Transformation of fishermen in Bangko sub-district, Rokan Hilir: analysis of fishermen's perceptions toward fisheries modernization

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Abstract. Fisheries modernization is one of the efforts to improve the welfare of fishermen and the sustainability of fishery resources. The success of implementing modernization in fisheries is highly dependent on the perception and acceptance of fishermen towards these changes. The study aimed to analyze fishermen's perceptions of the modernization of fishing in the Bangko sub-district Rokan Hilir. This study involved 30 respondents and used a quantitative research method with a survey approach. The data collection technique used is interviews using questionnaires, observations, and documentation. Fisherman transformation in the context of fisheries modernization refers to changes that occur to fishermen in the use of equipment technology, access to information, institutional support, and influence on conductivity. The study's findings indicate that there needs to be more awareness of the modernization of fisheries among fishermen. Juragan fishermen realize fisheries' modernization, while traditional fishermen still need to be higher in realizing fisheries' modernization.

1 Introcuction

Fisheries modernization is one of the critical elements in increasing the productivity and welfare of fishermen. Various technological developments have changed the fishing process in the fisheries sector [1]. Fishing communities adapt to more modern innovations and methods due to changes in technology, access to information, capital, and fishing practices [2]. These changes indicate a shift from traditional fishing to modern fishing methods.

Fisheries transformation is a dynamic process for traditional fishermen to adapt to environmental, economic, social, and technological changes [3]. This transformation process includes changes in fishing methods, fishing gear, use of digital media, finance, implementation of more efficient management and institutions, and increasing human

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resource capacity [2,3]. Although fisheries modernization aims to increase productivity, income, and welfare of fishermen as well as environmental improvement, its implementation has not gone smoothly because fishermen are less willing to adapt to these changes. Most fishermen believe that the modernization of fisheries has the potential to increase catches and welfare. However, fisheries modernization can threaten local wisdom for traditional fishermen [4].

Fishery modernization has become an essential part of the agenda in national development policy. It aims to increase productivity, efficiency, and poverty in the sector. It covers various aspects, ranging from the use of modern fishing gear, application of navigation technology, fish detection, improvement of supply chain systems, and processing of catches [1]. Various government regulations support the implementation of the policy. It aims to strengthen the legal framework in fisheries modernization. The government establishes principles for sustainable fisheries resource management. This encourages the use of more efficient, environmentally friendly fisheries technology through Law No. 45 of 2009 concerning amendments to Law No. 31 of 2004 concerning fisheries.

Rokan Hilir Regency, Riau Province, has quite an enormous potential for capturing fisheries, both in terms of natural resources and the number of fishermen involved in the fisheries sector [5]. However, this fisheries' potential has yet to be optimally utilized by fishermen [6] due to the application of modern technology and fishermen's perceptions of fisheries modernization. The transformation from traditional fishing methods to more modern practices often gives rise to various perceptions among fishermen, which can affect the success of the implementation of modernization policies. Fishermen's perceptions of this change can vary, depending on various factors such as socio-economic background, education level, and experience in managing marine resources [7]. Thus, the purpose of this study is to analyze the perceptions of fishermen in Rokan Hilir towards fisheries modernization, as well as to identify the challenging factors faced by fishermen in Rokan Hilir.

2 Methods of research

This research was conducted in Bagan Barat sub-district and Bagan Hulu, Bangko sub-district Rokan Hilir Regency. The research period was carried out from May 1 to June 30, 2024. The selection of the research location was carried out using a purposive technique, considering that this area has the potential for capture fisheries, both in terms of the number of fishermen and the available fish resources. In addition, this area has strategic geographical characteristics with direct access to waters rich in fish resources because it is located in the confluence of the Rokan River with the sea, so the fish caught also vary [8].

This study uses a cross-sectional approach to analyze fishermen's perceptions of fisheries modernization in Rokan Hilir Regency. The cross-sectional approach is a research method that involves collecting data at a certain point in time from a predetermined population sample [9]. The purpose of cross-sectional research is to describe the situation or phenomenon that is occurring and to identify the relationship between variables.

The information collected came from 30 respondents in Rokan Hilir Rule through an overview employing a survey. The survey was planned to degree different perspectives of fishermen's discernments of fisheries modernization, counting obstructions to innovation appropriation. Information was collected through interviews and perceptions to supply more profound settings.

The research data were analyzed using descriptive statistics (mean, frequency, percentage, and standard deviation). The assessment of fishermen's perceptions of fisheries modernization used a Likert scale for each indicator. The Likert scale points used range from 1 to 5; thus, point 5 = strongly agree, 4 = agree, 3 = neutral, 2 = less agree, and 1 = disagree. The average value is calculated by combining the values of various statements representing each indicator. A higher average index indicates a positive result, and vice versa.

3 Result and discussion

3.1. Caracteristic Respondent

Respondents are fishermen in Rokan Hilir, and 30 fishermen were used as a research sample. The characteristics of the respondents are representative of fishermen in Rokan Hilir who can provide responses to fishermen's perceptions of fisheries modernization. The characteristics of the research respondents are presented in Table 1 below.

Table 1. Caracteristic Respondent

Variables	Category	Frequency	Percent
Age (Years)	(26-40)	15	50
	(41-55)	12	40
	(56-69)	3	10
Education	Basic	22	73
	Secondary	6	20
	Tertiary	2	7
Number of years as a fisherman	5-10	10	33
	11-20	15	50
	≥ 21	5	17
Numbers of Houshold members	1-3	11	37
	4-6	14	47
	≥ 5	5	17

The age of fishermen is one of the critical factors that can affect their ability to adopt technology and adapt to changes in the fisheries sector. Based on Table 1, it shows that the majority of fishermen are in the age group of 26-40 years (50%). Fishermen in this group allow them to carry out productive activities in their work and have the ability to improve skills in the fisheries sector [10].

The education level of fishermen in Rokan Hilir plays a vital role in determining their capacity to adapt to changes in the fishing industry. Based on the survey results, most

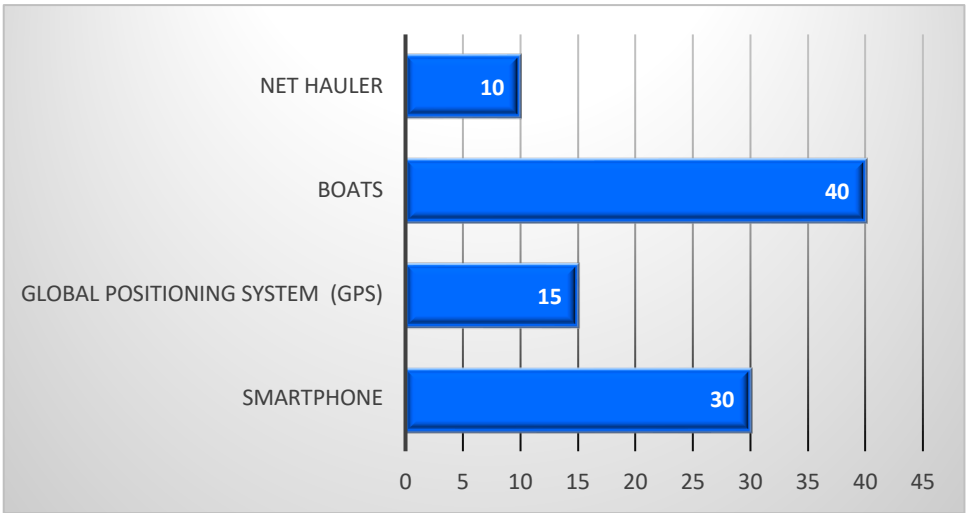
respondents have completed primary education (73%), while 20% are junior high school graduates, and only 7% have reached high school education. This shows that fishermen have been accustomed to going to sea since childhood, and the orientation to earn money is higher than to complete education [11].

The length of time a person has been a fisherman is a significant factor in determining the level of skills, knowledge, and adaptation to changes in the fisheries sector. Fishermen's work experience varies, but generally, fishermen have 11 to 20 years of experience (50%). This experience of fishermen reflects the accumulation of knowledge and skills that fishermen have acquired over many years of work in the fisheries sector [2]. Fishermen who have worked tend to have a deep understanding of local water conditions, fish migration patterns, and effective fishing techniques [12].

The number of family members of fishermen in the Rokan Hilir district tends to vary. Based on Table 1, it shows that the average number of family members of fishermen is 4-6 people per household. This reflects that most members of fishermen's households consist of husband and wife and children and accommodate other relatives such as parents or siblings. Family members of fishermen are also involved in the fisheries sector, such as wives who work in processing the catch, children, and other relatives who are also involved in preparing fish catches and marketing [13].

3.2. Ownership and Use of Technology in Fisheries

Ownership and use of fisheries technology in an effort to increase the sector's productivity and efficiency are important factors determining the success of fisheries modernization. Based on the results of research conducted in Rokan Hilir, there is significant variation in the types of technology owned and used by fishermen, as can be seen in Figure 1 below.



Fig, 1. Frequency of ownership of fisheries technology

The results of the study show that smartphone ownership by fishermen in Rokan Hilir is 30 units. Smartphone ownership is used for various purposes, such as communicating with family and friends. Furthermore, smartphones are used to get information about fish prices and marketing of catches. The use of smartphones by fishermen is still limited to essential functions but indicates the potential to increase operational efficiency and broader access to information [14].

GPS ownership by fishermen in Rokan Hilir is lower than that of smartphones. GPS can help fishermen determine more precise fishing locations and increase fishing productivity and fuel efficiency[15]. However, GPS ownership still needs to be higher due to limited access, costs, and lack of knowledge about the benefits of this technology.

Fishermen have 40 motorized boats, and their ownership is higher than that of other units. Several fishermen have two motorized boats. The study's results showed that around 67% of fishermen have switched from traditional boats to motorized boats, which allows them to reach further fishing areas and increase catch capacity. Motorized boats are an essential technology for increasing the mobility and flexibility of fishermen in finding optimal fishing locations.

Net haulers are a technological innovation that has many benefits for fishermen. The benefits of net haulers for fishermen are increasing fishing efficiency, reducing crew fatigue, and reducing the risk of injury [16]. Ownership of net haulers by fishermen in Rokan Hilir shows the lowest number among other technologies, with only ten units owned by fishermen. This means that only around 17% of fishermen use net haulers in their operations. The Indonesian Ministry of Marine Affairs and Fisheries assisted the net haulers used by fishermen. The low use of net haulers is due to the relatively high investment costs and a need to understand how to use this tool effectively.

3.3. Fishermen's perceptions of fishing modernization in Rokan Hilir

Fisheries modernization is an effort to improve the efficiency, productivity, and sustainability of fisheries sector businesses through the application of new technologies and practices. Fishermen's perceptions of fisheries' modernization show a variety of views, which are summarized in Table 2. Table 2 contains data showing fishermen's views on various aspects of fisheries modernization, including the use of fishing technology, access to humans, institutional support, and impact on productivity and welfare.

Table 2. Fishermen's perceptions of fishing modernization in Rokan Hilir

Perception	Strongly agree: Freq. (Percent)	Agree : Freq. (Percent)	Neutral : Freq. (Percent)	Disagree Freq. (Percent)	Stronly disagree : Freq. (Percent)	Mean	Std dev
Fishing technology (mean index: 3.9)							
1. Fishermen use modern fishing gear to increase their catch.	10 (33.3)	11 (36.7)	4 (13.3)	2 (6.7)	3 (10)	3.76	1.27

Perception	Strongly agree: Freq. (Percent)	Agree : Freq. (Percent)	Neutral : Freq. (Percent)	Disagree Freq. (Percent)	Stronly disagree : Freq. (Percent)	Mean	Std dev
2. Fishermen use modern fishing equipment skillfully	6 (20.0)	13(43.3)	6 (20)	3 (10)	2 (6.7)	3.6	1.13
3. Fishermen invest in modern fishing technology to provide profitable returns	13 (43.3)	8 (26.7)	4 (13.3)	3 (10)	2 (6.7)	3.9	1.26
4. Modern fishing technology is very helpful in the sustainability of fishing businesses..	17 (56.7)	7 (23.3)	6 (20)	0	0	4.36	0.81
Access to Information *(*mean index: 3.8)							
1. Fishermen often use the internet to search for information regarding weather and sea conditions.	17 (56.7)	5 (16.7)	5 (16.7)	1(3.3)	2(6.7)	4.13	1.22
2. Fishermen use the internet to get market information and fish prices	7 (23.3)	14(46.7)	5 (16.7)	4(13.3)	0	3.8	0.96
3. Fishermen can easily access information about fishing innovations	10 (33.3)	7 (23.3)	10 (3.33)	2 (6.7)	1 (3.3)	3.7	1.10

Perception	Strongly agree: Freq. (Percent)	Agree : Freq. (Percent)	Neutral : Freq. (Percent)	Disagree Freq. (Percent)	Stronly disagree : Freq. (Percent)	Mean	Std dev
via the internet.							
4. Fishermen can make good decisions if there is information on the internet	7 (23.3)	12 (40.0)	8 (26.7)	3 (10.0	0	3.7	0.93
Institutional Support (mean index: 3.8)							
1. Fishermen receive support from the government or private sector regarding training in innovative fishing technologyn	15 (50)	8 (26.7)	3 (10.0)	1 (3.3)	3 (10)	4.03	1.29
2. Fishermen receive support from the government or private sector regarding training in innovative fishing technology	11 (36.7)	14 (46.7)	1 (3.3)	3 (10)	1 (3.3)	4.03	1.06
3. Fishermen get support from fellow fishing communities in adopting fishing technology.	10 (33.3)	10 (33.3)	5 (16.7)	3 (10)	2 (6.7)	3.76	1.22

Perception	Strongly agree: Freq. (Percent)	Agree : Freq. (Percent)	Neutral : Freq. (Percent)	Disagree Freq. (Percent)	Stronly disagree : Freq. (Percent)	Mean	Std dev
4. Cooperatives and fishermen's associations play an essential role in fisheries modernizatio n	5 (16.7)	11 (36.7)	12 (40)	2 (6.7)	0	3.63	0.85
Impact on Productivity and Family Welfare (mean index: 3.7)							
1. Fisheries modernizatio n has increased fishing productivity.	7 (23.3)	13 (43.3)	8 (26.7)	1 (3.3)	1 (3.3)	3.8	0.96
2. Fishermen's income increased after using modern fishing technology.	4 (13.3)	14(46.7)	7(23.3)	4 (23.3)	1 (3.3)	3.5	1.01
3. The quality of life of families improves due to the use of modern technology in fisheries.	11 (36.7)	9 (30.0)	7 (23.3)	0	3 (10)	3.83	1..23
4. Fishermen are optimistic about the future of the fishing industry with modern technology.	10 (33.3)	11 (36.7)	5 (16.7)	3 (10)	1 (3.3)	3.86	1.10

Based on the results of the study in Table 1, it shows that around 65% of fishermen show a positive attitude toward the use of modern technology in fisheries. They consider that technology such as GPS, smartphones, and automatic fishing equipment can improve

operational efficiency, catches, and sustainability of fisheries businesses. The average perception of fishermen towards fishing technology is an index of 3.9. This value shows a positive perception, but fishermen still need to be convinced or challenged to adopt the technology [17]. Fishermen or those who own boats and employ crews tend to give a higher rating to fishing technology. This is because they are more able to invest in modern technology and have better access to training and information.

The results of this study revealed that the perception of fishermen in Rokan Hilir regarding access to information as an essential factor in realizing fisheries modernization had an average of 3.8. This value shows that fishermen generally have a reasonably optimistic view, but there is still room for improvement regarding the access to information they have. The majority of fishermen in Rokan Hilir are aware of the importance of access to information in supporting fisheries modernization. They understand that accurate and timely information, such as about efficient fishing techniques, market prices, weather conditions, and fisheries regulations, is essential to increase the productivity and sustainability of their businesses[17,18].

Fishermen showed positive perceptions of the support and training they received from the government or related institutions, such as the fisheries office or the private sector [19]. Overall, fishermen's perceptions of institutional support in realizing fisheries modernization had an average value of 3.8. Fishermen in Rokan Hilir received institutional support in the form of training activities and fishing gear assistance. Extension and training programs were considered very helpful in the process of adopting modern technology, with an average value of 4.03 and a standard deviation of 1.06. This average value indicates that existing programs are quite effective in preparing fishermen to adapt to the demands of modernization.

The results of the study revealed fishermen's perceptions of the impact of modernization on their productivity and welfare, with an average value of 3.7. This finding shows that, in general, fishermen have a relatively positive view of the impact of modernization. Increasing fishing productivity through modern technology has provided tangible benefits to most fishermen. Fishermen in Rokan Hilir feel that modernization has increased fishing productivity (mean 3.8), and most are optimistic about the future of their fishing business with modern technology (mean 3.86). Most fishermen also have the perception that modernization efforts can increase family income and quality of life [13].

4 Conclusion

The perception of fishermen in Rokan Hilir towards fisheries modernization is generally positive, especially among fishermen who are quicker to adopt modern technology such as GPS, net haulers, and smartphones. However, traditional fishermen still need help accessing and adopting technology, mainly due to limited capital and technical knowledge. Institutional support is considered quite good, but there are still obstacles to the quality and accessibility of fisheries extension programs. Fishermen hope that there will be increased support from the government and related institutions in facilitating technical training, providing access to information, and coordination between institutions.

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