

**ECONOMIC BEHAVIOR OF ANCHOVY FISHERMEN IN MAINTAINING
THEIR BUSINESS AND INCOME RISK IN TLANAKAN DISTRICT,
PAMEKASAN REGENCY**

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Abstract

Anchovy fishermen in Tlanakan District, Pamekasan Regency, contribute significantly to the local economy, but face challenges in the form of weather fluctuations, price instability, and technological limitations. This study aims to analyze the economic behavior, social status, and income risk of fishermen using a quantitative approach with indicators of risk preference, time preference, technology adoption, culture, sea experience, education level, and age. Income risk is analyzed through the coefficient of variation. The results show that fishermen prefer to catch anchovies because of the low risk and stability of the catch. Traditional technology still dominates, although modern technology has the potential to increase productivity. Socially, more than 10 years of experience at sea and a higher level of education have been shown to contribute positively to income. However, uncertainty due to weather changes remains a major obstacle.

Keywords: Economic Behavior, Social Status, Income Risk, Fishermen, Anchovies

INTRODUCTION

East Java Province is closely linked to fisheries activities, supported by a long coastline and abundant marine resources. Most coastal communities in this region depend on their livelihood as fishermen, by utilizing waters such as the Madura Strait, Bali Strait, Java Sea, and Flores Sea for consumption and economic needs. The local government has initiated various programs, such as coaching, training, providing fishing gear assistance, to the development of fisheries infrastructure. However, East Java fishermen still face various challenges, such as the impact of climate change, licensing constraints, and competition with foreign ships.

In addition to its economic function, fisheries in East Java also play an important role culturally, being part of traditions, local wisdom, and socio-religious activities of coastal communities. In coastal areas such as Pamekasan Regency, the fisheries sector is the backbone of the local economy, making a significant contribution to community income and food supply. Madura Island, including Pamekasan, with its long coastline and wide waters, has great potential for the development of this sector. Data shows that the fisheries sector in Pamekasan contributes significantly to the Gross Regional Domestic Product (GDP), making it one of the main pillars of the regional economy.

Table 1
GDP by Business Field in 2021-2023

No	Business Field GDP	Gross Regional Domestic Product (GDP) by Business Field based on Prevailing Prices (%)		
		2021	2022	2023
1.	Agriculture, Forestry, and Fisheries	32,37	32,43	31,69
2.	Mining and Quarrying	3,39	3,31	3,65
3.	Processing Industry	7,01	7,16	7,47
4.	Electricity and Gas Procurement	0,05	0,05	0,05
5.	Water Procurement, Waste Management, Waste and Recycling	0,08	0,08	0,08
6.	Construction	10,29	10,30	10,42
7.	Wholesale and Retail Trade; Car and Motorcycle Repair	20,72	21,19	21,43
8.	Transportation and Warehousing	1,64	1,83	2,04

9.	Provision of Accommodation and Meals	0,67	0,69	0,71
10.	Information and Communication	6,85	6,65	6,55
11.	Financial Services and Insurance	1,93	1,90	1,93
12.	Real Estate	1,85	1,82	1,77
13.	Corporate Services	0,38	0,35	0,35
14.	Government, Defense, and Compulsory Social Security Administration	6,70	6,37	6,10
15.	Educational Services	4,33	4,07	3,98
16.	Health Services and Social Activities	0,82	0,80	0,78
17.	Other Services	0,93	0,98	1,00

Source: Central Statistics Agency Pamekasan Regency, 2023

Table 1 shows that the GDP of Pamekasan Regency in 2021–2023 is dominated by the agriculture, forestry, and fisheries sectors, with a contribution of 32.27% in 2021, up to 32.43% in 2022, and down slightly to 31.69% in 2023. This sector is a regional flagship, supported by anchovy fishermen who play a major role in fisheries production and the local economy. Their catch is not only a source of livelihood but also encourages distribution and marketing activities of the fisheries sector.

Table 2
Marine Capture Fisheries Production in Pamekasan Regency in 2023

Types of Fish	Production Volume (Tons)	Production Value (Rupiah)
Mackerel	210,1	11.451.969.400
Shrimp	389,0	8.707.099.900
Skipjack	700,0	11.383.500.000
Squid	743,0	30.614.376.800
Bloating	3594,9	77.776.930.000
Teri	6811,2	123.210.712.900

Source: Pamekasan Regency Fisheries Service

Table 2 shows that anchovies dominate the catch in Pamekasan Regency with 6,811.2 tons and a production value of Rp123.2 billion, followed by mackerel (3,594.9 tons, Rp77.8 billion) and squid (743 tons, Rp30.6 billion). The abundance of anchovies in the surrounding waters is the main factor in the high catch. However, the economic condition of anchovy fishermen is still unstable due to price fluctuations, the impact of climate change, and

competition with other fishermen. In addition, marine resource management policies also affect their well-being (Sudana, 2019).

Table 1
Number of Fishermen by District in Pamekasan Regency

District	Fisherman (Soul)
Batumarmar	679
Prohibition	876
Galis	915
Pasean	1.923
Pademawu	1.928
Tlanakan	3.029

Source: Central Statistics Agency Pamekasan Regency, 2020

Table 3 shows that Tlanakan District has the highest number of fishermen in Pamekasan Regency (3,029 people), followed by Pademawu (1,928 people) and Pasean (1,923 people), while Batumarmar has the least number of fishermen. Tlanakan District is an attraction for fishermen because it is strategically located on the seashore with easy access to fish-rich waters. Its long coastline provides space for boats to lean on, while lush fish habitats, including anchovies, are a mainstay of livelihood. The abundant potential of marine resources attracts fishermen from various regions to make a living in this region (Happy et al., 2023).

Tlanakan has a strong maritime culture that encourages a high number of fishermen, with professions that are passed down from generation to generation, and creates a close bond between the community and the sea. Traditional values such as courage, perseverance, and cooperation are an important part of daily life. Infrastructure support, such as ports, piers, and fish sales facilities, also plays a role in increasing the number of fishermen and strengthening connectivity with markets and related parties (Istiana et al., 2023).

Anchovy fishermen in Tlanakan District are facing a decline in catch due to uncertain weather, which has an impact on their income. Usually, fishermen can catch up to 100 kg of anchovies with an income of around Rp 3 million, but now the catch has decreased drastically to only tens of kilograms. Although the price of anchovies increased from Rp 30 thousand to Rp 35 thousand - 40 thousand per kilogram, income remained affected (Ilyaza & Nasikh, 2022). Factors such as risk preferences, time preferences, technology use, and culture influence the economic behavior of fishermen. Therefore, risk analysis is very important to

identify and manage potential risks in the fishery business, in order to ensure the sustainability and stability of the anchovy fisherman's business (Ruswanty et al., 2019).

In the face of ocean uncertainty, risk preferences are the basis for fishers to make economic decisions, taking into account factors such as weather, seasonality, and markets. Time preferences also influence their decision, whether to choose an immediate outcome or wait for a greater potential outcome. The use of modern technology, such as efficient fishing gear and advanced navigation systems, helps fishermen increase their catches and optimize time and effort. Additionally, traditional cultural values such as courage, perseverance, and honesty influence the way fishermen evaluate risks and make decisions.

Anchovies have high economic value in local and regional markets, making them a leading commodity for Tlanakan fishermen. Abundant catches provide a stable income, while efficient fishing techniques, such as the use of anchovy nets or anchovy traps, play an important role in the success of these fishery businesses. Anchovy fishermen play a vital role in the economy of coastal communities, but often face challenges related to income uncertainty and business risks. Understanding the factors that affect fishermen's income is important to understand their socioeconomic dynamics and how these factors can be harnessed to improve their well-being.

One of the main factors is the experience of going to sea, which is divided into fishermen with less than 10 years of experience and more than 10 years. Longer experience is usually associated with better skills in overcoming ocean challenges and implementing more effective fishing strategies. Fishermen with more than 10 years of experience tend to have a wider social network and market, which can increase their income.

Education level is an important factor that affects fishermen's income. Fisherman's education is divided into three categories: low (below elementary school graduates), medium (elementary to high school graduates), and high (more than 12 years of education) (Kurniawan, 2022). Higher education is associated with better business management skills, including financial record-keeping, risk management, and the use of technology. Fishermen with higher education tend to have better access to market information and government policies, which can increase their income (Hartono, 2022).

In addition, the age of fishermen also affects income. Adult fishermen, who are of productive age, usually have optimal stamina and skills, so they have the potential to generate more income than inexperienced young fishermen or elderly fishermen whose physical abilities have decreased. Understanding the relationship between sea experience, education, and age can help formulate effective strategies to increase the income of anchovy fishermen in Tlanakan District. Fishermen tend to choose to catch anchovies because of the relatively low risk. Anchovies are easily found in large numbers in tropical waters, reducing the likelihood of failure to obtain sufficient catches. This helps maintain the stability of their income. In terms of time preference, anchovy fishing is also advantageous due to its short life cycle and the ability of anchovy populations to recover quickly after periods of intense fishing.

It is evident in the lack of thorough research on the effect of using new technologies in improving revenue outcomes and reducing revenue risk. Many previous studies have focused on social capital and skills, but not many have reviewed how technology can change the dynamics of risks faced by fishermen, especially in commodities such as anchovies. Leading research lies in more limited approaches, such as research by Heriza and Mulianingsih (2023), which discusses more social capital issues and less in-depth aspects of time and technology preferences in influencing fishermen's income. This study expands on these views by adding variables such as fisher culture and new technologies, as well as measuring their impact on their long-term economic success."

Taking these factors into account, fishermen choose anchovy fishing because it is more in line with their preference for low risk and quick returns. This explains why anchovies are the commodity with the most catch in Pamekasan Regency, Madura. Related to the phenomenon that occurs is the instability of anchovy fishermen's income, which is influenced by factors such as risk preferences, time preferences, the use of new technology, and fishermen's culture. In this case, this study aims to explore how the economic behavior of these fishermen is related to these factors and how it affects the sustainability of their business.

REVIEW OF LITERATURE

Economic Behavior

Economic behavior refers to the decisions of individuals, households, and organizations in allocating limited resources to meet their needs and goals. It includes purchases, consumption, investments, and other decision-making that are influenced by preferences, resource limitations, market conditions, psychological factors, and social influences. Economic behavior reflects the interaction between economic logic and non-economic factors in asset management (Suhada et al., 2022), (Rahmi et al., 2022). Research by (Wuepper et al., 2023) shows an increase in the use of economic behavior in agricultural research, which is seen in the increase in scientific production and actor engagement in the last five years.

Social Status

Overall, the identification of the social status of anchovy fishermen in terms of sea experience, education level, and age provides a clear picture of the potential and challenges they face in increasing income. By understanding the relationship between these factors, fishermen's empowerment programs can be more targeted and effective in improving their welfare (Prasetyo, 2023). Research shows that fishermen with higher education are better able to take advantage of economic opportunities, such as adopting new technologies to increase catches or access a wider market. In contrast, fishermen with low education tend to rely on traditional methods that are often less efficient in increasing income. Therefore, increasing education and training for fishermen can be a solution to increase their income and welfare (Widodo, 2021).

Risk Predirection

Risk can be interpreted as uncertainty that can have a negative impact if not managed properly. Managing risk is the right step because avoiding risk is completely difficult to do. Risk is the uncertainty or consequence of a process that occurs in the present or future (Syahputra et al., 2022). Risk in business is an aspect that needs to be prioritized, so it is important to pay attention to several factors such as risk capacity, information related to risks, and alternatives to reduce risks that may be faced. (Syahputra et al., 2023).

Time Predirection

Determining the pattern of the anchovy fishing season is important to maintain stock availability and support fish spawning. Catches can be optimized during the fishing season and reduced during the spawning season, so that fishermen can maximize their catch in certain seasons (Rahmawati Meliza et al., 2015). Working hours refer to the time spent by fishermen catching fish in a month, which varies depending on the method used. Although fishermen spend more time at sea, this does not necessarily increase the catch due to the uncertainty of location and the number of fish. Research by (Mappigau & Ferils, 2020) and Praditasari (2018), and Putra & Kartika (2019) showed that working hours did not have a significant effect on fishermen's income.

Push for the Use of New Technologies

Technology affects fishermen's catches. Fishermen who still use traditional methods face difficulties in obtaining abundant results (Nurhaeda et al., 2019). Despite the development of technology, many fishermen are reluctant to switch to modern equipment due to a lack of understanding and comfort with the traditional tools they are already familiar with (Ilyaza & Nasikh, 2022).

Culture

Coastal communities, most of whom work as fishermen, have different characteristics from those in other regions. This difference is influenced by economic conditions, culture, and the availability of supporting facilities. Coastal communities develop cultures that are in harmony with nature, using technologies that are adaptive to local conditions to utilize natural resources. Fishermen in Indonesia, in particular, try to catch fish to meet their living needs with various equipment, both traditional and modern (Andemora et al., 2021). Research by

(Raden Sulistiyanto & Nuryanti Nuryanti, 2021) shows that the majority of residents of Jobokuto Village, Jepara District, have worked as fishermen for generations.

Anchovy Fishermen's Business Income Risk

Risk is uncertainty that can have a negative impact if not managed properly. Managing risk is important because avoiding it completely is difficult to do. Risks arise as a result of a process that may occur in the present or future (Syahputra et al., 2022). In business, risks must be prioritized, taking into account risk capacity, related information, and alternatives to mitigate potential risks faced (Syahputra et al., 2023). Revenue risk can be measured by the magnitude, variance, and standard deviation. The coefficient of variation can be mathematically written, namely:

$$KV = \frac{\sigma}{\bar{X}} \quad \sigma = \sqrt{\frac{\sum x^2}{n}} \quad x = X - \bar{X}$$

KV = Income Variation Coefficient

σ = Standard Income Deviation

X = Revenue

\bar{X} = Average income

n = Number of samples

Decision-making criteria (Asbullah *et al.*, 2017):

1. A KV value of ≤ 0.50 indicates that the risk of operating income is low
2. A KV value of > 0.50 states that the risk of operating income is high.

RESEARCH METHOD

Type of Research

This study uses qualitative and quantitative approaches to identify the economic behavior of anchovy fishermen in Tlanakan District, Pamekasan Regency. The type of research applied is a survey method, with data collection through observation, interviews, and questionnaires. This research was carried out in Tlanakan District, Pamekasan Regency, East Java Province.

Research Location

The location selection was carried out deliberately (purposive) with the consideration that the area is one of the villages that, on average, earns a livelihood as fishermen. Research and data collection activities will be carried out from July to August 2024.

Data and Data Sources

This study took all anchovy fishermen in Tlanakan District, Pamekasan Regency, who obtained anchovy catches, with the number of fishermen in Tlanakan District as many as 3,029 fishermen. The data collected came from two sources: primary data obtained directly from anchovy fishermen in Tlanakan through interviews and questionnaires, and secondary data obtained from related references such as the Central Statistics Agency of East Java Province and the East Java Fisheries Office. The types of data used include quantitative data that includes numerical information about fishermen's fishing experience, education, and income, as well as qualitative data that explores aspects of fishermen's behavior, risk preferences, time, technology use, and culture.

Analysis Tools

For data analysis, descriptive analysis was used to describe the phenomenon that occurred, as well as statistical analysis to identify the relationship between variables such as education, experience at sea, and the fisherman's age on income. In addition, the coefficient of variation is used to measure the income risk of anchovy fishermen.

RESULTS AND DISCUSSION

Results and Discussion of Economic Behavior of Anchovy Fishermen

The economic behavior of anchovy fishermen is influenced by variables such as time preferences, risk, technology use, social interaction, as well as culture and personality. Anchovy fishing is highly dependent on weather conditions, with increased catches typically occurring between April and October. Risk preference is related to uncertainty that must be managed well, because risk avoidance is difficult to do. The use of advanced technology can increase fishermen's productivity. Fishermen's activities are influenced by social and economic interactions, with fishing communities having high work morale, strong social solidarity, and easily adapting to change. The culture of coastal communities, most of whom

work as fishermen, is influenced by the region's economy, cultural background, and available facilities.

Time Reference

The time preference in anchovy fishing depends on the season and weather conditions. Catches increase between April to October (summer) and decrease between November to March (rainy season). Fishermen go to sea from 5 p.m. to 6 a.m., depending on the weather and the number of catches. The results of the study are presented in the following table:

Table 1
Respondents' Statement of Time Preferences

NO	Statement	Score					Total Score	Maximum Score	Percentage (%)
		STS (1)	TS (2)	RR (3)	S (4)	SS (5)			
1.	Statement 1	10	34	0	0	0	78	220	35,45
2.	Statement 2	7	37	0	0	0	81	220	36,82

Source: Primary Data Analysis, 2024

Information:

Statement 1: Working time during the day is more effective in looking for anchovies

Statement 2: The time to work in the rainy season is more effective for looking for anchovies

Based on the results of the score, the fishermen's preference for working hours showed that 64.55% of fishermen preferred to work at night because it was more profitable, while 35.45% said that working during the day was less profitable. In addition, 63.18% of fishermen felt that working in the dry season was more effective, while 36.82% said that the rainy season was less effective. These results are in line with research (Andemora et al., 2021), which states that anchovy catches increase in summer (April-October). Fishermen go to sea from 5 pm to 6 am.

Risk Reference

Risk preference refers to the tendency of individuals or groups to choose the level of risk associated with economic decisions. In anchovy fishermen, risk preferences include an assessment of catch uncertainty, cost, and environmental factors. Managing risk is important because avoiding it is difficult. The results of the risk preference research are presented in the following table:

Table 2
Respondents' Statement on Risk Preference

NO	Statement	Score					Total Score	Maximum Score	Percentage (%)
		STS (1)	TS (2)	RR (3)	S (4)	SS (5)			
1.	Statement 1	0	0	0	27	17	193	220	87,73

Source: Primary Data Analysis, 2024

Information:

Statement 1: Fishermen like high-risk work

Based on the results of the study, most fishermen (87.73%) like high work risk, while 12.27% prefer low risk. This shows that the majority of fishermen tend to be willing to take big risks for the sake of higher profit potential. These results are in line with research (Kurniawan & Dewanti, 2020), which states that fishermen with high risk preferences are better prepared to face losses to achieve greater profits, influenced by their experience and financial capacity.

Push for the Use of New Technologies

The drive to use technology affects fishermen's catches. The more advanced the technology used, the higher the productivity and production. Fishermen initially used simple fishing gear such as fishing rods, nets, and lines, but as it developed, they now use modern fishing boats and fishing gear.

Table 3
Respondents' Statements on the Push to Use New Technologies

No	Statement	Score					Total Score	Maximum Score	Percentage (%)
		STS (1)	TS (2)	RR (3)	S (4)	SS (5)			
1.	Statement 1	0	0	0	22	22	198	220	90,00

Source: Primary Data Analysis, 2024

Description:

Statement 1: Using new technology, fishing gear is more effective in

Based on research, 90% of fishermen said that the use of new technology in catching anchovies was very effective in increasing catches, while 10% said it was less effective. These results are in line with research (Nurhaeda et al., 2019), which states that modern technology has a great influence on catches, while fishermen who use traditional tools find it difficult to get abundant results.

Culture

Coastal communities, most of whom work as fishermen, have unique characteristics that are influenced by the region's economy, cultural background, and the availability of supporting facilities. Their culture is nature-oriented, with technology that is adaptive to coastal conditions. The livelihood of fishermen in Indonesia is mostly carried out by coastal communities, who also maintain traditions and beliefs in how to go to sea and catch fish that have been passed down from generation to generation. The results of the research on culture are presented in the following table:

Table 4
Respondents' Statements About Culture

No	Question	Score					Total Score	Maximum Score	Percentage (%)
		STS (1)	TS (2)	RR (3)	S (4)	SS (5)			
1.	Statement 1	0	0	0	25	19	195	220	88,64
2.	Statement 2	0	0	0	23	21	197	220	89,55

Source: Primary Data Analysis, 2024

Information:

Statement 1: Being a fisherman is part of the hereditary culture

Statement 2: Livelihood as a fisherman is the culture of the surrounding community

Based on research, 88.64% of fishermen consider being a fisherman as part of their hereditary culture, while 11.36% do not. In addition, 89.55% of fishermen said that their livelihood as fishermen is the culture of the surrounding community, while 10.45% did not. These results are in line with research (Raden Sulistiyanto & Nuryanti Nuryanti, 2021) and (Andemora et al., 2021), which states that most coastal communities, such as in Jobokuto Village, work as fishermen for generations and have a culture that is in harmony with nature.

Results and Discussion on the Social Status of Anchovy Fishermen

The social status of anchovy fishermen is influenced by variables such as sea experience, education, and age. Fishermen with more than 10 years of experience at sea have more mature skills in facing marine challenges and predicting the weather. Education also affects fishermen's ability to manage their businesses, with highly educated fishermen tending to have more access to modern technology. Age also plays a role, with adult fishermen (26-55 years old) having the best productivity, while elderly fishermen may be

constrained by physical limitations. The combination of experience, education, and age has a significant impact on income, with experienced and highly educated fishers in adulthood tending to have more stable incomes.

Fishing Experience

The experience of going to sea is divided into two groups: under 10 years old and over 10 years old. Fishermen with more than 10 years of experience tend to have better skills in facing challenges and predicting weather and catches. On the other hand, fishermen with less than 10 years of experience are still in the learning stage and do not have an effective strategy to maximize income. The results of the research on the experience of going to sea are presented in the following table.

Table 5
Respondents' Statements About the Experience of Going to Sea

No	Statement	Score					Total Score	Maximum Score	Percentage (%)
		STS (1)	TS (2)	RR (3)	S (4)	SS (5)			
Groups under 10 years old at sea									
1.	Statement 1	0	2	0	6	1	33	45	73,33
2.	Statement 2	0	0	0	8	1	37	45	82,22
Groups over 10 years at sea									
3.	Statement 1	0	0	0	6	29	169	175	96,57
4.	Statement 2	0	0	0	10	25	165	175	94,29

Source: Primary Data Analysis, 2024

Information:

Statement 1: Having experience at sea makes relationships and markets wider

Statement 2: The longer the experience at sea can increase income

It can be concluded that fishermen with more than 10 years of experience at sea have a wider social network and market (96.57%), as well as the ability to increase income (94.29%). On the other hand, fishermen with less than 10 years of experience tend not to have an effective strategy to maximize income. These results are in line with Rahman's (2021) research, which shows that experienced fishermen have more mature skills in dealing with ocean challenges and predicting catches.

Table 6
Group Experience, Deviation Standards, and Net Income of Fishermen

Group	Standard Deviation	Net Income
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Under 10 Years	2,19	334.778
Above 10 Years	10,51	481.714

Source: Primary Data Analysis, 2024

Data shows that fishermen with less than 10 years of experience at sea have a standard deviation of 2.19 nautical experience and an average net income of 334,778 thousand rupiah. A low standard deviation value indicates a uniform experience, so that income is more stable even though it is relatively low, likely due to limited experience or seafaring techniques. Meanwhile, fishermen with more than 10 years of experience have an experience deviation standard of 10.51 and an average net income of 481,714 thousand rupiah. Greater variation in experience within this group showed differences in fishing strategies and techniques, and higher incomes tended to be associated with longer experience, better access to equipment, and more honed skills.

Length of Education

The length of education affects the ability of fishermen to manage their businesses, especially in financial and technological decision-making. Highly educated fishermen (over 12 years old) tend to have easier access to modern technology, while low-educated fishermen (below elementary school) have difficulty making optimal use of resources. Higher education allows fishermen to be more adaptive to change, which can increase their income. The results of the research on the length of education are presented in the following table:

Table 7
Respondent's Statement About the Length of Education

No	Statement	Score					Total Score	Maximum Score	Percentage (%)
		STS (1)	TS (2)	RR (3)	S (4)	SS (5)			
Low education group (≤ 6 years of education)									
1.	Statement 1	0	0	0	10	2	50	60	83,33
2.	Statement 2	4	8	0	0	0	20	60	33,33
Medium education group (Studying 6-12 years)									
3.	Statement 1	0	0	0	20	12	140	160	87,50
4.	Statement 2	0	4	1	20	7	126	160	78,75

Source: Primary Data Analysis, 2024

Information:

Statement 1: Education can help in managing finances, risks, and technology utilization so that it can increase income

Statement 2: The length of education helps to gain better access to market information so that it can increase income

The data shows the difference between fishermen with education ≤ 6 years and 6-12 years. Fishermen with 6-12 years of education (87.50%) feel helped in managing finances, risks, and the use of technology, thereby increasing income. On the other hand, 12.50% of fishermen with ≤ 6 years of education do not feel these benefits. In the second statement, 78.75% of fishermen with 6-12 years of education have better access to market information, while 21.25% of fishermen with ≤ 6 years of education do not. These results are in line with research (Widodo, 2021), which states that highly educated fishers are better able to take advantage of economic opportunities, such as new technologies and broader markets.

Table 8
Fishermen's Experience Groups, Deviation Standards, and Net Income

Group	Standard Deviation	Net Income
Low (≤ 6 years of education)	1,27	507.500
Medium (6-12 years of education)	1,69	430.719

Source: Primary Data Analysis, 2024

Fishermen with ≤ 6 years of education have an average income of 507,500 thousand rupiah, with low educational variation, while fishermen with 6-12 years of education have an average income of 430,719 thousand rupiah and greater educational variation. Although higher education is often associated with better income, the experience of going to sea and access to fishing gear also affect their income.

Age

Age affects the effectiveness and productivity of fishermen. Juvenile fishermen (18-25 years old) have high energy but are less experienced, while adult fishermen (26-55 years old) are at the peak of productivity. Elderly fishermen (56 years and older) have extensive experience, but physical limitations can affect their effectiveness. The results of the study on age are presented in the following table:

Table 9
Respondents' Statement About Age

No	Statement	Score					Total Score	Maximum Score	Percentage (%)
		STS (1)	TS (2)	RR (3)	S (4)	SS (5)			
Adult age group (19-59 years)									
1.	Statement 1	0	1	0	18	16	154	175	88,00
2.	Statement 2	0	2	0	12	21	157	175	89,71
Elderly age group (≥ 60 years)									
3.	Statement 1	0	1	0	4	4	38	45	84,44
4.	Statement 2	3	4	0	1	1	20	45	44,44

Source: Primary Data Analysis, 2024

Information:

Statement 1: Your current age can generate a large income as a fisherman

Statement 2: At your current age, you have more optimal stamina and skills in seafaring

Based on the data, 89.71% of elderly fishermen said they earned more, while 10.29% did not. Meanwhile, 84.44% of adult fishermen feel that they have optimal stamina and skills in going to sea, but 15.56% do not. This result is in line with Suryadi's (2023) research, which states that adult fishermen (26-55 years old) are at the peak of productivity, while elderly fishermen (56 years and older) have more experience, but physical limitations can affect their effectiveness.

Table 10
Age Group, Deviation Standard, and Net Income of Fishermen

Group	Standard Deviation	Net Income
Adult (19-59 years)	10,42	400.086
Senior (≥ 60 years old)	3,67	652.222

Source: Primary Data Analysis, 2024

Fishermen aged 19-59 years have a standard age deviation of 10.42 and an average income of 400,086 thousand rupiah, showing greater variation in experience, strategy, and use of technology. Meanwhile, fishermen aged 60 years and above have a standard age deviation of 3.67 and an average income of 652,222 thousand rupiah, with a narrower age range. Higher incomes in this group may be influenced by longer experience or more established networks, even though they belong to an older age group.

Results and Discussion of Anchovy Fishermen's Income Risk

Risk is uncertainty that can have a negative impact if not managed properly. The coefficient of variation (CV) is a comparison between the standard and mean deviations, which indicates how evenly the data is distributed. The larger the CV, the more uneven the data, and the smaller the CV, the more evenly distributed the data (Yusniyanti & Kurniati, 2017).

Table 11
Total Revenue, Cost, Average, and Standard Income Deviation

Information	(Rp)
Total Gross Income	102.995.000
Total Revenue	83.122.000
Total Net Income	19.873.000
Average Net Income	451.659,09
Standard Deviation	236,182,13

Source: Primary Data Analysis, 2024

The gross income of anchovy fishermen of 102,995,000 reflects the total income before deducting operating expenses of 83,122,000, which results in a net income of 19,873,000. Although the gross income is large, it is mostly used to cover operating expenses. The Coefficient of Variation (KV), with a standard income deviation of 236,182.13 and an average net income of 451,659.09, is used to measure income risk. A KV value greater than 0.50 indicates a high-income risk.

Using the Coefficient of Variation (KV) calculation formula:

$$KV = \frac{\text{Standard deviation}}{\text{Average income}}$$

$$KV = \frac{236.182,3}{451.659,09}$$

$$KV = 0,523$$

The value of the Coefficient of Variation (CV) of 52.3% or 0.523 indicates that the income risk of anchovy fishermen is relatively high, because this value is greater than 0.50. These calculations indicate significant fluctuations in revenue, which may be caused by external factors such as weather, anchovy market prices, or differences in efficiency and

fishing techniques. Therefore, the income of anchovy fishermen is at high risk, which requires mitigation efforts to increase the stability of their income.

CONCLUSION

Based on the results of research in Tlanakan District, Pamekasan Regency, it can be concluded that anchovy fishermen are more profitable to work at night and less effective in the rainy season. They tend to favor high work risks, and the use of new technologies increases catches. As part of the hereditary culture, fishermen's livelihood is also the culture of the surrounding community. More than 10 years of experience at sea increases social networks, markets, and income. Fishermen with ≤ 6 years of education are helped in managing finances, risk, and technology, while 6-12 years of education help access market information to increase income. Elderly fishermen earn more income, while adult fishermen have optimal stamina and skills. Anchovy fishermen's income is at high risk, which indicates the need for risk mitigation for income stability.

Based on the results of research in Tlanakan District, several suggestions to improve the welfare and income stability of anchovy fishermen include increasing support in fisheries business management through training in new technologies that are efficient and environmentally friendly, as well as better access to market information. The government needs to facilitate training in modern fishing gear and access to credit for equipment, as well as transparency in fish prices. Strengthening social networks between fishermen through regular forums can increase cooperation and information sharing. In addition, risk management and financial record-keeping training is essential. To reduce income risk, mitigation strategies such as diversification of fisheries businesses and training in managing different types of catch need to be implemented. Strengthening the capacity of fishermen in financial management and access to technology and insurance will help stabilize their income.

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