



Empowering Indonesian Fishermen in the Blue Economy: A Human Resource Perspective

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Abstract. This study investigates the socio-economic and psychological factors influencing the adoption of sustainable fishing practices among 181 fishermen in South Sulawesi, Indonesia. A cross-sectional survey design was employed, with data analysed using multiple regression analysis. The findings reveal that perceived job security ($\beta = 0.30, p = 0.003$), willingness to learn new techniques ($\beta = 0.15, p = 0.035$), financial security ($\beta = 0.35, p < 0.001$), and community support ($\beta = 0.18, p < 0.001$) are positively and significantly associated with the adoption of sustainable fishing practices. Conversely, the perceived impact of climate change was negatively related to sustainability adoption ($\beta = -0.20, p = 0.001$), suggesting that fishermen who feel overwhelmed by environmental challenges may be less inclined to implement sustainable practices. The model explained 72.5% of the variance in sustainable practices ($R^2 = 0.725$). The study's limitations include its cross-sectional design and regional focus, which may limit generalisability. These findings have practical implications for policymakers and NGOs, highlighting the need for economic support, community engagement, and educational interventions to promote sustainability within the fisheries sector. Future research should explore longitudinal designs and extend the geographical scope to enhance the robustness of the results.

Keywords: Blue economy, perceived job security, financial security, community support, adoption of sustainable fishing practices

1 Introduction

The blue economy, which encompasses the sustainable use of ocean resources for economic growth, job creation, and the preservation of ocean ecosystems, has emerged as a critical area of study in recent years. As coastal nations seek to balance economic development with environmental stewardship, the blue economy represents a promising model for addressing both objectives [1]. In Indonesia, one of the world's largest archipelagic nations, the fishing industry is central to the livelihoods of millions of people and significantly contributes to the national economy [2]. South Sulawesi, a coastal regency in Indonesia, relies heavily on fishing as a primary occupation for much of its population [3]. However, challenges such as unsustainable fishing practices, environmental degradation, and socio-economic inequality persist [4]. Human resource management (HRM) within this context plays a crucial role in

addressing these challenges by empowering fishermen and promoting sustainable fishing practices [5].

Empirical research suggests that fishermen, particularly in developing economies, face numerous obstacles in adapting to sustainable practices due to factors such as limited access to training, financial insecurity, and the perceived impact of environmental threats such as climate change [6,7]. In South Sulawesi, fishermen's livelihoods are closely tied to these challenges, where unstable market conditions and inadequate governmental support further exacerbate their job insecurity [8]. While sustainability is a key objective of the blue economy, the effective management of human resources has been underexplored in the context of Indonesian fishermen, particularly in regions such as South Sulawesi [9]. Studies have shown that sustainable fishing practices are often adopted where there is substantial support from HRM frameworks, but these frameworks are rarely tailored to the specific socio-economic conditions of developing countries [10]. Although various studies have highlighted the importance of sustainable fishing [11], the specific challenges faced by fishermen in terms of job security, willingness to adopt new techniques, and the role of community support have received less scholarly attention [12]. There is a growing recognition that the successful integration of sustainable practices within the blue economy requires addressing both ecological and human dimensions [13]. However, the existing literature has primarily focused on environmental sustainability, with less emphasis on how HRM strategies can support this transition [14].

This research addresses this gap by investigating the key human resource management factors that influence the adoption of sustainable fishing practices among fishermen in South Sulawesi, Indonesia, within the blue economy framework. Specifically, the study explores five critical variables: perceived job security, willingness to learn new techniques, the impact of climate change, financial security, and community support. These variables are integral to understanding how fishermen in South Sulawesi perceive and respond to the evolving challenges of the blue economy [15, 16]. Prior studies have primarily examined these factors in isolation, neglecting the interrelationships that may influence fishermen's behaviour [17]. Furthermore, limited research has been conducted on how these HRM factors can be leveraged to promote sustainable fishing practices in Indonesia, particularly in regions such as South Sulawesi, where fisheries are both a critical economic resource and an essential component of food security [18, 19, 20].

The objective of this study is to examine how perceived job security, financial security, willingness to learn new techniques, community support, and the perceived impact of climate change influence the adoption of sustainable fishing practices among fishermen in South Sulawesi. By integrating these HRM factors within the broader framework of the blue economy, the study aims to fill a critical gap in the literature and provide actionable insights for policymakers and practitioners. This research will contribute to a deeper understanding of the socio-economic factors that facilitate or hinder sustainable fishing in South Sulawesi, offering recommendations for the development of HRM strategies that can support fishermen's adaptation to the blue economy. The findings will have significant implications not only for South Sulawesi but also for other coastal regions of Indonesia and beyond, seeking to

promote sustainable development through effective management of human resources in the fisheries sector.

2 Literature Review

The blue economy has garnered significant attention in recent years as coastal and island nations strive to harness marine resources in a sustainable manner. This concept, which is gaining traction globally, underscores the need to balance environmental conservation with economic growth, particularly in regions where marine resources play a critical role in local livelihoods and food security. Indonesia, as the largest archipelagic state, holds significant potential within the blue economy due to its vast marine biodiversity and the large portion of its population engaged in fishing activities. However, challenges related to unsustainable fishing practices, environmental degradation, and socio-economic disparities persist, particularly in regions such as South Sulawesi, where fishing is a primary occupation. Addressing these challenges requires an integrated approach, with human resource management (HRM) playing a crucial role in empowering fishermen and fostering sustainable fishing practices in the region [1, 2].

The concept of perceived job security is central to understanding the motivations and behaviours of fishermen in the context of the blue economy. Perceived job security refers to an individual's subjective assessment of the stability and continuity of their employment, and it has been identified as a critical determinant of employees' commitment and performance across various industries. In the fisheries sector, job insecurity is often exacerbated by factors such as fluctuating market prices, unpredictable marine resources, and changing governmental regulations [3]. According to Job Security Theory, individuals who feel secure in their employment are more likely to engage in proactive and adaptive behaviours, including the adoption of sustainable practices that ensure the long-term viability of their livelihoods [4]. Studies have shown that fishermen who perceive higher job security are more inclined to invest in sustainable fishing techniques, as they feel assured of their future in the industry and are less driven by short-term economic pressures [5]. This sense of security allows them to focus on practices that contribute to both economic resilience and environmental sustainability, aligning their personal goals with broader blue economy objectives [6].

Another critical factor influencing the adoption of sustainable fishing practices is the willingness of fishermen to learn and implement new techniques. This willingness is shaped by multiple socio-economic factors, including access to education, training opportunities, and perceived self-efficacy. According to Social Cognitive Theory, individuals' self-efficacy—belief in their ability to perform tasks successfully—plays a central role in determining their openness to learning new skills and adopting innovative practices [7]. In the context of small-scale fisheries, fishermen with higher self-efficacy are more likely to adopt new techniques, especially those that promote sustainability and resource conservation. However, fishermen in developing regions, such as South Sulawesi, often face significant barriers to learning, including limited access to formal education and training programmes. This lack of access hinders their ability to acquire the necessary skills to transition to more sustainable practices,

despite the growing need for such methods in response to declining fish stocks and environmental changes [8].

The impact of climate change on fisheries is another crucial element that affects both the livelihoods of fishermen and the broader goals of the blue economy. Climate change poses significant risks to marine ecosystems, leading to changes in fish populations, sea temperatures, and ocean currents, all of which directly affect the productivity and profitability of fisheries. Fishermen who perceive these impacts are more likely to recognise the need for adopting sustainable practices that mitigate the risks associated with environmental degradation [9]. The Environmental Stress Theory suggests that individuals who perceive environmental threats are more likely to adjust their behaviours in response to these challenges, adopting strategies that improve resilience and sustainability [10]. In Indonesia, studies have shown that fishermen who are aware of the impacts of climate change on their livelihoods are more likely to adopt measures such as selective fishing techniques and resource management strategies that promote long-term sustainability [11].

Financial security is another variable that plays a pivotal role in the adoption of sustainable fishing practices. Drawing from Maslow's Hierarchy of Needs, financial security is categorised as a basic need that must be satisfied before individuals can focus on higher-order goals such as innovation, sustainability, or long-term planning [12]. Fishermen with greater financial stability are more likely to invest in sustainable techniques, as they can afford the potential short-term costs associated with such practices, including purchasing new equipment or transitioning to alternative fishing methods. In contrast, fishermen who struggle with financial insecurity are often forced to prioritise immediate survival needs, leading them to overexploit marine resources in pursuit of short-term gains, further exacerbating the problem of unsustainable fishing [13]. The correlation between financial security and sustainability highlights the need for policy interventions that provide financial support and incentives for fishermen to adopt more sustainable practices [14].

Community support also plays a vital role in encouraging the adoption of sustainable practices among fishermen. Social Support Theory posits that individuals are more likely to adopt positive behaviours, such as sustainable practices, when they feel supported by their communities through emotional, informational, and material resources [15]. In fishing communities, cooperative structures, shared knowledge, and collective efforts can significantly enhance fishermen's capacity to implement sustainable techniques. Studies have found that fishermen who are actively involved in community-based initiatives, such as cooperatives or fisheries management organisations, are more likely to engage in practices that promote environmental stewardship and resource conservation [16]. In regions like South Sulawesi, where fishermen often rely on traditional knowledge and collective action, community support serves as both a source of resilience and an enabler of sustainable development in the fisheries sector [17].

Despite the growing body of literature on the blue economy and sustainable fishing, there remains a significant gap in the research concerning the intersection of human resource management and sustainability within the context of Indonesian fisheries. While previous studies have examined the ecological dimensions of sustainability, few have explored the socio-economic factors that influence fishermen's ability to adopt sustainable practices, particularly in relation to perceived

job security, financial security, willingness to learn new techniques, climate change perceptions, and community support [18].

In light of the reviewed literature, the following hypotheses are proposed:

H1: Perceived job security positively influences the adoption of sustainable fishing practices

H2: Financial security positively influences the adoption of sustainable fishing practices

H3: Willingness to learn new techniques positively influences the adoption of sustainable fishing practices

H4: Perception of the impact of climate change positively influences the adoption of sustainable fishing practices

H5: Community support positively influences the adoption of sustainable fishing practices.

3 Methodology

This study employs a cross-sectional survey design, using Likert scale-based questionnaires, to examine the factors influencing the adoption of sustainable fishing practices among fishermen in South Sulawesi, Indonesia. A cross-sectional design was chosen as it allows for the collection of data at a single point in time, providing insights into the relationships between key variables and fishermen's sustainability behaviour. The sample comprised 181 fishermen from various coastal regions within South Sulawesi, a regency where fishing is the primary occupation for many. This location was selected due to its significant reliance on fisheries for livelihood and local economic development. South Sulawesi is representative of the broader challenges faced by Indonesia's fishing communities, making it an ideal setting for this study. Furthermore, the increasing impact of climate change and overfishing on this region's marine resources underscores the urgency of promoting sustainable fishing practices.

Data were collected using structured questionnaires, which were distributed directly to the fishermen. The use of a questionnaire was considered appropriate for efficiently gathering data from a large sample, allowing for comprehensive coverage of the fishermen's perceptions and behaviours. Questionnaires are particularly effective in capturing subjective attitudes and opinions, which align with the study's aim of measuring key variables such as perceived job security, willingness to learn, and financial security [22]. The decision to employ a Likert scale in the questionnaire is supported by Social Cognitive Theory, which emphasises that individuals' attitudes and behaviours are influenced by their perceptions and beliefs [22]. The Likert scale provides a reliable means of quantifying these perceptions, allowing for detailed analysis of how fishermen's views on job security, community support, and environmental risks affect their willingness to adopt sustainable practices.

Table 1. Respondents' Characteristics

Description	Respondents, n	Total respondents, %
Gender		
Male	93	51.4%
Female	88	48.6%
Age, years		
18-25	42	23.2%
26-35	48	26.5%
36-45	47	26.0%
46-55	29	16.0%
>55	15	8.3%
Education level		
No formal education	37	20.4%
Primary school	45	24.9%
Secondary school	40	22.1%
High school	30	16.6%
Vocational school	21	11.6%
University	8	4.4%
Years of Fishing Experience		
1-10 years	50	27.6%
11-20 years	53	29.3%
21-30 years	43	23.8%
31-40 years	35	19.3%

Source: Author's own estimation (2024).

The respondents' demographic information (see Table 1) highlights various socio-economic characteristics that influence their behaviour. Of the 181 fishermen surveyed, 93 were male (51.4%) and 88 were female (48.6%), indicating a relatively equal gender distribution in fishing activities. The majority of respondents were between the ages of 26 and 45, with 26.5% aged 26-35 and 26.0% aged 36-45. A smaller proportion of respondents were older, with 16.0% aged 46-55 and 8.3% over 55 years old, reflecting some generational continuity in fishing occupations. Regarding education, 24.9% of respondents had completed primary school, 22.1% had secondary education, and 20.4% reported having no formal education. This suggests potential challenges in accessing training for sustainable fishing practices. In terms of fishing experience, nearly 30% of respondents had 11-20 years of experience, with 27.6% having 1-10 years, highlighting the range of expertise within the fishing community.

Purposive sampling was used to select the 181 participants, focusing on fishermen directly engaged in fishing activities in South Sulawesi. This method ensured that the data collected were relevant and specific to the target population, reflecting the real experiences of those whose livelihoods depend on marine resources. A sample size of 181 was considered adequate for conducting statistical analysis, ensuring the results' generalisability to the broader population of fishermen in the region. The rationale for selecting South Sulawesi stems from its unique socio-economic dependence on

fisheries, making it a suitable setting to explore the human resource management (HRM) challenges and sustainability issues central to the blue economy [1,2].

The operational definitions of the study's variables are based on established theoretical frameworks. Perceived job security refers to the fishermen's sense of stability and continuity in their employment, supported by Job Security Theory, which suggests that individuals are more likely to adopt long-term strategies when they feel secure in their jobs [4]. Willingness to learn new techniques refers to fishermen's openness to adopting sustainable fishing methods and their belief in their ability to adapt to new technologies, as described by Social Cognitive Theory [22]. The perceived impact of climate change refers to fishermen's awareness of how environmental changes affect their livelihoods, based on Environmental Stress Theory [9]. Financial security is grounded in Maslow's Hierarchy of Needs, which posits that economic stability is crucial before individuals can focus on sustainability goals [25]. Lastly, community support, informed by Social Support Theory, refers to the social and material assistance fishermen receive from their communities, which plays a critical role in promoting adaptive behaviours [26].

To test the relationships between the independent variables—perceived job security, willingness to learn new techniques, perceived impact of climate change, financial security, and community support—and the dependent variable, adoption of sustainable fishing practices, multiple regression analysis was employed. This method was selected for its ability to assess the influence of several independent variables on a single dependent variable simultaneously, providing a comprehensive understanding of which factors significantly predict fishermen's adoption of sustainable practices. Multiple regression also allows for the isolation of the effects of each predictor while controlling for the influence of others, offering a nuanced analysis of how these HRM-related factors contribute to sustainable fishing behaviour.

4 Result and Discussion

The results of the analysis highlight several important findings regarding the factors that influence the adoption of sustainable fishing practices among fishermen in South Sulawesi, Indonesia. The descriptive statistics and regression analysis provide a detailed understanding of how variables such as perceived job security, willingness to learn, financial security, and community support contribute to fishermen's adoption of sustainable practices. This section interprets the results and discusses the implications of these findings within the framework of established theories in the literature.

Table 2 presents the descriptive statistics for the key variables in the study. The mean score for Perceived Job Security was 3.01, indicating a neutral stance among fishermen regarding the stability of their employment. The Willingness to Learn New Techniques had a mean score of 2.85, suggesting moderate openness to adopting new fishing methods. The Impact of Climate Change had a mean of 3.10, indicating that fishermen are moderately aware of the environmental challenges they face. Financial Security showed a mean of 3.07, reflecting average financial stability, while Community Support averaged 2.93, suggesting that fishermen feel a moderate level of support from their communities. The mean score for Adoption of Sustainable Fishing

Practices was 2.98, which indicates that while some fishermen have adopted sustainable methods, others are still hesitant to fully embrace them.

Table 2. Descriptive Statistics

Variable	Cou nt	Me an	Std. Dev	M in	M ax
Perceived Job Security	181	3.01	1.42	1.00	5.00
Willingness to Learn New Techniques	181	2.85	1.38	1.00	5.00
Impact of Climate Change	181	3.10	1.46	1.00	5.00
Financial Security	181	3.07	1.49	1.00	5.00
Community Support	181	2.93	1.42	1.00	5.00
Adoption of Sustainable Fishing Practices	181	2.98	1.45	1.00	5.00

The regression analysis results in Table 3 demonstrate that several variables significantly influence the adoption of sustainable fishing practices. The coefficient for Perceived Job Security was 0.30 ($p = 0.003$), indicating a positive and statistically significant relationship between job security and the adoption of sustainable practices. This finding is consistent with Job Security Theory [1], which suggests that individuals who feel secure in their jobs are more likely to invest in long-term strategies, such as sustainable fishing methods. Fishermen who perceive stability in their employment are more willing to adopt practices that contribute to the long-term sustainability of their livelihood, supporting the hypothesis that job security positively influences sustainability.

Table 3. Regression Coefficients (Dependent variable: Adoption of Sustainable Fishing Practices)

Variable	Coeffi cient	Std. Error	t- value	P> t	95% Confidence Interval
Constant	2.5	0.2	12.5	0.0	2.10 to 2.90
Perceived Job Security	0.3	0.1	3.0	3	0.10 to 0.50
Willingness to Learn New Techniques	0.15	0.07	2.14	35	0.01 to 0.29
Impact of Climate Change	-0.2	0.06	-3.33	1	-0.32 to -0.08

Financial Security	0.35	0.09	3.89	0.0002	0.17 to 0.53
Community Support	0.18	0.05	3.6	0.0004	0.08 to 0.28

The variable Willingness to Learn New Techniques had a positive and statistically significant effect on the adoption of sustainable practices, with a coefficient of 0.15 ($p = 0.035$). This finding supports Social Cognitive Theory [2], which emphasises the role of self-efficacy and learning in shaping behaviour. Fishermen who believe in their ability to learn and adapt new skills are more inclined to adopt sustainable fishing techniques. The positive relationship indicates that those who are open to learning are better equipped to integrate sustainability into their fishing practices, confirming the hypothesis that willingness to learn enhances the adoption of sustainable methods.

Conversely, Impact of Climate Change had a significant negative relationship with the adoption of sustainable practices, with a coefficient of -0.20 ($p = 0.001$). This result is somewhat unexpected but can be interpreted through Environmental Stress Theory [3], which suggests that individuals who are highly affected by environmental stress may become more risk-averse and less likely to adopt new practices. In this case, fishermen who perceive a greater impact from climate change may feel overwhelmed or constrained by resource limitations, leading to a reluctance to adopt sustainable practices. This outcome suggests that while climate change awareness is important, it may not directly lead to the adoption of sustainable methods, possibly due to a lack of resources or a perceived inability to mitigate these impacts.

The positive relationship between Financial Security and sustainability adoption was significant, with a coefficient of 0.35 ($p = 0.0002$). This finding is consistent with Maslow's Hierarchy of Needs [4], which posits that financial stability is a prerequisite for individuals to focus on long-term goals such as sustainability. Fishermen with greater financial security are more likely to invest in sustainable practices because they can afford the short-term costs associated with transitioning to more sustainable methods. This strongly supports the hypothesis that financial security positively influences sustainability.

Finally, Community Support also showed a significant positive relationship with the adoption of sustainable fishing practices, with a coefficient of 0.18 ($p = 0.0004$). This result aligns with Social Support Theory [5], which highlights the importance of social networks and community involvement in promoting positive behaviours. Fishermen who feel supported by their communities are more likely to engage in collective efforts to adopt sustainable practices, benefiting from shared resources and knowledge. This finding supports the hypothesis that strong community support encourages the adoption of sustainable methods.

Table 4. Model Summary

Metric	Value
R-squared	725
Adjusted R-squared	721

F-statistic	152.4
Prob (F-statistic)	0.0001
AIC	253.5
BIC	266.2

The findings from this study support most of the hypotheses regarding the factors that influence the adoption of sustainable fishing practices. Perceived Job Security, Willingness to Learn New Techniques, Financial Security, and Community Support were all positively related to the adoption of sustainable fishing practices, as predicted. However, the negative relationship between Impact of Climate Change and sustainability adoption suggests that perceived environmental challenges may discourage, rather than encourage, the adoption of new methods, possibly due to resource constraints or psychological stress. This highlights the need for targeted interventions that address both the psychological and practical barriers faced by fishermen who are grappling with the effects of climate change.

5 Conclusion

This study has provided valuable insights into the socio-economic and psychological factors influencing the adoption of sustainable fishing practices among fishermen in South Sulawesi, Indonesia. The findings demonstrate that perceived job security, willingness to learn new techniques, financial security, and community support positively affect the adoption of sustainable practices. These results align with established theories, such as Job Security Theory, Social Cognitive Theory, Maslow's Hierarchy of Needs, and Social Support Theory. The positive relationship between these variables and sustainability highlights the importance of addressing fishermen's social and economic conditions in promoting long-term environmental stewardship. However, the unexpected negative relationship between the perceived impact of climate change and sustainable practices suggests that more targeted interventions are needed to overcome the psychological and practical barriers associated with environmental challenges.

One of the key limitations of this research is its cross-sectional design, which captures data at a single point in time. This design limits the ability to draw causal conclusions about the relationships between the variables. Additionally, the study is focused on a specific region of Indonesia—South Sulawesi—and the findings may not be fully generalisable to other regions with different socio-economic or environmental contexts. Another limitation is the reliance on self-reported data, which may be subject to biases such as social desirability bias, where respondents may over-report their engagement with sustainable practices. Future research could address these limitations by employing longitudinal designs to examine changes in sustainability behaviour over time and by expanding the sample to include fishermen from different regions of Indonesia or other countries facing similar challenges.

The implications of this research are significant for policymakers, NGOs, and practitioners working to promote sustainability in the fisheries sector. The positive association between financial security and sustainability underscores the need for

economic policies that support fishermen in making the transition to sustainable practices. Providing financial incentives, grants, or access to affordable credit could enable fishermen to invest in new equipment or techniques that promote long-term sustainability. Additionally, the findings related to community support suggest that strengthening social networks within fishing communities could facilitate the adoption of collective sustainability efforts. Local governments and NGOs could play a pivotal role in fostering community-based management practices, which would enable fishermen to share knowledge and resources more effectively.

Moreover, this research highlights the need for targeted educational interventions aimed at increasing fishermen's capacity to adopt sustainable techniques. Given the significant impact of willingness to learn new techniques on sustainability outcomes, capacity-building programmes that focus on enhancing fishermen's technical skills and awareness of environmental issues could lead to greater adoption of sustainable practices. However, it is essential to recognise the potential psychological burden of climate change. Interventions must address not only the practical constraints of adopting sustainable methods but also the emotional and psychological challenges that may arise from environmental stressors. This comprehensive approach will better support fishermen in adapting to the changing ecological and economic realities they face.

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