                             |
| P9   | 0.000              | P20  | 0.000              |                  |                             |                             |
| P10  | 0.000              | P21  | 0.000              |                  |                             |                             |
| P11  | 0.000              | P22  | 0.000              |                  |                             |                             |

Based on Table 2, the results of the validity test show that all data are valid except for P8. P8 is invalid because the p-value is greater than 0.05. Therefore, P8 is not included in the following testing stage. In the reliability test, the Cronbach’s Alpha value is shown 0.7197. It means the data is declared reliable because the value of Cronbach’s Alpha greater than 0.70. In the normality test, the p-value was 0.221. It shows data is normally distributed because the p-value is greater than 0.05.

### 3.3 ANOVA Test Results

After testing the validity, reliability, and normality, the data was tested by ANOVA. The results is shown in Table 3.

| Factor              | Response | P-Value |
|---------------------|----------|---------|
| Income              | P11      | 0.005   |
| Income              | P16      | 0.049   |
| Departure time      | P11      | 0.026   |
| Departure time      | P18      | 0.009   |
| Percentage of fish damaged | P10     | 0.020   |
| Percentage of fish damaged | P13     | 0.033   |

There are two significant responses for income factor (P11 and P16). In response P11 or fishing techniques that are not good effect the income level of the fishermen. It means the low quality of fish catches affect the daily income of fishermen.

In response to P16 or damage to the mucus on the surface of the fish’s body affects income. Whereas, the parameter of fish freshness is fish slime (Manggaprouw et al., 2019). It can occur due to a lack of ice cube stock estimation, the length of time the fish is in the box, or too dense storage. Therefore, it needs a innovative handling maintain quality of the fish caught (A’yun, 2017) and if the quality of fish caught is appropriate it will affect to fishermen income (Ridha, 2017).

In response to P11, it shows that inappropriate fishing techniques are influenced by fishermen’s departure time. This shows the importance of understanding the exact departure time when catching fish (Aryanto & Sudarti, 2017). In fact, catching fish on shore for longer periods and over longer distances allows for more yields when the season is favorable. This is due to seasonal factors affect catches, unstable fish prices, and decrease fishermen’s income. Whereas, big advantage for fishermen is to gain more good-quality catches (Alhuda et al., 2016).

Departure time factor affects handling using ice for caught fish (P18). It means the incorrect departure time affects fishing techniques. It needs to determine the exact departure time and find the
appropriate way to catch fish. Furthermore, by using a lot of wet ice results in space limitation and it
will reduce the caught fish space. Therefore, there will be less fish that can be caught and loaded on
board even though temperature is one of the factors that can affect the rapid decline in fish quality
(Syafitri et al., 2016). Fishermen who are less effective in handling fish can determine the level of
freshness before the fish arrives to port. This condition causes fishermen’s catches to be less than
optimal (Deni, 2015).

The percentage of damaged fish significantly affected the responses of P10 and P13. The damage
is influenced by the fisherman’s inaccurate estimation of the stock of cooling media (P10). Cooling
media such as ice cubes can maintain the freshness of fish if the amount is sufficient (Nugroho
et al., 2017). This is because the use of ice is one of the easiest and cheapest ways. Furthermore,
the factor of the percentage of damaged fish significantly affects the number of decreased fish quality (P13).
It means an inappropriate place for fish is one factor that decreases fish quality; for example, fish are
placed at high temperatures, exposed to direct sunlight, and in dirty places (Sri et al., 2021).

A significant decrease in fish quality will cause a lot of fish to be damaged. The decline in fish
quality is usually caused by improper post-catch fish handling, such as lack of ice cubes, lack of fishing
techniques, and improper handling. Those practices cause to the caught fish injuries. Therefore, it
needs to conduct appropriate fish handling to maintain the quality (Syafitri et al., 2016).

The daily behavior of fishermen is influenced by income, time of departure, and the percentage
of damaged fish. This is due to the lack of daily fishing capital and the lack of information as additional
knowledge to improve the quality and quantity of catches. Therefore, cooperation from various parties
is needed to facilitate daily fishermen to compete economically. Daily fishermen with maximum effort
and supported but limited knowledge, they tend to gain less optimal yields (Jahi et al., 2011).

4. CONCLUSION
This research was conducted to determine the relationship between daily fishermen’s demographics
and fishermen’s behavior in Tegal City. Demographics influencing fishermen’s behavior include
income, time of departure, and the percentage of damaged fish. The income factor affects the response
of poor fishing techniques and the appearance of mucus due to poor storage. Departure time affects
fishing techniques that are not good, such as weather factors and the use of wet ice, which melts faster.
Furthermore, the percentage of damaged fish affects the quality of the fish when it arrives at port and
the estimation of the cooling media stock is not accurate. The approach taken is the collaboration of
various parties to assist daily fishermen with capital and provide additional knowledge related to
fishing methods and good fish handling. It aims to increase the capacity and quality of fish caught.

Future research can be done by focusing on fish handling with the unsold one. The handling
the unsold fish by adding value and it can be additional fishermen income. Moreover, it is a need for
research on media information type that is suitable for fishermen. The media can be a learning sources
for them to catch based on fish standard quality.

ACKNOWLEDGEMENTS
This acknowledgment is given to fishermen, especially daily fishermen in Tegal City who have been
willing to fill out a questionnaire and LPPM IT Telkom Purwokerto as a publication funds provider.

REFERENCES
Ayun, Q. (2017). Evaluasi Tingkat Kualitas Hidup bagi Permukiman Nelayan di Desa Pesisir Tambak Wedi dengan
Kriteria Eco-Settlement. EMARA: Indonesian Journal of Architecture, 2(2), 69.
https://doi.org/10.29080/ema.2012.24
Alhuda, S., Amna, Z., & Rustikawati, I. (2016). Analisis Produktivitas dan Kinerja Usaha Nelayan Paste Seine di
Pelabuhan Perikanan Pantai Lempasing, Bantar Lampung. VII(1).
Aryanto, D. A., & Sudarti, S. (2017). Analisis Faktor-Faktor yang Mempengaruhi Pendapatan Buruh Nelayan di
Pantai Sendanghiru Desa Tambakrejo Kabupaten Malang. Jurnal Ilmu Ekonomi JFE, 1(1), 16–29.
Deni, S. (2011). Karakteristik Mutu Ikan Selama Penanganan Pada Kapal KM. Cakalang. Jurnal Ilmiah Agrbisnis
dan Perikanan, 8(2), 72–80.

The correlation between daily fisherman’s demographics and their catching behaviors in Tegal, Indonesia (Nizar
Aulia Alharizmi, et al)
Jahi, A., Gani, D. S., Purnaba, I. G. P., Adrianto, L., Tjitradja, I., Antropologi, D., Ilmu, F., Politik, I., Indoneisa, U., Sains, D., Masyarakat, P., Ekologi, F., Bogor, I. P., Alam, P., Manajemen, D., Perairan, S., & Perikanan, F. (2011). Faktor-Faktor yang Mempengaruhi Perilaku Nelayan Artisanal Dalam Pemanfaatan Sumberdaya Perikanan di Pantai Utara Provinsi Jawa Barat. 15(2), 117–126.

Lestari, N., Yuwana, & Efendi, Z. (2015). Identifikasi Tingkat Kesegaran Dan Kerusakan Fisik Ikan di Pasar Minggu Kota Bengkulu. *Journal of religious studies*, 72(1), 189–193.

Litaay, C., Hari Wisudo, S., & Afrah, H. (2020). Penanganan Ikan Cakalang oleh Nelayan Pole and Line. *Jurnal Pengolahan Hasil Perikanan Indonesia*, 23(1), 112–121. https://doi.org/10.17844/jphi.v23i1.30924

Manggaprowung, A. E., Montololu, R. I., & Suwetja, I. K. (2019). Kajian Mutu Ikan Tongkol (Euthynnus affinis) Segar di Pasar Bahu Manado. *Media Teknologi Hasil Perikanan*, 2(2), 51–57. https://doi.org/10.35800/mthp.2.2.2014.6855

Mboto, N. K., Nurani, T. W., Wisodo, S. H., & Mustaruddin, M. (2015). Strategi Sistem Penanganan Ikan Tuna Segar Yang Baik Di Kapal Nelayan Hand Line Ppi Donggala. *Jurnal Teknologi Perikanan dan Kelautan*, 5(2), 189–204. https://doi.org/10.24319/jtpk.5.189-204

Naiu, A. S., Konioyi, Y., Nursinar, S., & Kasim, F. (2018). *Penanganan dan Pengolahan Hasil Perikanan* (hal. 43–70).

Nugroho, T. A., & Adietya, K. R., Birto, B. A. (2016). Kajian Ekspersimen Penggunaan Media Pendingin Ikan Peningkatan Performance Tempat Penyimpanan Ikan. *Teknik Perkapalan*, 4(4), 889–898.

Nugroho, T. A., Adietya, B. A., Perkapanal, D. T., Teknik, F., Diponegoro, U., & Pack, I. (2017). Kajian Ekspersimen Penggunaan Media Pendingin Ikan Berupa Es Basah Dan Ice Pack Sebagai Upaya Peningkatan Performance Tempat Penyimpanan Ikan Hasil Tangkapan Nelayan. *Jurnal Teknik Perkapalan*, 4(4), 889–898.

Palawe, J. F. P., Mandeno, J. A., Karimela, E. J., & Kaim, M. A. (2017). Ibm Teknik Penanganan Pasca Tangkap dan Pengesanan Ikan Segar Kelompok Nelayan Bahari dan Kelompok Nelayan Usaha Mina Pulau Manisa Desa Nanadakele Kecamatan Nusa Tabukan. *Jurnal Ilmiah Tatengkorang*, 2(November), 48–51.

Pandit, I. G. S. (2017). Penerapan Teknik Penanganan yang Berbeda Terhadap Kualitas Ikan Segar sebagai Bahan Baku Pembuatan Ikan Pindang. *Jurnal Perikanan Universitas Gadjah Mada*, 19, 39, 89–96.

Pianusa, A. F., Sanger, G., & Wongo, D. (2015). *Kajian Perubahan Mutu Kesegaran Ikan Tongkol (Euthynnus Affinis)* yang Dibrendam di Ekstrak Rumput Laut (Eucheuma Spinosum) dan Ekstrak Buah Bakau (Sonneratia Alba). 3(2), 66–74.

Prabowo, T., Asra, R., & Amelia, J. M. (2019). Hubungan Kelimpahan Zooplankton Terhadap Hasil Tangkapan Alat Tangkap Topok Di Kelurahan Kampung Nelayan Tanjung Jabung Barat Provinsi Jambi. 12(1), 11–23.

Ridha, A. (2017). Analisis Faktor-Faktor yang Mempengaruhi Pendapatan Nelayan di Kecamatan Idi Rayeuk. *Jurnal Samudra Ekonomi dan Bisnis*, 8(1), 646–652. https://doi.org/10.37059/jseb.v8i1.205

Rimawati, T. K. and A. A. (2019). *Analysis of Micro Insurance Models for Fishermans* (Study in Sukabumi and Pangandaran Port). 5(July), 1–23.

Sri Maryeni, Muhammad Natsir Kholis, D. K. (2021). Penanganan Ikan Tuna Sirip Kuning (Thunnus Albaeco) di Pelabuhan Perikanan Samudera di Bungus Kota Padang Provinsi Sumatera Barat. *Pengolahan Sumberdaya Perikanan*, 5(1), 131–134.

Sudarmo, A. P., Baskoro, M., Wirayawan, B., Wiyono, E. S., & Monintja, D. R. (2016). Analisis Internal dan Eksternal Pengelolaan Perikanan Pantai Skala Kecil Di Kota Tegal (An Internal and External Analysis of Small-Scale Coastal Fisheries Management in Tegal City). *Marine Fisheries : Journal of Marine Fisheries Technology and Management*, 7(1), 45–56. https://doi.org/10.29244/jmf.7.1.45-56

Syafitri, Metusalach, & Fahruil. (2016). Studi Kualitas Ikan Segar Secara Organoleptik Yang Dipasarkan Di Kabupaten Jeneponto Studi 0.9 Study of the Quality of Fresh Fish Organoleptically Marketed in District of Jeneponto. *Jurnal IPEI KPS*, 3(6), 544–552.

Wiyono, E. S., & Mustaruddin, . (2016). Factors affecting the performance of fisheries development: A case study of capture fisheries in Indramayu. *Marine Fisheries : Journal of Marine Fisheries Technology and Management*, 7(1), 109–115. https://doi.org/10.29244/jmf.7.1.109-115