

# Beyond the Catch: Exploring Access to Resources and Social Support Networks for Improved Fishermen Welfare

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*Abstract*— The welfare of fishermen is influenced by a multitude of factors that extend beyond the act of catching fish. This paper delves into the crucial aspects of access to resources and social support networks in relation to improving the welfare of fishermen. Drawing upon empirical research, this study examines the significance of resource accessibility, including fishing grounds, gear, finance, and infrastructure, and how limitations in these areas can impede the livelihoods and well-being of fishermen. Additionally, the paper explores the role of social support networks within fishing communities, investigating the impact of strong social ties, cooperative relationships, and collective action on enhancing the welfare of fishermen. Through a comprehensive review of existing literature and case studies, this paper highlights the importance of equitable resource allocation and access for fishermen, considering factors such as government regulations, licensing systems, and competition for resources. It further emphasizes the role of institutional support, policy frameworks, and governance in promoting fair practices and safeguarding fishermen's rights to resources. Additionally, the study explores the influence of social support networks in improving fishermen's welfare. It examines the benefits derived from strong community ties, cooperative associations, and the collective action of fishermen in addressing common challenges, enhancing socio-economic resilience, and improving overall well-being. The paper also explores the impact of social support networks in providing assistance during times of economic uncertainty, natural disasters, and occupational hazards. Furthermore, this research identifies the interplay between resource access and social support networks, recognizing the potential for synergy and mutual reinforcement. By investigating successful examples of resource management systems and community-driven initiatives, the study sheds light on the positive outcomes derived from collaborative efforts in promoting sustainable fishing practices and improving fishermen's welfare. In conclusion, this paper highlights the

significance of moving beyond the catch itself and delving into the factors of resource access and social support networks for enhancing the welfare of fishermen. The findings underscore the need for policies and interventions that prioritize equitable resource allocation, supportive governance structures, and the strengthening of social capital within fishing communities. By addressing these aspects, stakeholders can contribute to the well-being of fishermen, fostering sustainable fishing ecosystems and resilient fishing communities.

*Keywords*— Access to resources, social support networks, fishermen welfare, sustainable fishing

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## I. INTRODUCTION

The welfare of fishermen is a critical concern in the context of sustainable fishing practices and the overall well-being of fishing communities. Fishermen, as key stakeholders in the fishing industry, face numerous challenges that extend beyond the act of catching fish. Understanding and addressing the factors that influence their welfare is essential for promoting sustainable fishing ecosystems and fostering resilient fishing communities.

This paper aims to explore two crucial aspects that significantly impact fishermen's welfare: access to resources and social support networks. Access to resources, including fishing grounds, gear, finance, and infrastructure, plays a vital role in determining the livelihoods and economic well-being of fishermen. Limited access to these resources can hinder their fishing opportunities, restrict their earnings, and create economic vulnerabilities. Investigating the factors influencing resource access and identifying strategies for equitable resource allocation are crucial for enhancing the welfare of fishermen.

Additionally, social support networks within fishing communities play a fundamental role in fishermen's welfare. Strong social ties, cooperative relationships, and collective

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action provide a safety net and foster socio-economic resilience. These networks facilitate knowledge sharing, cooperative efforts, and the ability to address common challenges. Examining the dynamics of social support networks and their influence on the welfare of fishermen can provide valuable insights into enhancing their overall well-being.

By delving into these two interrelated aspects, this paper aims to contribute to the existing literature on fishermen welfare and sustainable fishing practices. It seeks to identify the barriers and enablers to resource access and investigate the role of social support networks in promoting welfare outcomes. Through an examination of empirical research, case studies, and policy frameworks, this study aims to provide a comprehensive understanding of the factors that influence fishermen's welfare.

Furthermore, this research endeavors to highlight the potential synergies and mutual reinforcement between resource access and social support networks. By recognizing the interconnectedness of these factors, stakeholders can develop policies, interventions, and support systems that enhance the welfare of fishermen while promoting sustainable fishing practices. This holistic approach aims to ensure the long-term viability of fishing ecosystems and the well-being of fishing communities.

## II. LITERATURE STUDY

Several studies have focused on the specific context of fisheries in Indonesia, shedding light on the challenges and opportunities within the country's maritime domain. Ahmad (2020) examines the development strategies in Natuna, emphasizing the integration of tourism, marine resources, and infrastructure for the implementation of Indonesia's Global Maritime Fulcrum. Putra et al. (2021) explore the potential fishing areas and their relationship to marine security in Natuna Island<sup>[1] [8]</sup>. They highlight the importance of understanding local fishing grounds for sustainable management. Likewise, Sukraaliawan et al. (2021) discuss the utilization of coastal resources for the welfare of fishermen in the west coast region of Buleleng Regency, emphasizing the need for effective resource management<sup>[13]</sup>.

The use of technology in fisheries has garnered attention in recent years. Dewi and Purwanta (2021) discuss the application of big data in Indonesian marine fisheries, highlighting its potential for improving fisheries management and decision-making processes<sup>[3]</sup>. Surbakti et al. (2022) explore the use of the Internet of Things (IoT) to improve fisherman product quality and fishing performance, demonstrating the potential of technological innovation in enhancing the fishing industry<sup>[14]</sup>. Nugroho et al. (2021) investigate the behavior of fishermen in Central Java Province regarding the use of information and communication technologies (ICTs), providing insights into the adoption and impact of ICTs on fishermen's practices<sup>[7]</sup>.

The concept of sustainable fisheries is crucial for long-term resource conservation and the well-being of fishing communities. Tiyaningsih et al. (2020) examine sustainable technology in marine fisheries in Cilacap Regency, Central

Java, focusing on environmentally friendly practices<sup>[16]</sup>. Budiarti et al. (2021) propose a triple helix model for empowering labor fishermen, emphasizing the collaboration between government, industry, and academia to promote sustainable fishing practices<sup>[2]</sup>. Likdanawati et al. (2021) explore the empowerment of coastal women communities through innovation in marine processed products, highlighting the role of sustainable practices in improving livelihoods<sup>[6]</sup>.

The role of local governments and institutional support in improving the welfare of fishermen has been studied. Kusumajanti et al. (2020) investigate the strategies and role of local government in improving the competitiveness of traditional fishermen in Pandeglang, Banten<sup>[5]</sup>. They discuss the importance of effective governance and policies to enhance the well-being of fishermen. Dirgantara (2022) examines the empowerment strategy of fishery products as economic resilience in the coastal marine, emphasizing the role of institutional support and policies in promoting economic stability<sup>[4]</sup>.

This literature study highlights key research areas relevant to the welfare of fishermen. It encompasses studies conducted in Indonesia and other regions, focusing on topics such as fisheries management, technology adoption, sustainability, institutional support, and policies. These studies provide valuable insights into the challenges and potential solutions for improving the welfare of fishermen and promoting sustainable fishing practices.

## III. FACTORS DETERMINING FISHERMAN WELFARE

### A. Economic Condition

Economic conditions are a significant factor that profoundly affects the welfare of fishermen. The fishing industry is inherently linked to market dynamics, fish prices, and the availability of fish stocks, all of which directly impact the income and economic well-being of fishermen. Fluctuations in fish prices can have a significant influence on fishermen's earnings. Price volatility, driven by market demand, supply, and external factors such as weather events or global trade patterns, can result in unpredictable income for fishermen. Sharp declines in fish prices can lead to reduced profitability, financial instability, and even financial distress for fishermen and their families. Such economic uncertainties can have detrimental effects on their overall welfare, including their ability to meet basic needs, access healthcare services, and plan for the future.

Moreover, the availability of fish stocks is crucial for sustaining the livelihoods of fishermen. Overfishing, environmental degradation, and climate change pose threats to fish populations and can lead to reduced catch. A decline in fish stocks not only affects the income potential of fishermen but also disrupts the balance of marine ecosystems. This creates a cycle of economic and ecological instability, impacting the welfare of fishermen in the long term.

Income variability is another aspect of economic condition that affects fishermen's welfare. Due to natural fluctuations in

fish abundance, seasonal variations, and unpredictable market conditions, fishermen may experience significant fluctuations in their income. Irregular income patterns make financial planning and budgeting challenging, increasing the vulnerability of fishermen and their families to economic shocks and hardships.

The economic condition also influences investment opportunities and access to credit for fishermen. Limited access to financial resources can restrict their ability to purchase or upgrade fishing gear, invest in technologies that improve fishing efficiency and sustainability, or diversify their livelihoods. Lack of financial capital can hinder their capacity to adapt to changing market conditions or cope with economic downturns, further affecting their welfare.

Addressing economic challenges requires a multi-faceted approach. Implementing policies that promote fair trade practices, encourage value-added activities, and provide market information and support can contribute to improved economic conditions for fishermen. Additionally, ensuring sustainable fishing practices and responsible resource management can help maintain fish stocks, thereby ensuring long-term economic viability for fishermen.

### *B. Occupational Hazards and Safety*

Occupational hazards and safety are critical factors that significantly affect the welfare of fishermen. Fishing is a physically demanding and hazardous occupation that exposes fishermen to a range of risks and challenges. One of the primary occupational hazards faced by fishermen is the risk of physical injuries. Handling heavy equipment, working in challenging weather conditions, and operating in a dynamic and unpredictable marine environment increase the likelihood of accidents. Slippery decks, entanglement in fishing gear, falls, and collisions are common causes of injuries among fishermen. These injuries can range from minor cuts and bruises to more severe injuries such as fractures, sprains, or even fatalities, leading to long-term health consequences and financial burdens for fishermen and their families.

Long working hours and extended periods spent at sea contribute to the physical and mental fatigue experienced by fishermen. Fatigue can impair their judgment, reaction times, and overall performance, increasing the risk of accidents and injuries. Moreover, the isolated nature of their work can result in mental health challenges such as stress, anxiety, and depression. The combination of physical exhaustion and mental strain can negatively impact their overall well-being and welfare.

Exposure to extreme weather conditions is another significant occupational hazard for fishermen. They are frequently exposed to adverse weather events, including storms, high winds, heavy rainfall, and rough seas. Such conditions not only pose a direct threat to their safety but also impact their ability to fish, resulting in reduced catch and financial losses.

Additionally, adverse weather conditions can cause vessel damage, equipment failure, and navigation difficulties, further increasing the risks faced by fishermen.

Addressing occupational hazards and ensuring safety measures are crucial for protecting the welfare of fishermen. Implementing and enforcing safety regulations, providing appropriate safety training and equipment, and promoting a culture of safety awareness are essential steps in mitigating occupational risks. Encouraging the adoption of best practices, such as regular vessel maintenance, emergency preparedness, and adherence to safe operating procedures, can significantly contribute to minimizing accidents and injuries.

### *C. Access to Resources*

Access to resources is a significant factor that influences the welfare of fishermen. Resources such as fishing grounds, fishing gear, finance, and infrastructure play a crucial role in determining the livelihoods and economic well-being of fishermen. Access to fishing grounds is essential for fishermen to carry out their activities. The availability and proximity of fishing grounds directly impact their catch potential and overall earnings. Limited access to fishing grounds, either due to resource depletion or access restrictions imposed by regulations or competing interests, can significantly hinder their ability to earn a sustainable income. It can lead to reduced fishing opportunities, increased competition, and even displacement of fishermen from traditional fishing grounds, affecting their welfare and disrupting their way of life.

Access to appropriate fishing gear is vital for fishermen to operate efficiently and sustainably. Outdated or inadequate gear can result in reduced catch, increased effort, and lower profitability. Lack of financial resources or limited access to credit may prevent fishermen from acquiring modern and more efficient gear, thereby affecting their ability to maximize their catch and optimize their income potential.

Furthermore, access to finance is crucial for fishermen to invest in their fishing activities and maintain their livelihoods. Capital is needed for purchasing and repairing fishing vessels, acquiring fishing gear, and covering operational costs. Limited access to finance can restrict their ability to invest, upgrade their equipment, or expand their fishing operations, leading to economic vulnerabilities and reduced welfare.

Infrastructure, including landing sites, storage facilities, and market access, is another important resource for fishermen. Well-equipped and accessible infrastructure facilitates efficient fish handling, storage, and transportation, ensuring the quality and value of their catch. Insufficient infrastructure or inadequate market access can result in post-harvest losses, reduced market opportunities, and lower returns for fishermen, impacting their economic well-being.

#### D. Social Support Networks

Social support networks play a vital role in influencing the welfare of fishermen. These networks encompass the relationships, social ties, and collective support mechanisms within fishing communities that contribute to the well-being and resilience of fishermen. Strong social support networks provide a sense of belonging and community among fishermen. They foster a supportive environment where individuals can share experiences, knowledge, and resources. Through social interactions and cooperation, fishermen can access valuable information about fishing techniques, market trends, and resource availability, which can enhance their fishing efficiency and economic outcomes. Additionally, social networks provide emotional support, encouragement, and camaraderie, helping fishermen navigate the challenges and stresses associated with their occupation.

Cooperative relationships within fishing communities contribute to improved welfare outcomes. Collaborative efforts such as cooperative fishing ventures, joint marketing initiatives, and collective bargaining for fair prices can enhance the economic well-being of fishermen. By pooling resources, sharing costs, and collectively negotiating with buyers, fishermen can gain stronger market positions and access better opportunities for their catch, thereby improving their financial stability and welfare.

Social support networks also play a crucial role during times of crisis or adversity. Fishing communities often face natural disasters, environmental emergencies, or market fluctuations that can severely impact their livelihoods. In such situations, social networks provide a safety net, enabling fishermen to mobilize collective resources, share assistance, and support each other through challenging times. This collective action can help mitigate the negative impacts, reduce vulnerabilities, and contribute to the overall resilience and welfare of fishermen.

#### E. Institutional Support and Policies

Institutional support and policies play a crucial role in shaping the welfare of fishermen. Government institutions, regulatory frameworks, and policy interventions have the potential to significantly influence the working conditions, access to resources, and overall well-being of fishermen. Effective governance structures and supportive policies are essential for safeguarding the rights and interests of fishermen. Clear and transparent regulations related to fishing licenses, access to fishing grounds, and resource management can ensure equitable distribution of resources and prevent exploitation. Well-designed policies can also address issues such as overfishing, bycatch, and habitat degradation, promoting sustainable fishing practices and safeguarding the long-term viability of fish stocks.

Institutional support is vital for providing necessary services and infrastructure to support the welfare of fishermen. This includes access to healthcare facilities, educational opportunities, financial services, and training programs. Establishing partnerships between government agencies, non-

governmental organizations (NGOs), and local communities can enhance the provision of these essential services and ensure that fishermen have access to resources that promote their well-being.

#### F. Education and Training

Education and training play a significant role in influencing the welfare of fishermen. Access to quality education and relevant training programs can equip fishermen with the knowledge, skills, and competencies necessary to thrive in the fishing industry and enhance their overall well-being. Education plays a vital role in empowering fishermen with foundational knowledge and basic literacy skills. It enables them to understand regulations, market trends, and best practices, fostering informed decision-making and compliance with sustainable fishing practices. Education also equips fishermen with critical thinking skills, problem-solving abilities, and a broader understanding of social, economic, and environmental factors that impact their livelihoods.

Specialized training programs tailored to the needs of fishermen can enhance their technical skills and improve fishing efficiency. Training on topics such as modern fishing techniques, navigation and safety procedures, post-harvest handling, and value-added processing can equip fishermen with the skills required to optimize their catch, reduce waste, and increase their economic returns. Furthermore, training in sustainable fishing practices, resource conservation, and ecosystem management can promote responsible fishing behavior, contributing to the long-term viability of fish stocks and the marine environment.

Continuing education and skills development are essential to keep fishermen abreast of emerging trends, technologies, and market demands. Training programs that focus on entrepreneurship, business management, and marketing can enable fishermen to diversify their income sources, engage in value-added activities, and access higher-value markets. These skills not only enhance their economic opportunities but also contribute to their resilience and ability to adapt to changing market conditions.

Efforts to improve access to education and training must consider the unique challenges faced by fishermen, including their remote locations and irregular schedules. Flexible training programs, distance learning options, and mobile training facilities can help overcome these barriers and ensure that fishermen have equitable access to educational opportunities.

In conclusion, education and training are essential factors that impact the welfare of fishermen. They provide the foundation for informed decision-making, enhance technical skills, foster responsible fishing practices, and promote entrepreneurship. By investing in education and training initiatives tailored to the needs of fishermen, stakeholders can empower them to improve their economic outcomes, enhance their well-being, and contribute to the sustainability of fishing communities.

### G. *Climate Change and Environmental Factors*

Climate change and environmental factors have significant implications for the welfare of fishermen. These factors pose numerous challenges to the fishing industry and can have profound impacts on the livelihoods, productivity, and well-being of fishermen. One of the key effects of climate change is the alteration of marine ecosystems. Rising sea temperatures, ocean acidification, and changes in ocean currents can lead to shifts in the distribution and abundance of fish stocks. These changes may result in the displacement of fish populations from traditional fishing grounds, impacting the catch potential and economic viability of fishermen. Additionally, alterations in the food web and ecological interactions can disrupt the balance of marine ecosystems, affecting the overall productivity and resilience of fish stocks.

Extreme weather events associated with climate change, such as storms, hurricanes, and cyclones, pose direct risks to the safety and livelihoods of fishermen. These events can damage fishing vessels, destroy fishing gear, and cause loss of life. Moreover, increased storm intensity and frequency can disrupt fishing activities, reduce fishing opportunities, and result in financial losses for fishermen.

### H. *Market Dynamics and Value Chains*

Market dynamics and the value chain are crucial factors that significantly affect the welfare of fishermen. The market plays a central role in determining the economic viability, profitability, and overall well-being of fishermen. Market dynamics, including supply and demand, prices, and market access, directly impact fishermen's income and economic outcomes. Fluctuations in market demand and supply can result in price volatility, affecting the profitability of fishermen. Additionally, market consolidation and power imbalances within the value chain can influence the bargaining power of fishermen, potentially leading to unfair prices and limited market opportunities.

The structure and efficiency of the value chain also play a vital role in determining fishermen's welfare. The value chain encompasses the various stages involved in bringing fish from the point of capture to the end consumer. Factors such as transportation, processing, storage, and marketing influence the quality, value, and marketability of the catch. Limited access to efficient value chain infrastructure, such as cold storage facilities or reliable transportation networks, can result in post-harvest losses and reduced profitability for fishermen.

Furthermore, the presence of intermediaries and their role within the value chain can impact fishermen's income. Depending on the market structure, fishermen may be dependent on middlemen or traders who purchase their catch and sell it to the end consumer. The margin between the price paid to fishermen and the price received by the final consumer

can vary, affecting the income distribution and economic well-being of fishermen.

### I. *Cultural and Social Factors*

Cultural and social factors are important aspects that influence the welfare of fishermen. The cultural and social context in which fishermen operate shapes their identities, values, norms, and social relationships, ultimately impacting their overall well-being. Cultural factors, such as traditional fishing practices, local knowledge, and cultural heritage, contribute to the sense of identity and pride among fishermen. These cultural elements often form the foundation of fishing communities and influence their social cohesion and resilience. Preserving and valuing cultural practices can enhance the well-being of fishermen by providing a sense of belonging, continuity, and purpose in their work.

Social factors, including social networks, community support, and social norms, play a crucial role in the welfare of fishermen. Strong social ties and community networks provide emotional support, mutual assistance, and a safety net during times of adversity. Social networks facilitate the sharing of resources, information, and collaborative initiatives, enabling fishermen to address common challenges and seize opportunities.

Moreover, social norms within fishing communities influence behavior, decision-making, and the distribution of resources. Norms related to cooperation, reciprocity, and collective responsibility can foster social cohesion, equitable resource sharing, and sustainable fishing practices. Conversely, harmful social norms, such as gender inequality or exclusionary practices, can hinder the welfare of certain groups within fishing communities.

### J. *Psychological Well – Being*

Psychological well-being is a crucial factor that significantly affects the welfare of fishermen. The unique challenges and demanding nature of their occupation can have profound impacts on their mental health and overall well-being. Fishing often involves long hours of work, isolation, and exposure to unpredictable and hazardous conditions. The physical demands, financial uncertainties, and uncertainties related to fish availability and market conditions can contribute to stress, anxiety, and depression among fishermen. Furthermore, the pressures associated with meeting livelihood needs and supporting their families can further impact their psychological well-being.

Social isolation is another psychological challenge faced by fishermen, particularly those who work in remote or offshore locations. Separation from family and limited social interactions can lead to feelings of loneliness, emotional distress, and a sense of detachment from the broader community. Loneliness and isolation can have detrimental

effects on mental health, affecting overall well-being and quality of life.

Traumatic events, such as accidents at sea or witnessing the loss of colleagues, can also have lasting psychological impacts on fishermen. Post-traumatic stress disorder (PTSD), anxiety disorders, and depression may occur as a result of such experiences. These psychological consequences can affect the ability of fishermen to cope with daily challenges, maintain healthy relationships, and perform their work effectively.

Promoting psychological well-being among fishermen requires addressing mental health stigma, raising awareness, and providing access to mental health support services. Implementing initiatives such as counseling services, mental health awareness campaigns, and peer support programs can help fishermen cope with stress, develop resilience, and seek timely assistance when needed.

#### IV. DISCUSSION

The discussion section of this paper aims to synthesize the findings and highlight the key implications of the factors affecting fishermen's welfare. Through a comprehensive examination of economic conditions, occupational hazards and safety, access to resources, social support networks, institutional support and policies, education and training, climate change and environmental factors, market dynamics and value chain, cultural and social factors, and psychological well-being, this study sheds light on the multifaceted nature of fishermen's welfare and the interconnectedness of these factors. Firstly, economic conditions emerged as a fundamental factor influencing fishermen's welfare. Income stability, fair pricing, and access to markets were found to be crucial determinants of their economic well-being. Policies and interventions that promote fair trade practices, enhance market access, and provide economic support can contribute to improving the economic outcomes and overall welfare of fishermen.

Indonesian fishermen who rely on capture fishing activities amount to 2.5 to 3.7 million people. About 90 percent, or 2.5 to 3.3 million, are small-scale fishermen who directly depend on the small-scale fisheries sector.<sup>1</sup> In order to protect and empower small-scale fishermen, the government has established a series of laws and regulations. In 2016, the Law Number 7 of 2016 concerning the Protection and Empowerment of Fishermen, Fish Cultivators, and Salt Farmers was enacted. Nine years prior to that, the Law Number 27 of 2007 concerning the Management of Coastal Areas and Small Islands (WP3K) was issued. This last regulation has undergone several changes during its implementation [9]. The enactment of the Law Number 7 of 2016 and the previous Law Number 27 of 2007 demonstrates the government's commitment to safeguarding the welfare of Indonesian fishermen. These laws aim to provide protection, empowerment, and sustainable management of coastal areas and small islands, recognizing the importance of small-scale fishermen in the fishing sector. With the implementation of these laws, there is hope for improved livelihoods and better access to resources and support for small-scale fishermen. The government's efforts in establishing these regulations reflect a broader recognition of the vital role that fishermen play in the country's economy and the need to address the unique challenges they face. By ensuring fair and just practices in the maritime domain, it is anticipated that the welfare of Indonesian fishermen can be enhanced, leading to more equitable opportunities and improved living conditions for this significant sector of the population.

Table 1 displays fisheries production according to vessel categories in Natuna Regency, 2019-2021. The data suggests that there have been fluctuations in production across different vessel categories in Natuna Regency. While some categories experienced significant growth, others showed a decline. Further analysis and investigation are needed to understand the factors influencing these trends and to develop appropriate strategies for sustainable fisheries management in the region.

unit: Ton

Type of Ships	Year			Trend	
	2019	2020	2021*	2019-2021*	2020-2021*
KM_0005	20.392,99	100.120,44	90.746,40	190,80	-9,36
KM_0005_0010	12.465,73	9.478,23	21.963,43	53,88	131,72
KM_0010_0020	4.678,99	2.730,97	2.143,17	-31,58	-21,52
KM_0020_0030	2.908,62	3.087,36	6.349,14	55,90	105,65
KM_0030_0050	-	1.166,26	2.485,15	-	113,09
PTM	6.371,88	4.005,58	8.945,32	43,09	123,32
<b>Total</b>	<b>46.818,21</b>	<b>120.588,84</b>	<b>132.632,62</b>	<b>83,78</b>	<b>9,99</b>

Notes

\* Interim number

**Table 1 Fisheris Production According to Vessel Categories in Natuna Regency, 2019 -2021**

Occupational hazards and safety were identified as significant factors affecting fishermen's welfare. The physically demanding nature of fishing, coupled with exposure to unpredictable weather conditions and potential accidents, poses risks to their physical and mental well-being. Implementing comprehensive safety measures, promoting proper training, and providing adequate support systems can help mitigate occupational hazards and improve the overall welfare of fishermen.

Access to resources, including fishing grounds, equipment, and infrastructure, plays a vital role in determining fishermen's welfare. Limited access or inequitable distribution of resources can hinder their productivity and economic opportunities. Ensuring equitable access to resources, promoting sustainable resource management practices, and investing in infrastructure development are crucial for enhancing the welfare of fishermen. Efforts to improve access to resources for fishermen have been recognized as essential in enhancing their welfare. The government's commitment to addressing this issue is evident through the enactment of laws and regulations that aim to promote equitable access to fishing grounds, equipment, and infrastructure. By ensuring that fishermen have fair and unrestricted access to these resources, their productivity and economic opportunities can be maximized. Sustainable resource management practices are also crucial in maintaining the long-term viability of fisheries and safeguarding the livelihoods of fishermen. Implementing measures such as establishing protected areas, regulating fishing techniques, and promoting responsible fishing practices can contribute to sustainable resource utilization and ensure the availability of fish stocks for future generations. Additionally, investments in infrastructure development, such as improved harbors, storage facilities, and processing centers, can enhance the efficiency of fishing operations and facilitate value addition in the fisheries value chain. These infrastructure developments can create employment opportunities, improve market access, and enable fishermen to obtain fair prices for their catches. By focusing on equitable access to resources and promoting sustainable resource management practices, policymakers and stakeholders can contribute to the overall welfare and prosperity of fishermen and foster a more sustainable and resilient fishing ecosystem.

Social support networks emerged as a critical factor contributing to fishermen's welfare. Strong social ties, community support, and collective action empower fishermen, providing them with emotional support, resources, and opportunities for collaboration. Fostering social networks, promoting community engagement, and supporting cooperative initiatives can enhance social capital and improve the overall well-being of fishermen.

Institutional support and policies play a crucial role in shaping the welfare of fishermen. Effective governance structures, supportive regulations, and institutional partnerships are necessary to safeguard their rights, provide essential services, and promote sustainable fishing practices.

Strengthening institutional support and policies can contribute to improved resource management, access to services, and overall welfare of fishermen.

Education and training were identified as vital factors that influence fishermen's welfare. Access to quality education and relevant training programs equips fishermen with knowledge, skills, and competencies necessary for their well-being. By investing in education and training initiatives tailored to the needs of fishermen, stakeholders can empower them to improve their economic outcomes, enhance their well-being, and contribute to the sustainability of fishing communities.

Climate change and environmental factors pose significant challenges to fishermen's welfare. Changes in marine ecosystems, extreme weather events, and environmental degradation can impact fish stocks, fishing opportunities, and the overall productivity of the industry. Implementing sustainable fishing practices, promoting ecosystem-based management, and adapting to the impacts of climate change are essential for safeguarding the welfare of fishermen and the long-term sustainability of the fishing industry.

Market dynamics and the value chain have profound implications for fishermen's welfare. Fluctuations in prices, market access challenges, and power imbalances within the value chain can affect their income and economic outcomes. Strengthening market transparency, promoting fair trade practices, and enhancing fishermen's market participation can contribute to improved welfare and economic sustainability.

Cultural and social factors significantly influence the welfare of fishermen. Preserving cultural practices, strengthening social networks, and promoting inclusive social norms contribute to their well-being. By considering these factors in policy and development interventions, stakeholders can contribute to the sustainable development and welfare of fishing communities. Psychological well-being emerged as a crucial factor affecting fishermen's welfare. The unique challenges and demanding nature of their occupation can have profound impacts on their mental health. Addressing mental health stigma, providing access to support services, and promoting a supportive work environment are essential for promoting psychological well-being among fishermen. Recognizing the psychological challenges they face, such as stress, anxiety, and feelings of isolation, is the first step toward addressing their mental health needs.

## V. CONCLUSION

This paper has explored the various factors that affect the welfare of fishermen, highlighting their interconnectedness and the need for a holistic approach to address their well-being. Through an examination of economic conditions, occupational hazards and safety, access to resources, social support networks, institutional support and policies, education and training, climate change and environmental factors, market

dynamics and value chain, cultural and social factors, and psychological well-being, we have gained valuable insights into the multifaceted nature of fishermen's welfare.

The findings emphasize the importance of recognizing the diverse challenges faced by fishermen and the need for comprehensive interventions. Economic stability, fair pricing, and market access are vital for improving their economic conditions and overall welfare. Ensuring occupational safety, providing adequate training, and implementing supportive measures can protect their physical and mental well-being. Equitable access to resources, social support networks, and institutional support systems contribute to their resilience and livelihood sustainability. Education and training initiatives equip fishermen with the necessary skills and knowledge for improved outcomes. Addressing climate change, promoting sustainable fishing practices, and mitigating environmental factors are essential for long-term viability. Enhancing market dynamics, value chain efficiency, and cultural preservation foster economic opportunities and community well-being. Furthermore, addressing psychological well-being challenges and promoting mental health support services are critical for the overall welfare of fishermen.

To achieve meaningful improvements in fishermen's welfare, it is crucial to engage all relevant stakeholders, including government agencies, industry representatives, fishing communities, and non-governmental organizations. Collaborative efforts should be made to develop policies and interventions that address the identified factors and their interdependencies. These initiatives should be context-specific, taking into account the unique characteristics of different fishing communities, cultural backgrounds, and ecological contexts.

It is evident that a comprehensive and integrated approach is required to enhance fishermen's welfare and achieve sustainable fishing ecosystems. By addressing economic, occupational, social, institutional, educational, environmental, market, cultural, and psychological dimensions, we can promote the well-being of fishermen and contribute to the long-term viability of fishing communities. This necessitates a commitment to inclusive and participatory processes, ongoing research and monitoring, and the allocation of adequate resources to support the welfare of fishermen.

#### REFERENCES

- [1] Ahmad, Abdul. "Developing Natuna: Integrating Tourism, Marine and Infrastructure Strategies towards Implementing Indonesia's Global Maritime Fulcrum. Author: Tirta Nugraha Mursitama, Yi Ying, Bahtiar Saleh Abbas." (2020).
- [2] Budiarti, Laeli, et al. "Triple helix as an empowerment strategy for labor fishermen: A proposed model through action research study." IOP Conference Series: Earth and Environmental Science. Vol. 746. No. 1. IOP Publishing, 2021.
- [3] Dewi, Ni Putu Novita Puspa, and I. Putu Budhi Darma Purwanta. "Big Data for Indonesian Marine Fisheries." 4th International Conference on Innovative Research Across Disciplines (ICIRAD 2021). Atlantis Press, 2021.
- [4] Dirgantara, Rudi. "Empowerment Strategy Of Fishery Products As Economic Resilience In The Coastal Marine." *AKADEMIK: Jurnal Mahasiswa Humanis* 2.1 (2022): 37-45.
- [5] Kusumajanti, Kusumajanti, Ni Putu Eka Widiastuti, and Asep Kamaluddin. "STRATEGIES AND ROLE OF LOCAL GOVERNMENT IN IMPROVING THE COMPETITIVENESS OF TRADITIONAL FISHERMEN IN PANDEGLANG, BANTEN." *EKSPRESI DAN PERSEPSI: JURNAL ILMU KOMUNIKASI* 3.1 (2020): 12-21.
- [6] Likdanawati, Likdanawati, Hamdiah Hamdiah, and Cut Putri Mellita. "Empowerment Of Coastal Women Community Of Gampong Pusong Lama Through Innovation Of Marine Processed Products." *Irritage Journal* 1.1 (2021): 43-50.
- [7] Nugroho, Sumarjianto BM, et al. "Fishermen behavior in the use of information and communication technologies (ICTs) in Central Java Province, Indonesia: Comparative study in Pati and Pemalang regencies." *Aquaculture, Aquarium, Conservation & Legislation* 14.5 (2021): 2698-2707.
- [8] Putra, R. D., et al. "The potential study of fishing area and its relationship to marine security in Natuna island." *IOP Conference Series: Materials Science and Engineering*. Vol. 1052. No. 1. IOP Publishing, 2021.
- [9] Quina, M et al. "FISHERMEN AND MARITIME JUSTICE: A Study on the Implementation of the Empowerment of Fishermen Law and Coastal Management Law in Seven Locations." Jakarta: IOJI, 2022
- [10] Rahman, Md Mizanur, et al. "Challenges of artisanal fishermen: a case study from Sonadia Island, Bangladesh." *Knowledge Management, Governance and Sustainable Development: Lessons and Insights from Developing Countries*. India: Routledge. [https://dx. doi. org/10.2139/ssrn.3773504](https://dx.doi.org/10.2139/ssrn.3773504) (2020).
- [11] Raju, S. S., et al. "Labour mobility in marine fisheries sector: A case study from Odisha State, eastern India." *Indian Journal of Fisheries* 68.3 (2021): 111-118.
- [12] Rosyidi, Hamdi, et al. "Relationship of group dynamics and fishermen Independence in fisheries agribusiness attaining maximum sustainable yield." *E3S web of conferences: 1st International Conference on Bioenergy and Environmentally Sustainable Agriculture Technology (ICoN BEAT 2019): Malang, East Java, Indonesia, November 7-8, 2019*. Vol. 226. EDP Sciences, 2021.
- [13] Sukraaliawan, I. Nyoman, et al. "UTILIZING POTENTIAL OF COASTAL RESOURCES FOR THE WELFARE OF FISHERMEN IN THE WEST COAST REGION OF BULELENG REGENCY."
- [14] Surbakti, Sandy Andhana, Solly Aryza, and Adi Sastra P. Tarigan. "AN IMPROVING FISHERMAN PRODUCT QUALITY AND FISHING PERFORMANCE BASED ON IOT." *INFOKUM* 10.03 (2022): 405-410.
- [15] Tan, Firwan wan, et al. "Strategy to improve economic condition of fishermen living in the coastal area in Kabupaten Pesisir Selatan." *Journal of Business and Socio-economic Development* 3.1 (2023): 69-85.
- [16] Tiyaningsih, Tri, A. Suyitno, and K. Saddhono. "Sustainable technology in marine fisheries in Cilacap Regency, Central Java, Indonesia." *International Journal of Design & Nature and Ecodynamics* 15.3 (2020): 401-407.
- [17] Zainola, Ismail, Omar Yaakobb, and Mohd Rajali Jalalb. "Perception Towards the Performance of Outboard Motors Among Malaysian Coastal Fishermen in Manjung, Perak." *Jurnal Kejuruteraan* 31.1 (2019): 131-137.