

## Externalities of the Modern Fishermen Village Program (Kalamo) for the Community of Samber Binyeri Village in Biak-Numfor District, Papua Province

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### ABSTRACT

This study aims to describe the externalities that exist from the presence of the modern fishing village program (Kalamo) for the Samber Binyeri village community in Biak-Numfor Regency, Papua Province and to find out the economic, social and environmental externalities that develop with the presence of the modern fishing village program (Kalamo) for the Samber Binyeri village community in Biak-Numfor Regency, Papua Province, both positive and negative externalities. The method used in this study is a quantitative descriptive method, with a purposive sampling method. The results of the study indicate that identifying several economic, social and environmental externalities, both positive and negative, with the presence of the modern fishing village program in Biak Numfor Regency, precisely in Samber-Binyeri Village. Such as an increase in income, increased solidarity and cooperation, and good waste and waste management. Positive externalities from both economic, social and environmental aspects have a higher percentage than negative ones

## **INTRODUCTION**

The use of natural resources must be carried out appropriately, as stated in Law No. 5 of 1990 on the Conservation of Biological Natural Resources and Their Ecosystems, ensuring that natural resources are preserved for the present and future. Samber Biyeri Village, also known as Kalamo, has gained national recognition through the Ministry of Maritime Affairs and Fisheries due to its potential as the largest fish supplier in Biak, with 80% of its population being fishermen. Previously, the village was categorized as "kalaju" or an advanced fishing village. In August 2023, the village was classified as a modern fishing village, known as the modern fisherman village. The development of Samber Binyeri Modern Fisherman Village (Kalamo) is a national strategic project by the Ministry of Maritime Affairs and Fisheries aimed at improving the welfare of Indigenous Papuan fishermen (OAP). Several facilities have been constructed, such as kiosks, fuel supplies, fisherman fuel stations (SPBN), cold storage warehouses, and training centers.

According to the Decree of the Minister of Home Affairs No. 9 of 2022 regarding the Tourism Program and Activities Plan, the Tourism Office of Biak Numfor Regency outlined a program to attract tourist destinations by managing tourist sites and empowering the community to manage these sites. The existence of the Modern Fisherman Village program, which will also develop tourism in the Samber Binyeri Modern Fisherman Village (Kalamo) in Biak Numfor Regency, will certainly lead to both positive and negative environmental changes. This will have an impact on the surrounding environment and community in terms of the economy, social, and environmental aspects.

Previous studies, such as by Putra et al. (2022), show that there are significant changes in social and economic aspects. According to Reynold Ronny Nahuway, Hugo Warami, and Ihwan Tjolly (2018), regarding the positive externalities, such as job absorption, business opportunities, and skill improvement. Negative externalities include significant landscape changes and environmental pollution, along with a relatively small emergence of social conflicts.

This study aims to describe the externalities caused by the presence of the modern fisherman village program (Kalamo) for the community of Samber Binyeri Village in Biak Numfor Regency, Papua Province, and to examine the economic, social, and environmental externalities (both positive and negative) that have developed with the presence of the modern fisherman village program (Kalamo) for the community of Samber Binyeri Village in Biak Numfor Regency, Papua Province.

## LITERATURE REVIEW

### *Concept of Externalities*

The impact of one party's activities on another, whether beneficial or detrimental, is known as externalization. To understand how the performance of a company or industry impacts the surrounding society and environment, both positively and negatively, the analysis of industrial externalities is crucial (Prasetya in Elfira R. Rahmadhani, 2016). However, as stated by Karl E. Case and Ray C. Fair (2002), externalities arise when the actions or decisions of one person or group of people provide benefits or costs to a second or third party. Internalization is a process that can encourage leaders to consider the external costs and benefits of their decisions.

Spillover effects are another term for externalities, and in contemporary life, the presence of externalities is an important phenomenon. Examples include pollution from passive smokers in the air, water, land, views, and smoke. The study of externalities is a primary focus of environmental economics. The opening up of Eastern Europe in 1989 and 1990 demonstrated that environmental issues had become a major topic, not just the free-market economy. Through negotiations and bargaining without government intervention, externalities sometimes became part of the way of thinking. According to Henry F. Noor in Mariyana (2017), externalities are the distribution of benefits or burdens to the public that are related to the actions of one party. The term is also used to describe the impacts of production and consumption activities on the general public who have no direct interest in the actions of any particular party.

According to Fauzi (2006), externalities are the effects of one person's actions on others, either positive or negative. Externalities occur when the production or consumption activities of one party undesirably affect the utility (usefulness) of another party, and the party causing the effect does not compensate those affected. However, according to Surjanti (2018), externalities are the impacts generated by economic activities on other parties involved in the economy. Thus, what is meant by externalities are the effects or impacts felt by other economic activities, which can be either positive or negative externalities.

It is explained that externalities can occur when someone engages in an activity that affects the welfare of others but does not pay or receive compensation for the impact (Coase (2013) in Sri Kurniati et al., 2022). Externalities are referred to as negative externalities when the impact of the activity is harmful; conversely, if the impact is beneficial, it is called a positive externality. Guritno Mangkoesobroto states the same in Renica Selvia (2016) that positive externalities occur when someone does something beneficial for others, but the benefit is not allocated to the market. If someone's activity provides benefits but others who receive those benefits do not pay or set a price for those benefits, then when the activity performed by an individual or group benefits another individual or group, it is called a positive externality.

According to Sankar (in Elfira Rizki Rahmadhani, 2016), negative externalities occur when the actions of an individual or group have harmful effects on others. Negative externalities are defined as costs imposed on others outside of the market system, such as those resulting from production activities or pollution.

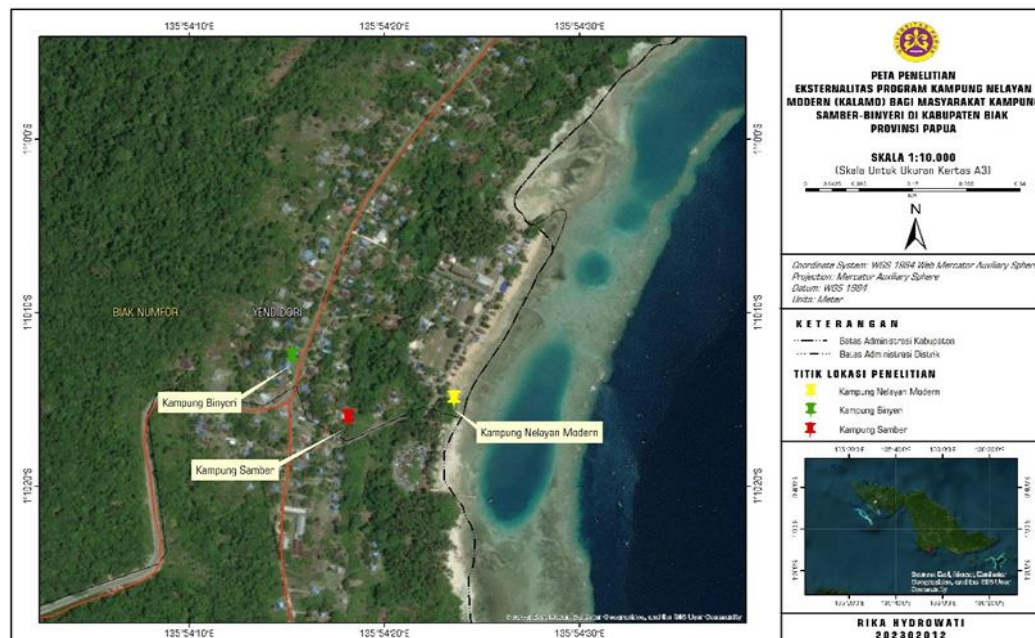
### **Modern Fishermen Village Program**

The Modern Fishermen Village Program is managed by the Ministry of Marine Affairs and Fisheries with the initial thought that fishermen villages today are known for poverty, limited facilities and infrastructure, slums, and other problems. Therefore, the Modern Fishermen Village program was created based on Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 34 of 2022, which mandates the arrangement, provision, and/or improvement of public facilities and infrastructure in fishermen villages to create a well-organized, clean, healthy village environment that can improve the productivity of fishermen and their families. This regulation also explains that a fishermen village is a residential community inhabited by people who mostly work as fishermen. Meanwhile, an advanced fishermen village is a well-organized, clean, and healthy fishermen village that can improve the productivity of fishermen and their families.

## **METHODOLOGY**

### **Research Location**

The research location or study area is at the Modern Fisherman Village (Kalamo) located in Samber Village and Binyeri Village in Yendidori District, Biak-Numfor Regency, Papua Province, as presented in Figure 1.



Picture 1. Map of Field Research

### **Research Design**

This research is a quantitative study using descriptive analysis. Descriptive analysis will depict the characteristics of the respondents, specifically the community in and around the Modern Fisherman Village. This analysis will also reveal the conditions and phenomena related to the types of externalities present in the area, which will then be further analyzed.

### **Data Collection Methods**

This study analyzes various economic, social, and environmental externalities arising from the contemporary fisherman village program by examining both positive and negative externalities. These three types of externalities will describe the impact of the Modern Fisherman Village program in Biak-Numfor Regency using both primary and secondary data. Primary data includes field observations and the distribution of questionnaires to respondents. The secondary data needed for this research includes information about the fishing activities in Kalamo and related activities of fisherman cooperative members.

### **Data Analysis**

The data analysis is descriptive and based on the calculation of Likert scale scores in the questionnaires that have been previously tabulated. Several frequency distribution percentage formulas that will be used in this study are as follows:

Formula to determine the percentage (%) of positive externalities for each indicator in the variable:

$$\frac{\text{Total positive externality score}}{\text{Ideal positive externality score}} \times 100\%$$

Formula to determine the final percentage (%) of positive externality analysis:

$$\frac{\text{Positive external score}}{\text{Ideal positive externality score}} \times 100\%$$

Formula to determine the final percentage (%) of negative externality analysis:

$$\frac{\text{Negative externality score}}{\text{Ideal negative externality score}} \times 100\%$$

## RESULTS AND DISCUSSION

### 1. Economic Externality Analysis

The positive externality scores from all economic externality indicators in the modern fisherman village are as follows:

Table 1. Positive Externality Indicator Scores

No.	Positive Externality Indicator	Total Score/Indicator
1.	Increase in Fishermen's Income	2118
2.	Increase in Fishery Productivity	1940
3.	Development of Fishermen-Based Coastal Tourism	1832
<b>Total Score</b>		<b>5890</b>

Source: Primary Data Processing (2024)

In the table above, it is evident that the highest score is obtained for the indicator of increased fishermen's income, with a total score of 2118, while the lowest score is for the development of fishermen-based coastal tourism, with a score of 1832. This indicates that the modern fisherman village has a real impact on increasing fishermen's income, but in terms of tourism development, there is still room for improvement. Based on this table, the percentage (%) of positive externalities derived from the economic aspect is:

$$\frac{5890}{8890} \times 100\% = 66,25 \%$$

Based on these calculations, it shows that the positive economic externalities arising from the modern fisherman village program account for 66.25%, with various types of positive economic externalities, including increased fishermen's income, increased fishery production, and the development of coastal tourism.

The increase in income felt by the community in the modern fisherman village is due to the program acting as a platform to market the fishermen's catch and distribute it to buyers. One of the partners cooperating in handling all the fish catches is PT Perikanan Nusantara Jaya. This company has been a partner in the modern fisherman village program since May 5, 2024, and operates in Semarang. This collaboration greatly helps fishermen in marketing their catch, although not all fishermen sell their catch to this partner company.

The increase in fishery production also occurs with the modern fisherman village program, as fishermen now know how to catch fish in a way that meets the company's requirements and are equipped with better motorized boats. Regarding the development of coastal tourism, this is highly feasible as the modern fisherman village program has provided the community with a pier bridge that tourists can visit to enjoy the sea view in Samber-Binyeri Village. Additionally, a canteen has been established, which, although it has not yet attracted many visitors, will likely draw more visitors once the tourism facilities are fully developed.

Next, the results of the calculation and analysis of negative externalities from the economic aspect for each indicator in this study are as follows:

Table 2. Negative Externality Indicator Scores

No.	Negative Externality Indicator	Total Score/Indicator
1.	Unhealthy competition among fishermen	591
2.	Increase in prices of goods and services	591
3.	Dependence on technology and credit	963
<b>TOTAL SCORE</b>		<b>1932</b>

Source: Primary Data Processing (2024)

In the table above, it can be seen that the highest score is obtained for the indicator of dependence on technology and credit, with a score of 963, while the lowest score is for unhealthy competition among fishermen, with a score of 378. This indicates that the modern fisherman village program has a negative impact, leading to unhealthy competition among the fishermen. In other words, some fishermen feel that there is unfairness in terms of the distribution of capital and technology support provided by the cooperative management, which creates unhealthy competition among them.

Based on this table, the percentage (%) of negative externalities is calculated to be  $\frac{1932}{6350} \times 100\% = 30,42\%$ . The percentage of negative externalities is relatively smaller compared to the percentage of positive economic externalities, indicating that although there are negative economic externalities associated with the modern fisherman village program, they are not significant and can be well-managed. The unhealthy competition that arises is an effect or impact of some fishermen who previously had larger catches or motorized boats that they could operate before the Modern Fisherman Village program. Therefore, with the implementation of this program, it will significantly help increase catch yields and income, especially for fishermen with less capital.

The increase in the prices of goods and services, such as boat rental fees or fuel costs, is explained not by the program itself, but rather by market prices set by the government. The availability of fuel for going to sea has also become more accessible as the necessary facilities are now in place.

The dependence on modern technology and credit is relatively small because most fishermen do not use modern technology, such as large ships equipped with modern fishing gear, but still rely on traditional methods to catch sea products. Access to credit has started to open up, as some financial institutions have begun offering loans to fishermen, allowing them to access credit from these institutions.

Therefore, it can be concluded that the research results show positive economic externalities from the modern fisherman village program, which has been implemented by the government. In other words, a program like this brings various impacts to the surrounding community.

## 2. Social Externality Analysis

The results of the calculations show the positive externality scores from all social externality indicators in the modern fisherman village as follows:

Table 3. Positive Externality Indicator Scores

No.	Positive Externality Indicator	Total Score/Indicator
1.	Increase in Solidarity and Cooperation	2642
2.	Better Access to Health, Education, and Infrastructure	2125
3.	Strengthening Local Wisdom and Culture	2108
<b>TOTAL SCORE</b>		<b>6875</b>

Source: Primary Data Processing (2024)

In the table above, it is evident that the highest score was obtained for the indicator of increased solidarity and cooperation among fishermen, with a total score of 2642, while the lowest score was for strengthening local wisdom and culture, with a score of 2108. This indicates that the modern fisherman village program has had a social externality impact on the surrounding community.

Next, based on this table, the percentage (%) of positive externalities from the social aspect is calculated to be  $\frac{6875}{8255} \times 100\% = 83,28\%$ . Based on these calculations, it shows that the positive social externalities resulting from the modern fisherman village program account for 83.28%, with various types of positive social externalities, including increased solidarity and cooperation, better access to health services, education, and infrastructure, as well as the strengthening of local wisdom and culture.

The increase in solidarity and cooperation is seen in the formation of several fishermen's groups, which are expected to significantly help fishermen work together to increase their catch and income. Furthermore, the local community has experienced better access to health and education services due to the program, with the local government paying more attention to the communities in both villages by providing various health and education facilities around the village area.

The strengthening of local wisdom is demonstrated by fishermen continuing to use traditional methods of fishing based on their knowledge, even though the target fish catch has started to shift to focus more on fish species that meet the criteria set by their fish collection partners, such as tuna, marlin, or sailfish and skipjack.

The positive social externalities of the modern fisherman village program indicate that social externalities from the implementation of a program or activity exist and are felt by the surrounding community. The research results also show the social externalities from the presence of an activity or program within the community, as highlighted by Putra, Nindya Lestari, Yeni Windhu, and Kurniawati Sri (2022), who revealed that activities such as oil palm cultivation provide social externalities to the local community. Another study by Heru

Wahyudi and Eko Ardianto (2022) highlighted the social externalities within the community due to the Beach Tourism Program 21.

Next, the results of the calculation and analysis of negative social externalities for each indicator in this study are as follows:

Table 4. Negative Externality Indicator Scores

No.	Negative Externality Indicator	Total Score/Indicator
1.	Socio-economic Inequality Among Citizens	952
2.	Shifts in Community Structure and Social Conflicts	783
<b>TOTAL SCORE</b>		<b>1735</b>

Source: Primary Data Processing (2024)

In the table above, it is evident that the highest score was obtained for the indicator of socio-economic inequality among citizens, with a total score of 952, while the lowest score was for the occurrence of shifts in community structure and social conflicts, with a score of 783. This indicates that the modern fisherman village program has had a negative impact, contributing to socio-economic inequality and shifts in community structure, as well as social conflicts.

Next, based on this table, the percentage (%) of negative externalities from the social aspect is calculated to be  $\frac{1735}{3810} \times 100\% = 45,53\%$ . Based on these calculations, it shows that the negative social externalities resulting from the modern fisherman village program account for 45.53%, with various types of negative social externalities, including socio-economic inequality among citizens, as well as shifts in community structure and social conflicts. Based on this percentage, it can be said that the negative social externalities are still perceived as relatively low by the fishing community in the two villages.

The socio-economic inequality mentioned and felt by the community is due to the fact that since the implementation of the modern fisherman village program, some fishermen have significantly increased their fish-catching businesses and improved their welfare, while others, who do not have enough capital for large-scale fishing activities, experience differences in catch results. Additionally, there are still some cooperative members or fishermen who do not directly sell their catch to the cooperative, because the market prices at that time were considered higher than the prices offered by the cooperative.

Shifts in community structure and social conflicts that have occurred are still relatively low and have been well-managed, so they do not greatly interfere with the fishermen's activities in the village. The fishermen still play a larger role as fish catchers rather than as business owners or workers in the fisheries industry, even though their catch is used to meet the needs of the fisheries industry from companies in Semarang. Similarly, social conflicts, although not impossible, have been addressed through good consultation, as the fishermen's groups are also supported with guidance or extension officers in the field.

### 3. Environmental Externality Analysis

The results of the calculations show the positive externality scores from all environmental externality indicators in the modern fisherman village as follows:

Table 5. Positive Externality Indicator Scores

No.	Positive Externality Indicator	Total Score/Indicator
1.	Better Waste and Wastewater Management	1743
2.	Use of Environmentally Friendly Technology	1941
3.	Increased Environmental Awareness Among Residents	2032
<b>TOTAL SCORE</b>		<b>5716</b>

Source: Primary Data Processing (2024)

In the table above, it is evident that the highest score was obtained for the indicator of increased environmental awareness among residents, with a total score of 2032, while the lowest score was for better waste and wastewater management, with a score of 1743. This indicates that the modern fisherman village program has had a real impact on increasing residents' environmental awareness, the use of environmentally friendly technology, and better waste and wastewater management.

Next, based on this table, the percentage (%) of positive externalities from the environmental aspect is calculated to be  $\frac{5716}{7620} \times 100\% = 75,01\%$ . Based on these calculations, it shows that the positive environmental externalities resulting from the modern fisherman village program account for 75.01%, with various types of positive environmental externalities, including increased environmental awareness among residents, the use of environmentally friendly technology, and better waste and wastewater management.

The positive environmental externalities resulting from the modern fisherman village program include the increased environmental awareness among residents, which is evident from the clean and well-maintained condition of the village and the coastal area. Furthermore, the fishermen have also expressed the importance of preserving the surrounding marine and coastal environment to ensure that the fish, which are their source of livelihood, remain abundant. The use of environmentally friendly technology is also practiced by the fishermen, where all fishing activities are carried out using traditional methods, avoiding the use of toxins or other substances that could damage the surrounding marine ecosystem.

Waste and wastewater management has been quite good, as the modern fisherman village has been equipped with a Wastewater Treatment Plant (IPAL). The waste generated consists of water used for cleaning fish, which are then packaged and sent to the cooperative partner. This ensures that waste management meets the necessary standards before being disposed of back into the sea.

Next, the results of the calculation and analysis of negative environmental externalities for each indicator in this study are as follows:

Table 6. Negative Externality Indicator Scores

No.	Negative Externality Indicator	Total Score/Indicator
1.	Overexploitation of Fish Resources	710
2.	Coastal Infrastructure Development Potentially Damaging Natural Habitats	1147
3.	Fisheries and Industrial Waste Arising from Modernization	801
<b>TOTAL SCORE</b>		<b>2658</b>

Source: Primary Data Processing (2024)

In the table above, it is evident that the highest score was obtained for the indicator of coastal infrastructure development potentially damaging natural habitats, with a score of 1147, while the lowest score was for overexploitation of fish resources, with a score of 710. This indicates that, with the modern fisherman village program, there are concerns among the local population regarding the construction of infrastructure that may harm the marine or coastal habitats, fisheries and industrial waste arising from modernization, and the overexploitation of fish resources.

Next, based on this table, the percentage (%) of negative externalities from the environmental aspect is calculated to be  $\frac{2658}{5712} \times 100\% = 46,50\%$ . Based on these calculations, it shows that the negative environmental externalities resulting from the modern fisherman village program account for 46.50%, with various types of negative environmental externalities, including concerns about infrastructure development that may damage natural marine or coastal habitats, fisheries and industrial waste arising from modernization, and overexploitation of fish resources. This percentage reveals that the negative environmental externalities are still relatively low and can be improved with better management.

The infrastructure development that is feared to harm marine habitats can still be managed well. This development does not occupy a large portion of the coastal ecosystem, and there are still natural areas that, by being left untouched, showcase their aesthetic value. The beauty of the coastal area is also more organized with the construction of the pier and other facilities, which are expected to attract both local and foreign tourists. Fisheries waste concerns can also be effectively managed, as there is an Integrated Wastewater Treatment Plant (IPAL) used to handle the waste before disposal. As for overfishing or exploitation of fish resources, it is not very evident, as the fishermen still use traditional fishing methods, not modern equipment that might damage fish habitats or the marine ecosystem.

Thus, it can be concluded that environmental externalities occur in the modern fisherman village with the implementation of several fisherman village programs, where the positive externalities are more significant than the negative externalities generated.

## **CONCLUSIONS AND RECOMMENDATIONS**

Based on the results of the research and discussion on the externalities of the Modern Fisherman Village Program (KALAMO) for the community of Samber-Binyeri Village in Biak-Numfor Regency, Papua Province, the following conclusions can be drawn:

1. The research identifies several economic, social, and environmental externalities, both positive and negative, arising from the modern fisherman village program in Biak-Numfor Regency, specifically in Samber-Binyeri Village. These include increased income, improved solidarity and cooperation, and better waste and wastewater management.
2. The positive externalities from the economic, social, and environmental aspects have a higher percentage compared to the negative externalities.

## **FURTHER STUDY**

1. For the local community, the positive economic, social, and environmental externalities are very important for the development of fishing activities. Therefore, the existing positive externalities experienced by the fishermen involved in the modern fisherman village program can be further enhanced, such as increasing fishermen's income through assistance and training programs. It is also important to build infrastructure that supports the fisheries industry, such as ports and warehouses, which are currently still limited. In addition, fisheries products can be developed further by creating high-value and sustainable products, as well as raising environmental awareness, specifically by increasing public awareness of the importance of good environmental management.
2. The negative externalities that arise would be best minimized by continuing to develop environmentally friendly technologies, improving resource use efficiency, such as through government or relevant stakeholders' support, and by ensuring the preservation of the existing marine ecosystem.

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