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Analysis of Sustainable Fisheries Marketing to Achieve SDGS (Sustainable Development Goals): A Study on SDG Integration in Fishery Product Marketing Practices

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Abstract: This research examines sustainable fisheries marketing strategies and their role in achieving Sustainable Development Goals (SDGs), with a focus on integrating SDGs into fishery product marketing practices. The study addresses the global challenge of overfishing and declining fish populations through a quantitative approach, surveying middle-up management personnel at PT. XYZ. Using Structural Equation Modeling with Partial Least Square analysis, the research investigates the relationships between fish stock measurement, ecosystem impact assessment, and local community welfare in sustainable marketing practices. The findings demonstrate significant positive relationships between these environmental and social factors with sustainable marketing practices, which in turn influence SDG integration in the fisheries sector. The research contributes theoretically to sustainable marketing model development in fisheries and provides practical recommendations for industry stakeholders and policymakers. Results emphasize the importance of integrating environmental, social, and economic aspects in fisheries marketing strategies to achieve sustainable development objectives.

Keywords: *Sustainable Marketing, Sustainable Development Goals, Fish Stock Measurement, Ecosystem Impact, Community Welfare.*

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I. INTRODUCTION

Excessive exploitation of fisheries resources has become an increasingly concerning global issue. Reports from the Food and Agriculture Organization (FAO) indicate that approximately 34% of global fish stocks have been overexploited to the point of unsustainability in 2020, a significant increase compared to approximately 10% in the early 1970s (Pauly & Zeller, 2016). This drastic decline reflects a failure in managing fisheries resources sustainably.

In Southeast Asia, illegal, unreported, and unregulated fishing practices (IUU Fishing) have become a major problem affecting countries such as Indonesia, the Philippines, and Thailand. According to Beveridge & Phillips (2016), IUU Fishing in Indonesian waters causes economic losses of USD 4 billion annually. This is reinforced by findings from Thomson & Sneddon (2017) who identified the negative impacts of IUU Fishing on coastal community welfare and marine ecosystem sustainability.

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Table 1: Volume of Fisheries Exports by Commodity 2019-2023

Commodity	2019	2020	2021	2022	2023*
Total Export Volume (Tons)	**1,184,172**	**1,262,830**	**1,221,905**	**1,224,060**	**1,221,196**
Bawal	6,708	7,158	5,020	4,421	7,754
Catfish	3,446	4,624	2,521	2,222	2,632
Cumi-Sotong-Gurita	143,847	140,036	168,226	157,723	152,910
Kekerangan	13,531	8,214	5,354	8,400	8,678
Kerapu	7,692	5,844	6,056	6,140	7,062
Komoditas Lainnya	294,492	288,393	238,263	243,898	236,215
Layur-Gulama-Reeve S Croakers-Bigeye Croakers	23,488	48,868	43,894	19,537	25,214
Lobster	1,633	2,150	1,960	1,470	1,145
Makarel	5,221	36,540	11,619	2,876	2,702
Mutiara	8	6	10	13	11
Rajungan-Kepiting	25,943	27,616	32,813	29,178	29,371
Rumput Laut	209,241	195,574	225,612	253,680	265,844
Sarden-Sardinella	12,391	18,703	21,728	18,592	18,243
Sidat	10,257	10,982	10,165	8,257	4,029
Tepung Ikan-Pellet-Makanan Ikan	14,315	15,941	7,685	15,063	18,978
Tilapia	12,033	12,288	10,583	11,418	11,166
Tuna-Tongkol-Cakalang	184,130	195,759	174,764	194,724	203,203
Ubur-ubur	8,073	4,851	5,548	5,248	5,421
Udang	207,703	239,282	250,715	241,201	220,889

Source: BPS Diolah DJPDSPKP, 2023

This increase in export volume creates a dilemma between meeting market demand and resource sustainability. According to Lazuari (2022), without appropriate sustainable marketing strategies, increased export volumes can threaten the long-term preservation of fisheries resources. This aligns with findings from Olsen (2017) who identified the importance of integrating ecosystem impact assessments into marketing strategies to ensure the sustainability of the fishing industry.

Previous research has examined various aspects of sustainability in the fishing industry, but several gaps remain to be explored further. In studies on fish stock measurement, Pauly & Zeller (2016) found that global fish stock data is often inaccurate and not integrated with marketing strategies. Their research focused on the technical aspects of fish stock measurement but had not examined how this data could be integrated into sustainable marketing strategies. Consistent with these findings, Beveridge & Phillips (2016) identified the importance of fish stock measurement for sustainability but had not explained the mechanism for its integration into marketing practices.

In the context of ecosystem impact, Thomson & Sneddon (2017) have examined the relationship between fishing practices and marine ecosystem health. Although their research provided an in-depth understanding of ecological impacts, there remains a gap in how ecosystem impact assessments can be integrated into sustainable marketing strategies. The study conducted by Olsen (2017) on ecosystem impacts in the fishing industry had not explored how ecosystem impact assessment results could influence marketing decisions and consumer preferences.

A third gap is identified in studies on community welfare. Jentoft & Chuenpagdee (2015) researched social aspects in fisheries management but had not examined how community welfare could be integrated into marketing strategies. The study conducted by Adams et al. (2016) on sustainability-oriented innovation touched on social aspects, but its primary focus was on technological innovation, not on integrating social aspects into marketing strategies.

Regarding the integration of Sustainable Development Goals (SDGs), Lazuari's (2022) research examined the implementation of SDGs in the fishing industry in general. However, this study had not specifically analyzed the role of sustainable marketing in supporting SDG achievement. Kotler (2021) developed the concept of sustainable marketing, but its application in the context of fisheries sector SDGs still requires further study.

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These research gaps are further confirmed by a recent study by Tinonetsana (2024), which identified that integrating sustainability into business strategies still faces various implementation challenges. This research recommends the need for further studies on how to effectively integrate environmental, social, and economic aspects into marketing strategies.

This research seeks to fill these gaps by developing an integrated model that connects fish stock measurement, ecosystem impact assessment, and community welfare with sustainable marketing and SDG achievement. The research uses a quantitative approach with Structural Equation Modeling based on Partial Least Square (PLS-SEM) analysis. Data was collected through a survey of 100 middle to upper management personnel in the Indonesian fishing industry. The results are expected to provide theoretical contributions to the development of sustainable marketing models in the fisheries sector and provide practical recommendations for industry stakeholders and policymakers.

II. LITERATUR REVIEW

A. Dynamic System Theory

Dynamic system theory is a computer-based simulation modeling methodology developed by Jay Forrester from MIT. This theory emphasizes understanding how all objects in a system interact with each other (Sterman, 2000).

B. Sustainable Marketing Concept

Sustainable marketing is defined as the process of planning, implementing, and controlling the development, pricing, promotion, and distribution of products that meet the criteria: (1) customer needs are met, (2) organizational objectives are achieved, and (3) the process is compatible with the ecosystem (Kotler, 2021).

C. Sustainable Development Goals (SDGs)

SDGs are a global development agenda consisting of 17 goals with 169 targets established by the UN through 2030. The fisheries sector is closely related to several SDG goals, especially SDG 14 (Life Below Water) and SDG 12 (Responsible Consumption and Production).

D. Fish Stock Measurement

Fish stock measurement is an important component in sustainable fisheries management. Pauly and Zeller (2016) define fish stock measurement as the process of evaluating fish population conditions in waters, which can be used as a basis for determining catch quotas and ensuring that fishing practices are not excessive or overfishing.

E. Ecosystem Impact Assessment

Ecosystem impact assessment is the process of evaluating the impact of human activities on aquatic ecosystems. According to Olsen (2017), ecosystem impact assessment includes evaluation of various environmental aspects, such as biodiversity, water quality, and marine habitat conditions. This measurement is crucial in understanding the extent to which fishing activities cause ecosystem damage or changes, such as species population decline, coral reef damage, and marine pollution.

F. Local Community Welfare Measurement

Measuring local community welfare is an important aspect of sustainable fisheries management. Jentoft and Chuenpagdee (2009) state that coastal communities that depend on the fisheries sector are often the groups most vulnerable to environmental and economic changes. Measuring local community welfare must include the economic, social, and health aspects of communities involved in the fishing industry.

G. Integration of SDGs in Marketing Practices

Integrating SDGs into fishery product marketing practices is an effort to align marketing activities with sustainable development goals. Alfaris and Rustam (2023) show that achieving SDGs requires a multidimensional approach that integrates various aspects of development.

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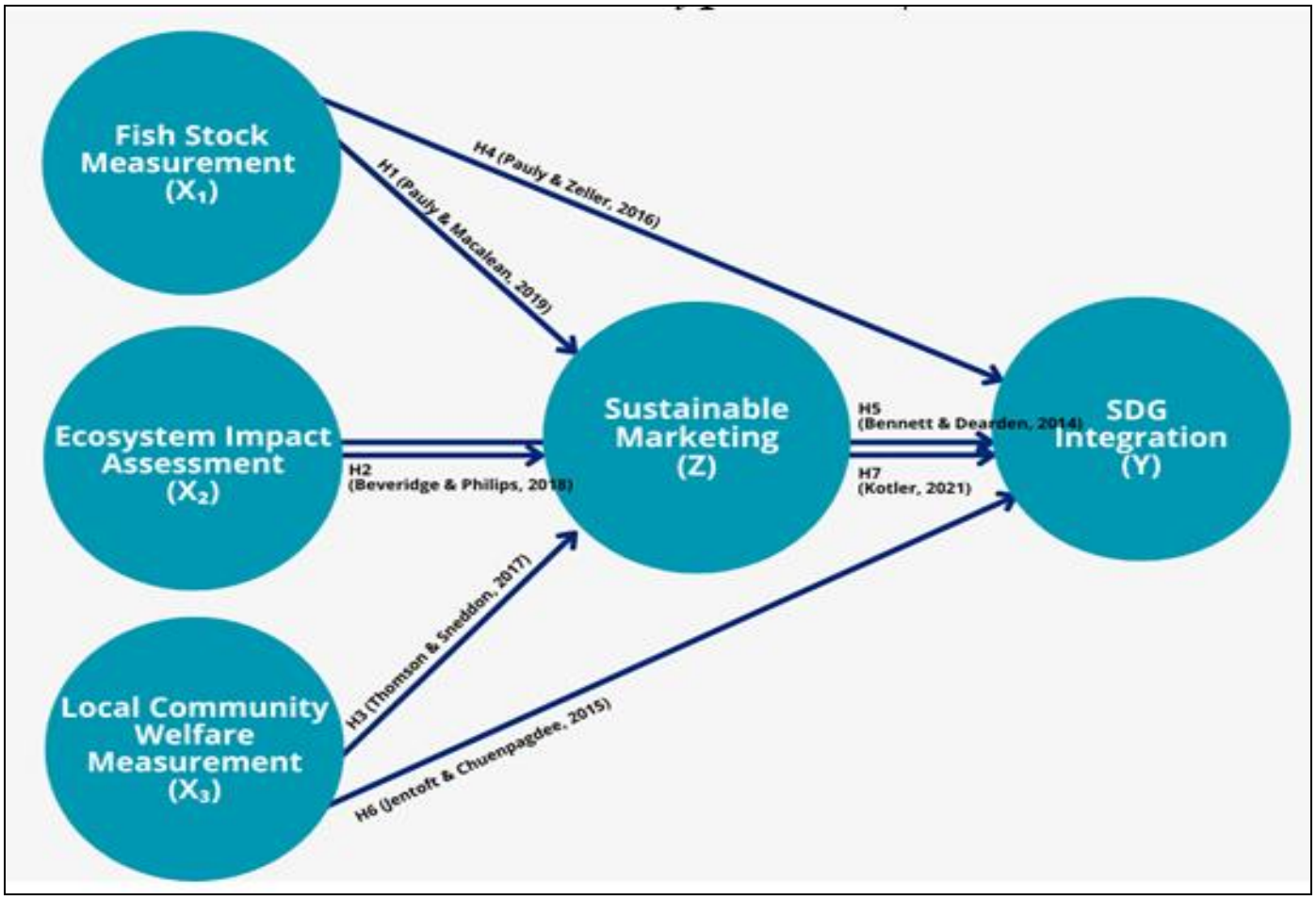
H. Research Framework and Hypotheses



Gambar 1: Desain Penelitian

- **H1**: Fish Stock Measurement (X1) has a positive and significant effect on Sustainable Marketing (Z);
- **H2**: Ecosystem Impact Assessment (X2) has a positive and significant effect on Sustainable Marketing (Z);
- **H3**: Local Community Welfare Measurement (X3) has a positive and significant effect on Sustainable Marketing (Z);
- **H4**: Fish Stock Measurement (X1) has a positive and significant effect on SDG Integration (Y);
- **H5**: Ecosystem Impact Assessment (X2) has a positive and significant effect on SDG Integration (Y);
- **H6**: Local Community Welfare Measurement (X3) has a positive and significant effect on SDG Integration (Y);
- **H7**: Sustainable Marketing (Z) has a positive and significant effect on SDG Integration (Y).

III. RESEARCH METHODOLOGY

A. Research Design

This research uses a quantitative approach with survey methods. According to Creswell (2010), the quantitative approach involves measuring quantitative data and objective statistical analysis using scientific calculations from a sample of people or populations who are asked to answer a series of survey questions. This approach allows researchers to answer research questions by making careful measurements of the variables studied, so that conclusions generated can be generalized.

B. Population and Research Sample

The population in this study is employees of PT. XYZ. The selected research sample is 100 middle to upper management personnel. The middle to upper manager group was chosen because they are considered to have in-depth knowledge regarding sustainable marketing strategies and company performance in the context of sustainable fisheries resource management.

C. Data Analysis Method

Data analysis in this study uses Structural Equation Modeling (SEM) based on Partial Least Square (PLS). According to Ghozali and Latan (2015), PLS-SEM aims to develop theory or build theory (prediction orientation). PLS is used to explain the presence or absence of relationships between latent variables (prediction).

PLS-SEM analysis consists of two sub-models, namely the measurement model (outer model) and the structural model (inner model). Evaluation of the outer model is carried out to test the validity and reliability of the instrument, while evaluation of the inner model is carried out to test the relationship between latent variables.

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Evaluation of the outer model includes testing Reliability, Convergent Validity, and Discriminant Validity. The construct is declared reliable if the composite reliability and Cronbach alpha values are > 0.70. The PLS model is declared validated convergently if the loading factor value is greater than 0.70 and the AVE (Average Variance Extracted) value of each construct is greater than 0.5.

Evaluation of the inner model is done by looking at the R-Square value and conducting hypothesis testing. R-Square values of 0.75, 0.50, and 0.25 can be concluded that the model is strong, moderate, and weak, respectively. Hypothesis testing is done by looking at the t-statistics value. The hypothesis is accepted if the t-statistics value is greater than 1.96 at the 5% significance level.

IV. RESULTS AND DISCUSSION

A. Outer Model Evaluation Results

Table 2: Outer Model Evaluation Results

Criteria	Parameter	Value	Standard	Remark
Convergent Validity	*Loading Factor*	0,738 - 0,866	> 0,70	Met
	AVE	0,640 - 0,670	> 0,50	Met
Discriminant Validity	*Fornell-Larcker*	Higher correlation with own construct	-	Met
	Cross Loading	Higher loading on own construct	-	Met
Reliability	*Cronbach's Alpha*	0,949 - 0,968	> 0,70	Met
	Composite Reliability	0,955 - 0,968	> 0,70	Met

Table 2. shows the results of the measurement model evaluation (outer model) that tests the validity and reliability of the research instrument. Based on this table, all parameters have met the established standards. The loading factor values are in the range of 0.738 - 0.866 (above the standard 0.70) and the Average Variance Extracted (AVE) values are in the range of 0.640 - 0.670 (above the standard 0.50), which indicates that the model has good convergent validity. The discriminant validity criteria are also met where the correlation value of indicators with their own construct is higher compared to other constructs. In terms of reliability, the Cronbach's Alpha (0.949 - 0.965) and Composite Reliability (0.955 - 0.968) values are far above the standard of 0.70, indicating that the research instrument has very good internal consistency. Overall, this measurement model shows that the research instrument is valid and reliable.

B. Inner Model Evaluation Results

Table 3: R-Square Values

Endogenous Variable	*R-Square*	Category
Sustainable Marketing (Z)	0,959	Strong
SDG Integration (Y)	0,952	Strong

Table 3. presents the R-Square values that indicate the predictive ability of the structural model. The R-Square for the Sustainable Marketing variable (Z) is 0.959, which means that 95.9% of the variation in the Sustainable Marketing variable can be explained by the Fish Stock Measurement (X1), Ecosystem Impact Assessment (X2), and Local Community Welfare Measurement (X3) variables. As for the SDG Integration variable (Y), the R-Square value is 0.952, which means 95.2% of the variation in this variable can be explained by the independent and mediator variables in the model. According to Chin's criteria (in Ghozali, 2015), R-Square values above 0.67 are categorized as "Strong." This shows that the research model has very good predictive ability and is relevant in the context of this study.

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Table 4: Hypothesis Testing Results

Hypothesis	Relationship	Path Coefficient	*t-statistic*	*p-value*	Remark
H1	X1 → Z	0.2520	2.7860	0.0060	Accepted
H2	X2 → Z	0.4000	3.2310	0.0010	Accepted
H3	X3 → Z	0.3570	5.3430	0.0000	Accepted
H4	X1 → Y	0.0210	0.1920	0.8480	Rejected
H5	X2 → Y	0.2170	1.4130	0.1580	Rejected
H6	X3 → Y	0.1860	1.4880	0.1370	Rejected
H7	Z → Y	0.5670	4.2620	0.0000	Accepted

Table 4 displays the results of the research hypothesis testing that reflects the direct influence between variables in the model. Of the seven hypotheses tested, four hypotheses were accepted and three hypotheses were rejected based on t-statistic values and p-values. Hypotheses H1, H2, and H3 testing the influence of Fish Stock Measurement (X1), Ecosystem Impact Assessment (X2), and Local Community Welfare Measurement (X3) on Sustainable Marketing (Z) were accepted with path coefficients of 0.252, 0.400, and 0.357, respectively. The t-statistic values for these three relationships are greater than 1.96 with p-values < 0.05, indicating statistical significance.

Hypothesis H7 testing the influence of Sustainable Marketing (Z) on SDG Integration (Y) was also accepted with a path coefficient of 0.567, t-statistic of 4.262, and p-value of 0.000. In contrast, hypotheses H4, H5, and H6 testing the direct influence of Fish Stock Measurement (X1), Ecosystem Impact Assessment (X2), and Local Community Welfare Measurement (X3) on SDG Integration (Y) were rejected due to t-statistic values below 1.96 and p-values > 0.05. These results indicate that the three independent variables do not have a significant direct influence on SDG Integration, but have an indirect influence through Sustainable Marketing mediation.

Table 5: Indirect Effect Testing Results

Indirect Path	Coefficient	t-statistic	p-value	Remark
X1→Z→Y	0.143	2.301	0.022	Significant
X2→Z→Y	0.227	2.635	0.009	Significant
X3→Z→Y	0.203	3.137	0.002	Significant

Table 5. presents the results of testing the indirect effect of the three independent variables on SDG Integration (Y) through Sustainable Marketing (Z) as a mediator variable. The results show that all indirect paths tested have a significant influence. The indirect effect of Fish Stock Measurement (X1) on SDG Integration through Sustainable Marketing has a coefficient of 0.143 with a t-statistic of 2.301 and p-value of 0.022. The indirect effect of Ecosystem Impact Assessment (X2) has a coefficient of 0.227 with a t-statistic of 2.635 and p-value of 0.009. Meanwhile, the indirect effect of Local Community Welfare Measurement (X3) has a coefficient of 0.203 with a t-statistic of 3.137 and p-value of 0.002.

This table shows that although the three independent variables do not have a direct influence on SDG Integration (as shown in Table 3), they do have a significant indirect influence through Sustainable Marketing. This indicates that Sustainable Marketing acts as a full mediator in the relationship between the three independent variables and SDG Integration, which is an important finding in this research.

C. Discussion

- *The Influence of Fish Stock Measurement on Sustainable Marketing*

The research results show that fish stock measurement has a significant positive effect on sustainable marketing with a path coefficient of 0.252. This finding supports the theory proposed by Pauly and Maclean (2019) about the importance of fish stock measurement in developing sustainable marketing strategies. When companies have valid data about fish stock conditions, they can develop more targeted marketing strategies while considering resource sustainability.

In line with dynamic system theory, the research results show that fish stock measurement is part of a system that interacts and influences the success of sustainable

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marketing. James and Dearden (2014) also emphasize the importance of fish stock monitoring to support responsible fishing practices and sustainable marketing.

- *The Influence of Ecosystem Impact Assessment on Sustainable Marketing*

Ecosystem impact assessment is proven to have a significant positive effect on sustainable marketing with a path coefficient of 0.400. This finding strengthens the theory proposed by Olsen (2017) about the importance of understanding ecological impacts in developing sustainable marketing strategies. The research results show that ecosystem impact assessment provides the largest contribution compared to other variables, which confirms Jentoft and Chuenpagdee's (2015) theory about the close relationship between ecosystem health and fishing industry sustainability.

This result is also in line with the sustainable marketing concept proposed by Kotler (2021) which emphasizes the importance of balance between business interests and environmental conservation.

- *The Influence of Local Community Welfare Measurement on Sustainable Marketing*

The analysis results show a significant positive effect of local community welfare measurement on sustainable marketing with a path coefficient of 0.357. This finding supports Thomson and Sneddon's (2017) theory which emphasizes the importance of social aspects in sustainable marketing. Effective community welfare measurement enables companies to develop more inclusive marketing strategies and support socio-economic development of coastal communities.

This result is also aligned with the triple bottom line concept in sustainable development proposed by Adams et al. (2016), where the social aspect becomes one of the main pillars besides economic and environmental aspects.

- *The Influence of Fish Stock Measurement, Ecosystem Impact Assessment, and Local Community Welfare Measurement on SDG Integration*

The research results show that the direct effects of these three variables (H4, H5, H6) on SDG integration are not significant. However, there are significant indirect effects through sustainable marketing. This indicates that sustainable marketing plays a role as a full mediator in the relationship between these three variables and SDG integration.

- *The Influence of Sustainable Marketing on SDG Integration*

The analysis shows a significant positive effect of sustainable marketing on SDG integration with a path coefficient of 0.567, which indicates the strategic role of sustainable marketing in systemic transformation. In accordance with the concept conveyed by Kotler (2021), sustainable marketing is proven to be an effective instrument in aligning business interests with sustainable development goals.

The findings of this research are in line with the results of studies by Alfaris and Rustam (2023) which show that achieving SDGs requires a multidimensional approach that integrates various aspects of development. Just as employment opportunities and the human development index positively influence economic growth in the context of SDG-8, this research finds that sustainable marketing that considers economic, social, and environmental aspects positively influences SDG integration in the fisheries sector.

V. CONCLUSION

- Fish stock measurement has a positive and significant effect on sustainable marketing in the fishing industry.
- Ecosystem impact assessment has a positive and significant effect on sustainable marketing in the fishing industry.
- Local community welfare measurement has a positive and significant effect on sustainable marketing in the fishing industry.
- Fish stock measurement does not have a significant direct effect on SDG integration, but has a positive and significant indirect effect through sustainable marketing.
- Ecosystem impact assessment does not have a significant direct effect on SDG integration, but has a positive and significant indirect effect through sustainable marketing.
- Local community welfare measurement does not have a significant direct effect on SDG integration, but has a positive and significant indirect effect through sustainable marketing.
- Sustainable marketing has a positive and significant effect on SDG integration in the fishing industry.

Overall, this research proves that a holistic approach that integrates environmental aspects (fish stock measurement and ecosystem impact assessment) and social aspects (local community welfare measurement) is very important in developing sustainable marketing strategies, which in turn support the achievement of SDGs in the fisheries sector.

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