

IMPACT ANALYSIS OF OIL AND GAS COMPANIES' CSR PROGRAMS FOR MITIGATION AND ADAPTATION OF CLIMATE CHANGE IMPACT

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ABSTRACT

In the 6th assessment report published by the IPCC (Intergovernmental Panel on Climate Change), it is stated that the impact of climate change will be felt on the settlements and infrastructure of people living in coastal areas. The magnitude of this potential impact has encouraged the Anambas Islands Regional Government to include this impact in the Anambas Islands District Medium Term Development Plan for 2021-2026. Of course, synergy is needed in handling these impacts by involving all stakeholders, including oil and gas companies operating in this area. This study aims to determine the impact of climate change and the forms of community adaptation, as well as community perceptions of the contribution of oil and gas companies through the CSR change program in order to help mitigate climate impacts and also increase the adaptability of the community. Data was collected from all stakeholders as well as beneficiaries of the company's CSR program, by conducting in-depth interviews, observations, and also using a questionnaire. For the general public, climate change has begun to be felt with extreme weather conditions that often cause disasters, as well as decreased catches of fishermen in coastal areas. In fact, in certain seasons it will affect the smooth transportation of sea people, so that it can affect people's daily activities. Regarding the CSR program that has been carried out by oil and gas companies, the community considers this program very important for them, but further efforts still need to be made in order to meet their expectations, including increasing income.

Keywords: *climate change impacts, community adaptation, CSR program of oil and gas company*

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INTRODUCTION

In its sixth assessment report, the Intergovernmental Panel on Climate Change (IPCC) stated that an increase in the earth's temperature by 1.50C in the near future will cause unavoidable dangers and risks to ecosystems and humans, including loss of biodiversity. across a wide range of ecosystems, including terrestrial, freshwater, coastal, and marine ecosystems (UNGC, 2020). In addition, the IPCC also states that climate change will also have an impact on the warming and acidification of the ocean, which will affect food production from shellfish farming and fisheries. The impact will also be felt on settlements and community infrastructure living in coastal areas. In fact, further sea level rise can result in the loss of lowland coastal ecosystems, including small islands (Ledoh et al., 2019).

Based on the description above, with more than 17 thousand islands and a coastline of more than 95,181 kilometers, Indonesia is a country that is being seriously affected by the current climate change. More than 2,000 islands and 405,000 hectares of coastal areas will sink as a result of climate change, including coral reef ecosystems (Akbar & Huda, 2017). Therefore, in the 2020-2024 RPJMN document, the Government of the Republic of Indonesia states that it is necessary to carry out adaptive social protection efforts, in overcoming the impacts of climate change and natural disasters (Witasari, 2020). These safeguards include a) the Development of social protection that is integrated with economic and social risks; b) Strengthening social

protection institutional systems that are responsive to social and economic risks; c) Development of a social protection financing system (United Nations, 2017).

Geographically, in Indonesia there are 2 (two) provincial areas that are included in the Archipelago category, namely the Kepulauan Riau Province and the Bangka Belitung Province. As an archipelago, the Kepulauan Riau Province has 2,408 islands and the Bangka Belitung Province region has 470 islands (Witasari, 2020). Referring to the ownership of the islands owned by each province, the Kepulauan Riau Province is an area that has a higher threat compared to the Bangka Belitung Islands, due to the current climate change. Administratively, the Riau Islands Province consists of 5 districts and 2 municipalities, namely: (i) Kab. Bintan, has 240 islands; (ii) Kab. Karimun, has 249 islands; (iii) Kab. Kepulauan Anambas, has 238 islands; (iv) Kab. Lingga, has 377 islands; (v) Kab. Natuna, has 154 islands; (vi) Batam City Region, has 329 islands; and (vii) Tanjung Pinang City Area. Of the five Regencies and Cities, only 2 (two) are located on the border, namely: the Kab. Natuna and the district area. Anambas Islands. Of the two, the Kab. The Kepulauan Anambas is the area with the largest number of islands compared to Natuna Regency. With an area that reaches 98.7% in the form of sea and the remaining 1.3% in the form of land, the Anambas Islands Regency has a high potential threat to the social and economic vulnerability of the people in this region due to the current climate change (Rahmanda & Njatrijani, 2019).

Based on the description above, the location of Anambas Islands Regency is included in the 3T category (Forefront, Outermost and Disadvantaged) which makes accessibility to and from this area limited. Even in certain seasons, such as the north wind season, modes of transportation are often unable to operate due to bad weather conditions and high sea waves. As a result, not only is the mobility of the people limited, but also the mobilization of the basic needs of the people brought in from outside the area is also experiencing obstacles, resulting in inflation (Romadhon, 2014).

Based on the conditions mentioned above, the Regional Government of Anambas Islands Regency places climate change as one of the strategic issues relevant to the Anambas Islands Regency area. This is because climate change greatly affects the condition of society, where the existence of infrastructure and housing for residents in this area is very vulnerable to being affected by climate change (Kurniadi, 2015). Therefore the Regional Government requires synergy between government development programs and all stakeholders, including oil and gas companies operating in this area, to reduce the impact of climate change on society (Rahmadi et al., 2022).

Oil and gas companies operating in this area have also carried out Community Empowerment activities for a long time, as a form of their social responsibility towards the communities around their operating areas. Therefore, the study in this research was carried out to find out to: 1) know the forms of community vulnerability and adaptation to climate change that is happening; 2) oil and gas company's CSR program in increasing the adaptive capacity of the community in dealing with climate change; and 3) beneficiaries' perceptions of CSR programs that have been implemented by oil and gas companies (Saputra, 2016).

METHOD

The research design used in this study is a mixed method, which uses both qualitative and quantitative approaches. A qualitative approach was applied to obtain information related to

the level of vulnerability and forms of community adaptation to the impacts of climate change at the research location. Meanwhile, a quantitative approach is used to dig in depth about the type of program and also the impact it has on the implementation of the CSR program of oil and gas companies in the Kab. Anambas Islands. The research was conducted in beneficiary villages, including villages in the Kute Siantan District and villages in the East Siantan District. The collected data will then be triangulated through check-recheck-crosscheck, so that valid data is obtained.

Data collection was carried out by field observation, structured interviews / questionnaires and in-depth interviews. The implementation of primary data collection was carried out in the Anambas Islands Regency area, especially the beneficiaries of oil and gas companies' CSR programs. In addition, primary data was also collected from the company, from the level of Managers, Team Leaders to program implementing staff.

The data collected on the implementation of the CSR Program is limited to the period from 2018 to 2021. The secondary data used in this research comes from books, articles, scientific journals, and sustainability report documents. Questionnaire data was collected from program beneficiaries (purposive sampling) and the number of samples used in this study was 57 respondents, with 24 questions covering aspects of input, process, outcome and sustainability (Kartikasari et al., 2020).

The qualitative data collected was then analyzed using the principle of data triangulation by testing the data with other collected data, both the results of observations, secondary data studies and also the results of in-depth interviews and focus group discussions (FGD). As for quantitative data, validity and reliability tests were carried out to test the research instruments. Validity testing is carried out by using a correlation matrix, namely testing the correlation between each indicator and the total score of the construct. The stages of testing the hypothesis are carried out with the following steps:

Ho : $r_{xixtot} = 0$ there is no correlation between certain question items and the total score (invalid)

Ho: $r_{xixtot} \neq 0$ there is a correlation between certain question items and their total score (valid)

With the norms above, in making decisions, the following rules can be followed:

If the ρ -value of $r_{xixto} < 0.05$ then H_0 is rejected (invalid)

If the ρ -value of $r_{xixto} \geq 0.05$ then H_0 is accepted (valid)

The reliability test was carried out to test the consistency of the answers from respondents who measure a variable I . The analytical tool used to perform reliability testing is Cronbach's Alpha Coefficient where the basis for making a decision whether an indicator is reliable or not is:

If the Cronbach's Alpha Coefficient > 0.60 then all statements in the questionnaire prove to be consistent or reliable

If the Cronbach's Alpha Coefficient < 0.60 then all statements in the questionnaire are not consistent or reliable

In addition to the two tests above, further testing will be carried out between the level of importance and performance in each using the One Sample Test and the Paired Sample Test. The One Sample Test is conducted to evaluate the perceptions and performance of CSR beneficiary items. The stages of testing the hypothesis are carried out with the following steps:

$H_0 : \mu \leq 2.5$, which means that the average perception and performance of the satisfaction item receiving CSR benefits is less than equal to 2.5 (not good)

$H_a : \mu > 2.5$, which means that the average perception and performance of items on satisfaction with receiving CSR benefits is more than 2.5 (already good)

With the norms above, in making decisions, the following rules can be followed:

If the p -value of the t statistic ≤ 0.05 then H_0 is rejected

If the p -value of the t statistic > 0.05 then H_0 is accepted

Furthermore, to test the difference between the perceived level of importance and performance from receiving CSR benefits and the performance obtained, it is carried out using the Paired Sample Test. The stages of testing the hypothesis are carried out with the following steps:

$H_0 : \mu I = \mu P$ which means that there is no average difference between the level of importance and performance for each item of perceived satisfaction of CSR beneficiaries

$H_0 : \mu I \neq \mu P$ which means that there is an average difference between the level of importance and performance for each item of perceived satisfaction of CSR beneficiaries

RESULTS AND DISCUSSION

Profile of Research Respondents. Based on the results of the interviews, it can be described that the beneficiaries of the program are dominated by the age range of 41-55 years and the rest are spread out as shown in the graph below. In addition, when viewed by gender, the respondents to this program were dominated by women who reached 77% and the rest were men who only reached 23%. As for the level of education, the majority of respondents were dominated by those who had graduated from elementary school or the equivalent and did not graduate and did not attend school. While the rest have junior high school education to a diploma or bachelor's degree. Meanwhile, based on income level, 98% of respondents were dominated by income below the minimum wage and only 2% earned more than Rp. 5.7 million. In detail, the distribution of respondents can be seen in the following figure.

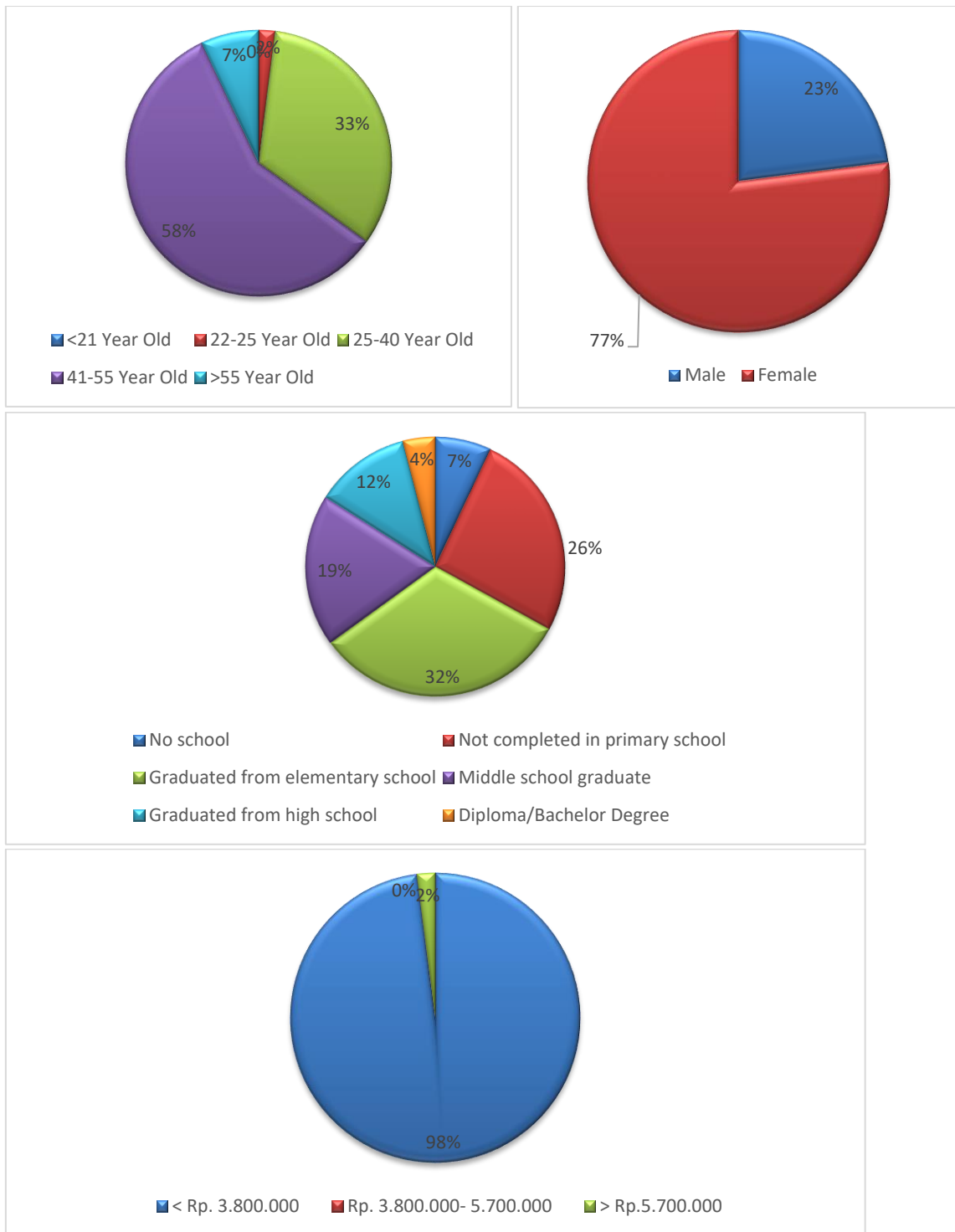


Figure 1. Profile of Research Respondents

Types of Vulnerability and Forms of Community Adaptation to Climate Change. Based on data from the Vulnerability Index Data Information System (2018) issued by the Ministry of Environment and Forestry, it is stated that in the Anambas Islands Regency area there are 5 villages that fall into the "Slightly Vulnerable" category and 49 villages fall into the "Quite Vulnerable" category.

Table 1. Number of Villages Based on Vulnerability Levels Due to Climate Change in Kepulauan Riau Province, 2022

Region	Not Vulnerable	Slightly Vulnerable	Vulnerable Enough	Prone To	Very Vulnerable
1. Karimun District	5	9	57	0	0
2. Bintan District	10	4	37	0	0
3. Natuna District	1	4	68	0	3
4. Lingga District	3	2	77	0	0
5. Kepulauan Anambas District	0	5	49	0	0
6. Batam City	35	3	26	0	0
7. Tanjung Pinang City	13	3	2	0	0
Total	67	30	316	0	3
Percentage	16%	7%	76%	0%	1%

Source: SIDIK, Director General of Climate Change Control, KLHK (Processed, 2023)

Furthermore, based on the results of research on the description of vulnerability in each variable consisting of physical vulnerability, economic vulnerability, social vulnerability and ecological vulnerability, it can be explained as described below.

1. Social Vulnerability. As explained in the previous sub-chapter, the population density in Anambas Islands Regency in 2022 will reach 79.21 people/km² or 0.79 people per hectare. In general, the population density in all sub-districts is quite diverse, with the highest population density in Siantan District with a density of 265.59 people/km² or 2.66 people per hectare and the lowest in Jemaja Timur District with 18.78 people/km² or 0.19 people per hectare. In addition, the sex ratio of the population reached 107 and the ratio of poor people reached 7.51% of the total population. The data on the ratio of the disabled population is not found in the BPS report for Anambas Islands Regency for 2023. The ratio of vulnerable groups in this region reaches 17,898 people or 35.59% of the total population, consisting of: 13,197 children and 4,701 elderly people. With this description, the level of social vulnerability in the Kepulauan Anambas district is in the low category
2. Economic Vulnerability. Economic vulnerability indicators used in this study include: sources of income and catches.
 - a. Source of Income. Generally, people in this area have more than 1 source of income. Apart from carrying out fishing activities, the community also has other productive activities, such as the state civil apparatus (ASN), traders, planters, and also employees. The existence of an oil and gas company's shorebase in this area has become a strong attraction for people to be able to work for the company, even the desire to work for the company has become an attraction for people from outside the sub-district area. Even though they have worked at the company, they generally continue to carry out other economic activities outside of their working hours. This diversity of sources of income, of course, greatly helps the sustainability of people's livelihoods.

- b. Catch Value. In recent years, fishermen as one of the community's livelihoods have complained about a decrease in fish catches in coastal areas or around 20 nautical miles from the coast. To overcome this, fishermen catch fish in other areas, even reaching the operating area or rigs of oil and gas companies. During the north wind season which occurs every year from October to February, fishermen's catches become even more limited. High waves and extreme weather have increased the risk for fishermen in catching fish that have high economic value, such as mackerel, tuna and other fish.
3. Physical Vulnerability. Physical vulnerability indicators used in this study include: social facilities and public facilities, as well as settlements.
 - a. Fasos and fasum. The existence of social and public facilities is a means of supporting community activities. Even though the majority of people choose to live above the sea, they place social and public facilities in the land area. This placement is intended to facilitate access for the public in general so that developments in weather conditions do not affect the accessibility of the community to utilize these facilities.
 - b. Settlements. Currently, the majority of the population lives in coastal areas. People build buildings on the sea, which is part of their custom for a long time. The coast was chosen as a place to live, because it facilitates interaction with immigrants, whereas in the mainland area which is dominated by hills, it is more difficult to live in. In the beginning, the community only used the land as their plantation area. Over time, some people began to choose land areas as a place to live after road access became available. In terms of building materials, people generally use wood as a building material. But over time, some people started using cement and concrete in building their homes.
4. Ecological Vulnerability. Ecological vulnerability indicators used in this study include the availability of clean water, tidal flooding, and waste management.
 - a. Availability of clean water. According to the Payamaram Youth Group, the problem of clean water is a fundamental problem that often comes up in the people of Kute Siantan District, including the Anambas community in general. For the Kute Siantan District area, the source of clean water used by the people in this area comes from groundwater obtained from drilled wells with a depth of 10-20 meters. This water quality includes class 3 quality standards, which means it can only be used for bathing, washing, and toilet needs (MCK). One of the reasons for this condition is the lack of sufficient distance between the location of the drilled well as a source of clean water and the disposal site for dirty water in residential areas. Therefore, to meet drinking water needs, people use refilled water or bottled drinking water (AMDK).
 - b. Tidal floods. With an increase in sea level, currently, many buildings whose position above the sea is very affected if there is an increase in seawater or waves. For buildings with wooden floors, they chose to open the wooden baseboards to avoid being carried away by sea waves. This phenomenon does not only occur in the Kute Siantan District area but is a common phenomenon for coastal communities in the Anambas Islands Regency area.

- c. Waste management. Based on the results of observations and interviews, all villages in the Kute Siantan Subdistrict carry out waste management in the community by collecting it in one place for further burning. For waste that cannot be burned, they only hope that the waste will decompose naturally. Initially, this activity was the only way of managing household waste in the community. However, currently several villages have tried to process some of their waste into organic fertilizer, as was done in the Teluk Bayur Village area to support environmental hygiene and vegetable planting activities in the community.

Perceptions of Program Beneficiaries on the Implementation of the Oil and Gas Company's Community Empowerment Program

Table 2. Validity and Reliability Testing Variable Satisfaction of CSR Program Beneficiaries

Indicator	Validity Testing		Reliability Testing		
	Correlation	Conclusion	Cronbach Alpha	Conclusion	
Input	Compatibility with Needs	0.260*	Valid	0.863	Reliable
	Participation in Program Planning	0.647**	Valid		
	Program Companion Competencies	0,631**	Valid		
Process	Assistance Frequency	0,777**	Valid		
	Participation in Program Implementation	0,609**	Valid		
Output	Knowledge Enhancement	0,603**	Valid		
	Skill Upgrade	0,701**	Valid		
Outcome	Increased revenue	0,754**	Valid		
	Environmental Quality Improvement	0.765**	Valid		
Sustainability	Group Sustainability	0,758**	Valid		

*=alpha 10% **=alpha 5%

Source: Processed data (2023)

Furthermore, a perception and performance test of the beneficiaries of the CSR program was carried out on the aspect of the level of importance and level of performance at each stage of activity, consisting of (i) Input; (ii) Process (process); (iii) output; (iv) Results (outcomes);

and (v) Sustainability (Hakim et al., 2019). In detail, the test results for each stage of the activity are explained in the descriptive narrative below.

Testing the Perception of Importance and Level of Performance at the Input stage

At the input stage, there are 3 (three) variables tested, namely: (i) conformity with needs; (ii) participation in program planning; and (iii) competence of program assistants (Nababan, 2018). Based on the results of data processing using SPSS as stated in the table below, it can be stated as follows:

1. Conformance with Requirements Indicator.

- On the aspect of the level of importance, the test results show that this indicator produces an average value of 3.4561, with a statistical t value of 14.366 and produces a p -value <0.05 . This can be interpreted that beneficiaries have a high perception of the importance of this indicator.
- While on the aspect of performance level, the test results show that the resulting average value is 2.5965 with a statistical t value of 0.888 and produces a p -value >0.05 . This can be interpreted that the beneficiary has a perception of the level of performance that is considered not as expected.
- Testing the average difference shows that there is a significant difference, between the level of importance and the level of performance for the Conformity to Needs indicator, which shows the p -value of t statistics <0.05 .

Based on the test results above, it can be stated that the "Conformance with Needs" indicator is something that is considered important in program implementation, but in practice it is considered unable to meet their expectations. This was expressed by respondents who stated that the implementation of the following activities could prepare not only seeds and fertilizers, but also help to provide soil for planting media, as expressed by beneficiaries who live above the sea.

2. Indicator of Participation in Program Planning.

- In the aspect of the level of importance, the test results show that the average value is 3.5614 with a statistical t value of 14.975 and produces a p -value <0.05 . This can be interpreted that this indicator is considered important for the beneficiaries of the CSR program.
- While on the aspect of performance level, the resulting average value is 3.3860 with a statistical t value of 8.647 and produces a p -value <0.05 . This can be interpreted that respondents assess aspects of the level of performance on this indicator as expected.
- Testing the average difference shows that there is no significant difference between the level of importance and the level of performance on this indicator, which is indicated by the p -value of t statistic >0.05

Based on the test results above, it can be stated that the indicator "Participation in Program Planning" is considered important in program implementation, and in practice it is considered to have shown good performance and met their expectations. Beneficiaries stated that they were actively involved in expressing opinions in planning this program.

3. Program Facilitator Competency Indicators

- The aspect of importance level produces an average value of 3.6842 with a statistical t value of 19.065 and produces a ρ -value <0.05 . This can be interpreted that the beneficiaries of the CSR program have a high level of importance perceptions of the Competency aspects of Program Assistants.
- As for the aspect of performance level, the resulting average value is 3.4561 with a statistical t value of 8.986 and produces a ρ -value <0.05 . This can be interpreted that respondents assess aspects of the level of performance on this indicator as expected.
- Testing the average difference shows that there is no significant difference between the level of importance and performance on this indicator, which is indicated by the ρ -value of t statistics <0.05

Table 3. Perception and Performance Testing Variable Satisfaction of CSR Beneficiaries
Input Stages

Variable	Group	Mean	St Dev	One Sampel Test	Paired Sample	Sig. (2-tailed)
Compatibility with Needs	Interest Level	3.4561	0.502	14.366**	7,789	0.000
	Performance Level	2.5965	0.820	0.888		
Participation in Program Planning	Interest Level	3.5614	0.535	14.975**	1,603	0.115
	Performance Level	3.3860	0.773	8.647**		
Program Companion Competencies	Interest Level	3.6842	0.468	19.065**	3,034	0.004
	Performance Level	3.4561	0.803	8.986**		

*= α 10% **= α 5%

Source: data processed by SPSS

Testing Perceptions of Importance and Performance Levels at the Process Stage.

At the process stage, there are 2 (two) variables tested, namely: (i) assistance frequency; and (ii) participation in program implementation. Based on the results of data processing using SPSS as stated in the table below,

Table 4. Perception and Performance Testing Variable Satisfaction of CSR Beneficiaries
Process Stage

Variable	Group	Mean	St Dev	One Sampel Test	Paired Sample	Sig. (2-tailed)
Assistance Frequency	Interest Level	3.6316	0.48666	17.555**	3.060	0.003
	Performance Level	3.3860	0.81841	8.173**		

Participation in Program Implementation	Interest Level	3.8421	0.36788	27.543**	6.497	0.000
	Performance Level	3.1053	1.02964	4.438**		

Based on the table above, the results obtained are the level of importance and performance, as follows:

1. Assistance Frequency Indicator

- In the aspect of importance, the test results show that the average value is 3.6316 with a statistical t value of 17.555 and produces a p-value <0.05. This can be interpreted that the beneficiaries of the CSR program have a high perception of this assistance frequency indicator.
- While on the aspect of performance level, the test results show that the resulting average value is 3.3860 with a statistical t value of 8.173 and produces a p-value <0.05. This can be interpreted that respondents assess aspects of the level of performance on this indicator as expected.
- Testing the average difference shows that there is no significant difference between the level of importance and the level of performance on this indicator, which is indicated by the p-value of the t statistic <0.05.

2. Indicators of participation in program implementation.

- The aspect of importance produces an average value of 3.8421 with a statistical t value of 27.543 and produces a p-value <0.05. This can be interpreted that the beneficiaries of the CSR program have a high perceived importance of participation indicators in implementing this program.
- While in the performance aspect, the resulting average value is 3.3860 with a statistical t value of 8.173 and produces a p-value <0.05. This can be interpreted that respondents assess the performance aspects of this indicator as good and as expected.
- Testing the average difference shows that there is a significant difference between importance and performance on this indicator, which is indicated by the p-value of the statistical t <0.05

Testing the Perception of Importance and Level of Performance in the Output Stage.

At the output stage, there are 2 (two) variables tested, namely: (i) increased knowledge; and (ii) skills improvement. Based on the results of data processing using SPSS as stated in the table below, it can be stated as follows:

1. Indicators of increased knowledge

- In the aspect of the level of importance, the test results show that the average value is 3.5789 with a statistical t value of 16.353 and produces a p-value <0.05. This can be interpreted that the beneficiaries of the CSR program have a high level of perceived importance of indicators of increased knowledge.
- Whereas in terms of performance level, the resulting average value is 3.2105 with a statistical t value of 6.740 and produces a p-value <0.05. This can be interpreted

that respondents assess aspects of the level of performance on this indicator as expected.

- Testing the average difference shows that there is no significant difference between the level of importance and the level of performance on this indicator, which is indicated by the p-value of the t statistic <0.05

2. Skills Improvement Indicator.

- In the aspect of performance level, the test results show that the average value is 3.7193 with a statistical t value of 18.743 and produces a p-value <0.05. This can be interpreted that the beneficiaries of the CSR program have a high level of importance perceptions of skills improvement indicators.
- While in the aspect of performance level, the resulting average value is 3.1228 with a statistical t value of 6.882 and produces a p-value <0.05. This can be interpreted that respondents assess aspects of the level of performance on this indicator is good and as expected.
- Testing the average difference shows that there is no significant difference between the level of importance and the level of performance on this indicator, which is indicated by the p-value of the t statistic <0.05

Table 5. Perception and Performance Testing CSR Beneficiary Satisfaction Variable Output Stage

Variable	Group	Mean	St Dev	One sampel	Paired Sample	Sig. (2-tailed)
Knowledge Enhancement	Interest Level	3.5789	0.49812	16.353**	3.609	0.001
	Performance Level	3.2105	0.79590	6.740**		
Skill Upgrade	Interest Level	3.7193	0.49115	18.743**	7.589	0.000
	Performance Level	3.1228	0.68322	6.882**		

*=alpha 10% **=alpha 5%

Source: data processed by SPSS

Testing the Perception of the Level of Interest and the Level of Performance at the Outcome Stage.

At the Outcome stage, there are 2 (two) variables tested, namely: (i) increase in income; and (ii) environmental quality improvement. Based on the results of data processing using SPSS as stated in the table below, it can be stated as follows:

1. Indicators of increasing income

- In the aspect of performance level, it produces an average value of 3.5439 with a statistical t value of 15.684 and produces a p-value <0.05. This can be interpreted that the beneficiaries of the CSR program have a high level of perceived importance of indicators of increasing income.

- While on the aspect of performance level, the resulting average value is 2.3860 with a statistical t value of -0.995 and produces a ρ -value > 0.05 . This can be interpreted that respondents assess aspects of the level of performance on this indicator not as expected.
- Testing the average difference shows that there is a significant difference between the level of importance and the level of performance on this indicator, which is indicated by the ρ -value of t statistics <0.05

This condition is in line with the statement of the respondent who assessed that the implementation of this program places more emphasis on teaching farming cultivation and has not helped increase productivity. This statement is based on the type and amount of assistance deemed inadequate in supporting their agricultural cultivation activities. Some of the support needed includes: (i) Planting media and supporting facilities, such as: Polybags, pesticides, soil, pallet boards; (ii) vegetable seed support; (iii) support for organic fertilizers and chemical fertilizers; (iv) Mini tractor, water pump machine, mulch and plant cover nets (Rohmat, 2009).

2. Environmental quality improvement indicators.

- The aspect of importance level produces an average value of 3.6316 with a statistical t value of 17.555 and produces a ρ -value <0.05 . This can be interpreted that the beneficiaries of the CSR program have a high perceived level of importance on environmental quality improvement indicators.
- In the aspect of performance level, the test results show that the resulting average value is 2.8246 with a statistical t value of 2.696 and produces a ρ -value <0.05 . This can be interpreted that respondents assess aspects of the level of performance on this indicator is good and as expected.
- Testing the average difference shows that there is no significant difference between the level of importance and the level of performance on this indicator, which is indicated by the ρ -value of t statistics <0.05

Table 6. Perception and Performance Testing
Variable Satisfaction of CSR Beneficiaries Outcome Stage

Variable	Group	Mean	St Dev	One sample	Paired Sample	Sig. (2-tailed)
Increased revenue	Interest Level	3.5439	0.50250	15.684**	10.398	0.000
	Performance Level	2.3860	0.90147	-0.955		
Environmental Quality Improvement	Interest Level	3.6316	0.48666	17.555**	7.131	0.000
	Performance Level	2.8246	0.90874	2.696**		

*= α 10% **= α 5%

Source: data processed by SPSS

Testing the Perception Level of Importance and Performance Level in the Sustainability Stage.

At this stage, there is 1 (one) variable being tested, namely group sustainability. Based on the results of data processing using SPSS as stated in the table below, it can be stated as follows:

- In the aspect of importance, the test results show that the average value is 3.3860 with a statistical t value of 11.962 and produces a p -value <0.05 . This can be interpreted that the beneficiaries of the CSR program have a high level of importance perception of this group's sustainability indicators.
- While on the aspect of performance level, the resulting average value is 3.3158 with a statistical t value of 8.662 and produces a p -value <0.05 . This can be interpreted that respondents assess the performance aspects of this indicator as expected.
- Testing the average difference shows that there is an insignificant difference between the level of importance and the level of performance on this indicator, which is indicated by the p -value of t statistic > 0.05

Table 7. Perception and Performance Testing Variable Satisfaction of CSR Beneficiaries Sustainability Stage

Variable	Group	Mean	St Dev	One sample	Paired Sample	Sig. (2-tailed)
Group Sustainability	Important	3.3860	.55916	11.962**	0.782	0,438
	Performance	3.3158	.71108	8.662**		

*=alpha 10% **=alpha 5%

Source: data processed by SPSS

Mangrove Ecosystem Rehabilitation Program

Based on the results of interviews with mangrove program informants from the two oil and gas companies, in general, they considered that the implementation of mangrove nurseries and planting had had an impact, both on the environment and also on humans (Guterres, 2020). The impacts on each aspect of sustainable livelihoods include:

1. Natural Resources. In this context, the impact of the program is considered to have been able to increase the number and variety of fish in the mangrove ecosystem area again compared to previous conditions.
2. Human Resources. The implementation of this program has also increased the ability of program beneficiaries to take care of mangrove seedlings, plant and embroider mangrove plants that have been planted but are not growing. Not only that, efforts to socialize and create mangrove nurseries in schools are also considered an effort to build awareness from an early age for students to care for the mangrove ecosystem around where they live.
3. Physical Resources/Infrastructure. Until now, the availability of several infrastructure buildings in the mangrove nursery area in the Company Y program has helped support the sustainability of planting activities. However, program implementers stated that other supporting infrastructure was needed, so that the mangrove planting location could

be used as a tourist area that could have an economic and environmental impact on the community.

4. Financial Resources. The availability of mangrove seedlings has become a source of income for program beneficiaries. In company X's mangrove nursery program, the beneficiaries have sold the seedlings provided to environmental activists who will carry out mangrove planting activities in the Anambas Islands Regency area. In addition, an increase in the number and variety of fish in the mangrove ecosystem area has had an impact on reducing the operational costs of fishermen due to the increase in fishing locations around their living areas.
5. Social Resources. Until now, the implementation of the mangrove nursery and planting program in the framework of the rehabilitation of mangrove ecosystems has been able to raise awareness among school students to plant mangroves in designated locations. Not only that, at the district level, there is synergy in the implementation of activities involving the Indonesian Navy, village government, and oil and gas companies in supporting the implementation of mangrove activities in this area.

CONCLUSION

The conclusions that can be drawn from the research results are as follows: The impact of climate change that is currently happening has begun to be felt by the people in the Anambas Islands Regency area. Climate change mitigation efforts are also being carried out by oil and gas companies through the implementation of CSR programs. Regarding the two CSR programs that have been implemented by oil and gas companies, in general, the beneficiaries of the program consider the program very important to them, however, further efforts still need to be made in order to meet their expectations, the Mangrove Nursery and Planting Program has helped reduce ecological vulnerability by increasing the diversity and number of fish in the area rehabilitation of mangrove ecosystems and the Food Security Program are considered to have helped increase the adaptive capacity of program beneficiaries through increased knowledge and skills in cultivating plants and processing household organic waste.

REFERENCES

- Akbar, T., & Huda, M. (2017). Nelayan, Lingkungan, Dan Perubahan Iklim (Studi Terhadap Kondisi Sosial Ekonomi Pesisir Di Kabupaten Malang). *WAHANA*, 68(1). <https://doi.org/10.36456/wahana.v68i1.630>
- Guterres, A. (2020). The Sustainable Development Goals Report 2020. *United Nations Publication Issued by the Department of Economic and Social Affairs*.
- Hakim, D. A., Hermanto, A., & Fikri, A. (2019). Kebijakan Yuridis Pemerintah Daerah Terhadap Tanggung Jawab Sosial Perusahaan (Corporate Social Responsibility). *Jurnal Mahkamah: Kajian Ilmu Hukum Dan Hukum Islam*, 4(2), 245–266.
- Kartikasari, I. B., Oberto, P., Jauhari, M., & Pujiatikinasi, D. A. (2020). Adaptation of Wayame village Agriculture in Climate Change Through Innovative CSR Programs with The SDGs Approach. *International Journal of Science, Technology & Management*, 1(3), 145–154.

- Kurniadi, H. (2015). Corporate Social Responsibility (CSR) Industri Ekstraktif di Indonesia (Studi Kasus CSR PT. Chevron Pacific Indonesia pada Masyarakat Minas di Provinsi Riau). *Jurnal Communiverse*, 1(1).
- Ledoh, L. Y., Satria, A., & Hidayat, R. (2019). Kerentanan Penghidupan Masyarakat Pesisir Perkotaan Terhadap Variabilitas Iklim (Studi Kasus di Kota Kupang). *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan (Journal of Natural Resources and Environmental Management)*, 9(3). <https://doi.org/10.29244/jpsl.9.3.758-770>
- Nababan, B. S. P. (2018). Analisis Peraturan Daerah Tentang Tanggung Jawab Sosial Perusahaan Di Tengah Iklim Kemudahan Berusaha Dalam Perspektif Teori Perundang-Undangan. *Jurnal Rechts Vinding: Media Pembinaan Hukum Nasional*, 7(3), 353–372.
- Rahmadi, M. M., Liviawaty, E., Faizal, I., Purba, N. P., Ramadhan, R. A., Amrullah, R., & Dianti, I. E. (2022). The vulnerability of Small Islands from Coastlines Change in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 1095(1), 012026.
- Rahmanda, B., & Njatrijani, R. (2019). Aspek Hukum Pemberian Corporate Social Responsibility Perusahaan Terhadap Lingkungan Sekitar. *Law, Development and Justice Review*, 2(2). <https://doi.org/10.14710/ldjr.v2i2.6084>
- Rohmat, D. (2009). *Materi Pengkayaan Pengelolaan Lingkungan Hidup Bagi Dunia Pendidikan Se-Jawa Barat*. Bandung.
- Romadhon, A. (2014). Analisis kerentanan dan adaptasi masyarakat pulau Gili Labak terhadap perubahan iklim berbasis ekosistem terumbu karang. *Konferensi Dan Seminar Nasional Pusat Studi Lingkungan Hidup Indonesia XXII*. Surabaya.
- Saputra, S. E. (2016). Pengaruh leverage, profitabilitas dan size terhadap pengungkapan Corporate social responsibility pada perusahaan di bursa efek Indonesia. *Journal of Economic and Economic Education*, 5(1), 75–89.
- UNGC. (2020). *The Ten Principles | UN Global Compact*. United Nations Global Compact.
- United Nations. (2017). The Sustainable Development Goals Report. *United Nations Publications*. <https://doi.org/10.18356/3405d09f-en>
- Witasari, Y. (2020). Adaptasi Masyarakat Nelayan Terhadap Kerentanan Fisik Pesisir Pulau Bintan. *JFMR-Journal of Fisheries and Marine Research*, 4(3). <https://doi.org/10.21776/ub.jfmr.2020.004.03.16>