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INTERNALIZATION OF MINING COMPANY EXTERNALITIES IN ENVIRONMENTAL POLLUTION

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ABSTRACT

Nickel mining in Tambea village, Southeast Sulawesi, pollutes water and threatens sea cucumber populations and fishermen's livelihoods. Internalization of externalities and fines to mining companies are needed. Earmarking of revenue-sharing funds from the mining sector is necessary for environmental rehabilitation and compensation to affected communities. Environmental protection and socio-economic impacts should be the focus of nickel mining policy. This research uses a qualitative approach with a case study method to understand the negative externalities of mining in Tambea Village. Data were collected through surveys, interviews and direct observation. Data analysis was conducted by writing, organizing, and interpreting data. Data triangulation was also conducted to reduce bias. It was found that environmental pollution due to mining waste threatens sea cucumber populations and fishermen's income. Sea cucumber production decreased drastically after pollution, which is a negative externality of mining activities. Previous studies have shown that the water around Pomalaa is polluted and contains harmful metals. Environmental regulations must be enforced to address the negative impacts of mining. Obtaining funds from mining proceeds through the implementation of local regulations and internalization of externalities can help reduce the negative impact of environmental pollution on sea cucumber fishers and ensure that certain funds are used to address externalities generated by mining activities. This research provides a concrete case study of the negative impacts of nickel mining on sea cucumber populations and fishers' incomes and highlights the need for enforcement of environmental regulations in addressing the negative impacts of mining.

KEY WORDS

Internalization of externalities, environmental pollution, nickel mining.

Mining ventures in an area can sometimes have unintended consequences for the communities living around them. While mining can provide economic benefits, its impact on society and the environment needs to be seriously considered. Nickel mining activities can produce liquid waste containing heavy metals, such as Arsenic (As), Chromium VI (Cr+6), Iron (Fe), Cadmium (Cd), Copper (Cu), and Lead (Pb). Contaminated water will enter groundwater through the infiltration process (Steven, et al, 2020). If these wastes are not handled properly, they can contaminate surface water and groundwater around the mining area. Water pollution by heavy metals can disrupt aquatic ecosystems, reduce water quality, and damage aquatic life (Hamzah, 2016).

Nickel mining activities have become a rapidly growing sector in several regions in Indonesia, including in Tambea village, Pomalaa sub-district, Kolaka district, Southeast Sulawesi province. Various mining companies have come and gone to ravage this area, deforesting the forest, excavating land without reclamation, leaving gaping holes that are very dangerous and pollute the surrounding area. Mining provides significant economic benefits to the country and some people, but not to sea cucumber fishing communities who experience externalities directly from mining activities.

The pollution of seawater by toxic substances produced by nickel mining activities has also affected the quality of sea cucumbers and reduced demand from the market (happen). The decline in sea cucumber populations due to environmental pollution has serious consequences for the livelihoods of fishermen. Dead sea cucumbers and stunted growth lead to a decrease in the production and quality of sea cucumbers that can be



produced. In addition, the harvesting time is no longer timely, causing fishermen to experience a significant decrease in income. The accumulation of these problems leads to widespread poverty in fishing communities.

Sea cucumbers (Holothuroidea) or better known as sea cucumbers are animals from the Echinodermata class. Sea cucumbers have an important economic value because of their high nutritional content (Wulandari et al., 2012). Sea cucumbers have a unique and distinctive body shape. They have an elongated and cylindrical body, with the dorsal (back) part usually equipped with rows of protrusions or fine spines. Sea cucumbers use these spines to move and crawl on the seabed (Martoyo et al. 1996).

Sea cucumbers can be found in a variety of aquatic habitats, ranging from coral reefs to muddy bottom waters. They play an important role in marine ecosystems because they act as detritus-eating organisms and process organic remains on the seabed into nutrients available to other organisms (Darsono, 1998). In some areas, including Tamba Village, sea cucumbers are also a source of livelihood for fishermen. Fishermen often cultivate sea cucumbers in ponds or catch wild sea cucumbers as a source of income. However, hunting and unsustainable fishing practices can threaten sea cucumber populations and disrupt the balance of aquatic ecosystems.

In Tamba Village, there is a mining company waste disposal basin that flows into the sea adjacent to the sea cucumber farming location. Based on the research results, it is known that the mining industry discharges its waste into the sea and the fishing community has known this since the industry was running. Along the hill that stretches in front of Tamba village, which is separated by a highway that connects Pomalaa and Watubangga sub-districts, there are rows of checkdams built to accommodate the processed waste from mining activities.

The cekdam is arranged in such a way as to settle the sludge and the waste water will be flowed into the sea with the provision that the waste flowed into the sea is clear. This has also been an agreement between the community, but the situation that occurs is that during the rainy season due to the high intensity of rainfall, the cekdam at the top of the mining site cannot accommodate rainwater. The inability to accommodate rainwater causes the cekdam to overflow and even break down, bringing red mud from mining waste to the sea cucumber farming location.

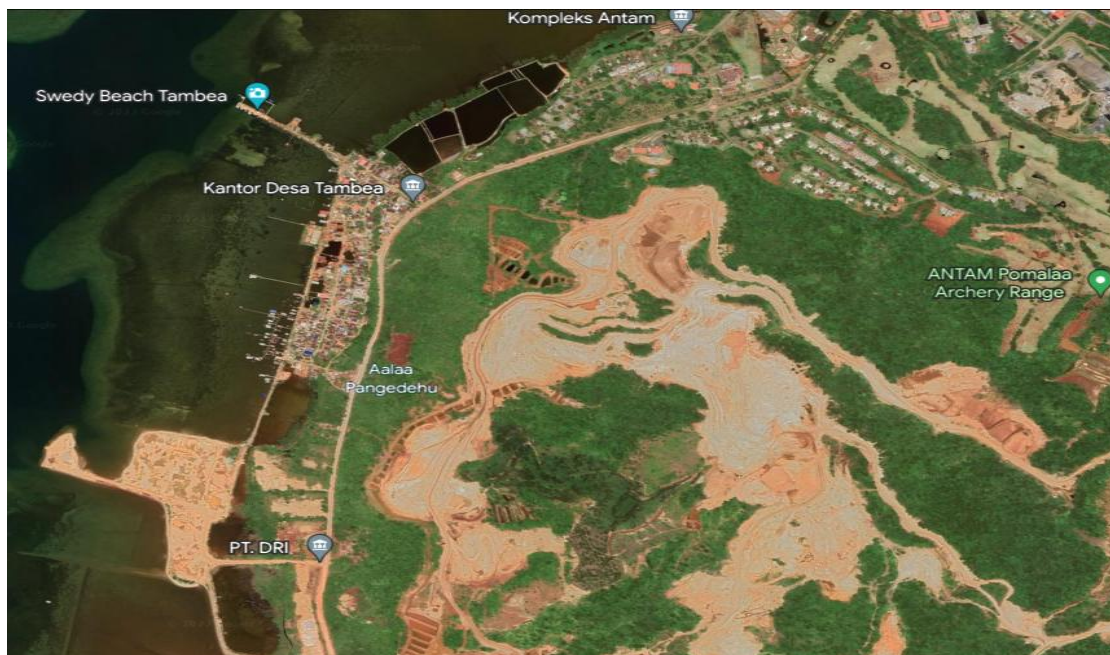


Figure 1 – Nickel Mining Area in Tamba Village (Source: <https://earth.google.com/web/search/desa+tamba+kecamatan+pomalaa,+kolaka+district>)



Water pollution by mining waste containing hazardous materials can cause the death of sea cucumbers and damage to their tissues and organs. Sea cucumbers exposed to these wastes will die and float on the sea surface with their skin peeled off. Dead or injured sea cucumbers not only reduce fishery resources, but also disrupt the food chain and biodiversity in these waters.

LITERATURE REVIEW

According to Khusaini (2006), the impact of a person's or party's actions on the welfare or circumstances of others is known as an externality. Externalities occur when the actions of producers and consumers have an unexpected or indirect impact on other producers and or consumers. In terms of their impact on other parties, externalities can be positive externalities or negative externalities. When activities undertaken by a person or group benefit another person or group, this is referred to as a positive externality (Shankar, 2008).

Social costs are defined as externalities when an activity generates benefits or costs for activities or parties outside its implementation. This social cost issue is actually related to environmental pollution, which is considered a cost of economic development (Suparmoko, 2006: 237).

Internalization of externalities is any action (public or private) that ensures that unpaid benefits or costs are incorporated into the price composition of goods and services (Ding et al. 2014). There are different phases of internalization of external effects: Corrective duties, emission standards, exchangeable permits, resource rights, government subsidies, etc. Internalization of positive and negative externalities contributes to achieving allocative efficiency, but not necessarily sustainability, which also aims to increase equity in the relationship between humans and nature (Tamasauskiene, 2019).

Internalization of externalities and sustainability are closely related, as sustainable development can be ensured by taking into account all externalities and long-term environmental stability. One of the most important steps to achieve sustainability is internalizing external influences (Tamasauskiene, 2019).

Internalizing external costs is an important tool for decision-makers to achieve more sustainable social development and maximize welfare. Sustainable development is a harmonious development process that takes into account ecological, social and economic aspects and ensures long-term ecological stability. Sustainable development policies differ from traditional environmental policies in that they not only aim to assimilate negative externalities, but also aim to preserve non-renewable natural resources for future generations.

In relation to environmental pollution, according to Coase (1960), neither the polluter nor the victim (victimizer) of pollution is responsible only for the cost of pollution and should therefore be shared. Coase believes that externalities can be internalized through negotiations between polluters and victims.

Coase's theorem suggests a very specific and minimal role of government in managing the internalization of externalities, that property rights are based on the use of resources when the transaction costs of negotiation are zero. According to him, if property rights are fully transferred and negotiations are costless, if no regulator is involved, private negotiations can lead to economic efficiency in markets with externalities.

Carbon tax is a prime example of a Pigovian tax introduced in several European countries, such as Denmark, Finland, Germany, the Netherlands, Norway, Sweden and the UK, which tries to internalize negative externalities. There are additional taxes on pollutants that cause acid rain, such as sulfur dioxide and nitrogen oxides. The purpose of landfill taxes is to encourage producers to produce less waste and get more value out of it, for example through recycling or composting, and to use environmentally friendly waste treatment methods (Owen 2006).

Nguyena et al. (2016) point out that "in addition to externalities caused by emissions, increased production of industrial products comes at the expense of unsustainable use of resources such as land, water, fossil fuels, and minerals, whose externalities must also be



considered . It is therefore important to improve monetization methods that can quantify negative externalities and unsustainable resource use." It is also important to assess externalities at all stages of the production chain. Nguyena et al. (2016) used three European monetization models to illustrate how external environmental impacts are valued and internalized: EPS 2000, environmental tax and Stepwise 2006.

The main disadvantage of tax-and-support solutions is information - governments typically cannot understand firms' production technologies or the value of potential information dissemination from research (Tumlinson, 2018). If the government reduces negative externalities (and increases positive externalities), the question is what level of externalities is optimal. Reducing pollution from the production of a market good to zero in most cases means the production of that good is also reduced to zero, which is not necessarily optimal for society (Ahlheim 2018).

Bithas (2011) points out that negative environmental externalities are global and dynamic, so internalization of externalities is inevitable due to the time period and spatial effects of individual variations. Therefore, the internalization of external factors in the real world does not result in the loss of sustainability. He claims that internalization of externalities cannot be a sufficient condition for sustainability because environmental externality evaluation methods do not sufficiently reflect the interests of future generations.

Internalization of externalities (in the general sense of "externalities" and "internalization") achieves allocative efficiency that corrects market failures, but not necessarily distributive justice, which is also essential for sustainable development. Therefore, it can be concluded that internalization of externalities, even in forms that lead to the preservation of environmental rights for future generations, is not a guarantee of sustainable development (Tamasauskiene, 2019).

Public policy can be defined simply as whatever the government tells us to do or not do (Anderson, 2011; Dye, 2017) Public policy is a form of government manifestation in response to something, and not just an expression of the wishes of the government or officials. The government's decision not to do something is also part of public policy, because the decision has the same influence or consequences as the government's decision to do something.

Public policy is a way to achieve common goals. The best public policy is one that encourages every citizen to build their own competitiveness and not fall further into a dependency model. From this it can be concluded that public order is a government action or decision to solve an emerging problem. The aim is to encourage competitiveness and goal achievement or goal realization (Nugroho, 2004).

The field of institutional economics focuses on understanding how evolutionary processes and institutions shape economic behavior. The dichotomy introduced by Thorstein Veblen between technology and the "ceremonial sphere" of society is its source. From 1919 (Walton, 1919), the method has its name and main components.

The view of institutions according to Veblen, a social thinker. Veblen described institutions as imperfect collections of norms and ideal conditions that are reproduced through habit in each subsequent generation of individuals (Yustika, 2012: 43). This results in dramatic changes in institutions over time. Organizations or institutional structures have an important role in influencing and guiding individual actions, where individual decisions are not only influenced by personal desires but also by existing institutional structures. In this context, theories that depart from the assumption that individual desires are the main reason for decision-making become irrelevant.

Williamson (2000) outlines the concept of institutions into four levels. First, the level of social embeddedness, where institutions have existed in society for a long time and have become a guide for life and social interaction in society. The second level is the institutional environment, also known as the formal rules of the game. This refers to the formally established rules and norms within an institutional system. The third tier is about good governance to reduce transaction costs. In this case, it is important to have an effective and efficient management system to reduce the costs associated with conducting economic transactions. The fourth tier refers to the institutions that govern resource allocation and employment. This relates to the relationship between the principal (the mandated party) and



the agent (the commissioned party) within an organization or agency theory framework. Overall, the paper explains that institutions can be divided into four levels involving aspects of social embeddedness, institutional environment, good governance, and regulation of resource allocation and employment.

It enhances understanding of the field of institutional economics and its important role in understanding the role of evolutionary processes and institutions in shaping economic behavior. It also provides a strong theoretical foundation for explaining key concepts in the field, as well as the importance of considering institutional factors in economic decision-making. The explanation of the four levels of institutions shows how complex and diverse the institutional components are that need to be considered in economic analysis.

In order to analyze how nickel mining activities affect sea cucumber fishers economically and socially, we had to apply these concepts in the study of this paper. What is the role of institutions in determining ownership rights and use of natural resources, and how the Pigovian tax can be used as a policy tool to internalize the cost of externalities generated by nickel mining.

According to the Environmental Protection and Management Act No. 32 of 2009, "environmental pollution is the introduction of living things, energy substances, and/or other components into the environment by human activities so that it exceeds official environmental standards."

Law Number 32 of 2009 concerning Environmental Protection and Management aims to preserve ecosystems and the lives of living things, maintain environmental functions, ensure that there is justice for present and future generations, control the wise use of natural resources, realize sustainable development, and prevent pollution and/or environmental damage, which includes planning for pollution and/or environmental damage (Rismika & Purnomo, 2019).

This law addresses various aspects related to environmental protection and management in Indonesia. Some of the things discussed in this law include:

- Principles of environmental protection and management;
- Implementation of environmental management by the government and the community;
- Environmental impact assessment (EIA) in activities that may have a significant impact on the environment;
- Control of environmental pollution and damage;
- Natural resource management, including forests, water, energy, etc;
- Waste management, including solid waste, liquid waste, and hazardous waste;
- Law enforcement and sanctions against violations of environmental regulations;
- Community participation in environmental protection and management.

Law No. 32/2009 on Environmental Protection and Management provides a strong legal basis for protecting the environment and controlling pollution. This law is relevant in addressing environmental pollution problems that occur in sea cucumber fishing communities and internalizing the externalities of mining companies. Through the principles, environmental impact evaluation, pollution control, and law enforcement stipulated in this law, it is hoped that the environment can be safeguarded, the justice of present and future generations is guaranteed, and companies are responsible for their impact on the environment.

METHODS OF RESEARCH

This research was conducted using a qualitative approach that focuses on case studies. The qualitative approach considers processes, events, and authenticity to understand and construct reality. Researchers are deeply involved with research subjects and interact with the real world (Manzilati, 2017: 56). In this research, the case study method is used to gain an in-depth understanding of the phenomena and events that occur in Tambea Village related to the negative externalities of mining.



To select research informants, various guidelines and processes were followed. For sea cucumber fishers, relevant criteria were used, such as active involvement in sea cucumber farming or representation of the sea cucumber fishing group as a whole. Data sources used included sea cucumber fisher associations or pre-existing relationships with sea cucumber fishing communities. Methods used included surveys, face-to-face interviews, or direct observation at sea cucumber farming sites.

After the data collection stage, the third step in this research is data analysis. Researchers analyzed and processed it by writing and organizing data until it reached the desired level of saturation. The researcher also interpreted the data to gain a better understanding of the adverse events in Tambea Village, Pomalaa Sub-district, Kolaka Regency. To provide a broader perspective and reduce bias in the research, the researcher also applied a data triangulation process.

RESULTS AND DISCUSSION

Sea cucumbers or with the Latin name *Holothuroidea*, *Echinodermata* are one of the most easily recognized groups of marine life. The body shape is usually cylindrical, extending from the mouth to the anus (orally aborally). The mouth is located at the front end (anterior) and the anus at the back end (posterior). In addition to radial symmetry, sea cucumbers have a skeletal shape and a water-vascular system. The process of modifying this skeleton into spicules scattered on the body wall is an important factor in determining the type of sea cucumber (Darsono, 2007). Sea cucumbers have a unique and distinctive body shape. They have an elongated and cylindrical body, with the dorsal (back) part usually equipped with rows of protrusions or fine spines. Sea cucumbers use these spines to move and crawl on the seabed (Martoyo et al. 1996).

Sea cucumbers can be found in a variety of aquatic habitats, ranging from coral reefs to muddy bottom waters. They play an important role in marine ecosystems because they act as detritus-eating organisms and process organic remains on the seabed into nutrients available to other organisms (Darsono, 1998). In some areas, sea cucumbers are also a source of livelihood for fishermen. Fishermen often cultivate sea cucumbers in ponds or catch wild sea cucumbers as a source of income. However, poaching and unsustainable fishing practices can threaten sea cucumber populations and disrupt the balance of aquatic ecosystems.

In this context, this study will analyze the importance of internalizing externalities by the government against companies that violate environmental regulations. In this case, negative externalities occur when the impact of environmental pollution by mining activities affects the production and income of fishing communities that depend on sea cucumbers. This negative impact is not internalized in the decisions of mining companies, but is instead borne by fishing communities as parties not involved in mining activities.

By taking into account the aspirations of the community, environmental sustainability, and economic interests, it is hoped that an adequate agreement can be found to protect the community and the environment in the context of implementing mining business licensing. Through a gentler and more inclusive approach, a better balance can be created between economic development and environmental preservation as well as community welfare in areas affected by mining business licensing.

Environmental pollution, especially from mining waste containing hazardous materials discharged into the sea, can cause a decline in sea cucumber populations in the waters. Sea cucumbers exposed to mining waste containing hazardous materials may suffer damage to their tissues and organs. Injured or dead sea cucumbers cannot be sold at an optimal price or even at all. If the sea cucumber population declines, the supply of sea cucumbers for sale will decrease, impacting the income of fishermen. They will face difficulties in acquiring and selling their cultured or caught sea cucumbers. This leads to a decrease in the income of fishermen who depend on the cultivation or capture of sea cucumbers.

In the context of externality theory, the decline in sea cucumber fishermen's income due to environmental pollution can be linked to the concept of negative externalities.



Negative externalities occur when the actions of individuals or companies cause negative costs or negative impacts for other parties that are not accommodated in market transactions (Buchanan, 1962).

In this case, mining companies that cause environmental pollution indirectly create negative externalities for sea cucumber fishers. Mining activities that produce hazardous waste pollute waters and disrupt sea cucumber habitats, causing a decline in sea cucumber populations and damage to existing sea cucumbers. Sea cucumber fishers suffer undesirable negative impacts due to the activities of mining companies, which damage their source of income and reduce their economic well-being.

Before the mining activities in this village, based on the research results, the fishermen community said that the sea cucumber commodity was very good to be developed here because not all coastal areas had sea cucumbers. Before the pollution, the community said that in 1 hectare with 1000 seeds they could produce 500 kg of sea cucumber commodities within 6 months with the price of sea cucumbers reaching 1 to 2 million rupiah per kilogram which was determined based on the size. The price of sea cucumbers is determined by looking at their size first and then their weight. The larger the size of the sea cucumber, the more expensive the price. But now after the pollution, they can only harvest half of it with uncertain harvest time, usually more than 6 months or even one year.

Table 1 – Estimated selling price of sea cucumbers in Tambea Village, Pomalaa Sub-district, Kolaka Regency, 2022

No.	Size	Quantity (tail)	Weight (Kg)	Estimated Price (Rp)
1	Large (Super, 20 Cm)	7-8 tails	1	1.200.000
2	Medium (Responsibility, 15 Cm)	30	1	950.000
3	Small (Bean, 10cm)	50	1	700.000

Data source: Sea cucumber fishermen, processed, 2022.

The estimated price of sea cucumbers in the table above is based on the price of fishermen, but if the sea cucumbers have been processed and dried by collectors, the price will increase significantly.

Table 2 – Estimated Income and Loss of Sea Cucumber Fishermen before and after Mining Activities

Before Pollution		After Pollution	
Seedlings	1000 tails	Seedlings	1000 tails
Harvest Period	6 Months	Harvest Period	> 6 months - 1 year
Harvest Yield	400-500 Kg	Harvest Yield	200-250 Kg
Advantages	400-500 Million	Advantages	200-250 Million
		Loss	200-250 Million
		Loss	Indeterminate Harvest Time

Data source: Sea cucumber fishermen, processed, 2022.

Based on Table 2, the losses suffered by sea cucumber fishermen do not include if during pollution there are dead sea cucumbers. The table above only calculates the average losses experienced based on harvest time and the development of sea cucumbers that slowed down due to pollution.

We can see the relationship between changes in sea cucumber production before and after pollution with the concept of externalities in economics. Before the pollution, fishing communities in this village were able to produce a significant commodity of sea cucumbers from their ponds. This high production indicates that sea cucumbers are an abundant resource in this area, and fishing communities can utilize them efficiently to earn a good income. However, with the pollution associated with mining activities, sea cucumber production dropped dramatically. Communities were only able to harvest half the amount they were supposed to, coupled with erratic harvesting times and even exceeding the previously required time.



To validate the above findings, the author needs to submit some previous research results that have been conducted in the same location, namely research on water quality and biodiversity which we present in table 1.3 as follows:

Table 3 – Water Quality Study in Pomalaa Sub-district, Kolaka Regency, 2009-2022

Year	Location	Researcher	Findings
2009	Pomalaa	Hamza	Using the STORET Index on 12 pollution stations, there is 1 lightly polluted station and 11 others are moderately polluted including the Tambea Sea.
2016	Pomalaa	Hamza	Some of the calculated pollution load parameters such as copper (Cu) and Cadmium (Cd) have exceeded their assimilation capacity causing ecological, economic, social and technological dimensions to be less sustainable.
2019	Pomalaa	Erfina & Sjarmidi	The results of LFA measurements at the North, Central and South Mine sites show a low complexity index of 5 (North Mine), 4 (Central Mine) and 3 (South Mine) respectively, indicating that the habitat and shelter for local fauna on the land have not developed, which is concluded that the mining site has impaired regulatory functions, habitat and biomass production of the ecosystem is not running properly.
2020	Pomalaa	Steven et al	Mining openings resulted in a decrease in water quality with discoloration of river water samples. In addition, several harmful metal elements were found such as Arsenic (Ar), Chromium VI (Cr+6), Iron (Fe), Cadmium (Cd), Copper (Cu), and Lead (Pb).
2022	Pomalaa	Riska et al	The concentrations of Pb, Cd, and Hg metals in the waters exceeded the threshold of seawater quality standards for marine biota based on the Decree of the Minister of Environment No. 51 Year 2004.

Based on this, it can be concluded that mining industry activities cause negative externalities in the form of polluting the water environment of Pomalaa and its surroundings. Therefore, the local government enforces environmental regulations and handles violations committed by mining companies and ensures that companies comply with applicable environmental regulations.

DISCUSSION OF RESULTS

In the context of externality theory, the decline in sea cucumber fishermen's income due to environmental pollution can be linked to the concept of negative externalities. Negative externalities occur when the actions of individuals or companies cause negative costs or negative impacts for other parties that are not accommodated in market transactions. In this case, mining companies that cause environmental pollution indirectly create negative externalities for sea cucumber fishermen. Mining activities that produce hazardous waste pollute waters and disrupt sea cucumber habitats, causing a decline in sea cucumber populations and damage to existing sea cucumbers.

The economic impact of reduced income for sea cucumber fishers due to environmental pollution is a concrete example of a negative externality. Sea cucumber fishermen suffer unintended negative impacts due to the activities of mining companies, which damage their source of income and reduce their economic well-being. In this situation, the application of externality theory may involve internalizing the negative external costs incurred by the mining company. Internalizing externalities means forcing companies to account for the social or economic costs incurred by the negative impacts of the pollution they produce.

One approach to internalizing externalities is to apply environmental taxes or fines to mining companies as a form of compensation for the negative impacts on sea cucumber fishers. This approach aims to force companies to take into account external costs in their decisions and encourage them to reduce pollution or find alternative solutions that are more environmentally friendly. Fines should be established through applicable rules and regulations, either in Law No. 32/2009 on Environmental Protection and Management or other relevant regulations. The process of authorizing and determining fines must follow applicable legal procedures. Revenues obtained from the fines should be used for



compensation to affected sea cucumber fishermen and/or for environmental recovery and protection programs in the Tambea Village area.

By applying externality theory to these conditions, efforts can be made to address and reduce the negative impacts of pollution on sea cucumber fishers. Internalizing externalities helps create incentives for mining companies to consider the social and economic impacts of their activities, as well as provide economic protection for affected sea cucumber fishers.

The damage caused by mining activities is not only in environmental pollution but also in the destruction of landscapes as a result of industrial activities. This certainly requires large costs in rehabilitating the land and returning it to its original condition. If you only expect from revenue sharing funds, it seems that it will be difficult to solve this problem in a short time because the allocation of revenue sharing funds is to support infrastructure development, economic development, community empowerment, environmental improvement and governance in the regions.

Therefore, specifically for revenue sharing funds in the mining sector, *earmarking is* necessary. This is by allocating or directing funds or resources specifically to certain purposes or uses such as the use of DBH Excise and Tobacco Products (DBHCHT) to limit local governments in the execution of expenditures (Ananda, 2017: 165). The earmarking process involves designating or allocating funds in a way that is clear and separate from other resources. This is done to ensure that the funds are used in accordance with their intended purpose and are not used for anything else. *Earmarking is* generally done using an accounting or recording system that distinguishes *earmarked* funds from general or other funds.

Earmarking is often used in the context of governments, non-profits, or other organizations to direct funds to specific programs, projects, or sectors. For example, in a government context, funds can be earmarked for purposes such as education, health, infrastructure, or regional development. This ensures that funds allocated by the government are used specifically for these purposes, and are not used freely for other purposes. The *earmarking* of mining sector DBH is intended to address damages arising from mining activities such as environmental restoration, infrastructure improvement and local community development in affected areas.

By locking *earmarked* funds to one activity, local governments can ensure that resources are only devoted to addressing the externalities caused by mining activities. Of course, at the local level this must involve various parties in the process, for example the budgeting department at the local level to determine the allocation of funds to the mining sector in the annual budget or long-term planning which can be outlined in a local government decision with the legislature.

CONCLUSION

In the context of externality theory, the decline in sea cucumber fishermen's income due to environmental pollution can be attributed to negative externalities. Internalization of externalities can be done by applying environmental taxes or fines to mining companies as a form of compensation for negative impacts on sea cucumber fishers. Making local regulations involves the stages of initiation, formulation of draft local regulations, public consultation, discussion, and voting by the legislative body, as well as the stipulation and signing of local regulations. Earmarking of revenue sharing funds from the mining sector can be done to allocate or direct funds specifically to limit the use of these funds in addressing the negative impacts caused by mining activities. The earmarking process involves various parties, such as local budgeting departments, local governments, and legislative bodies, and is important in determining the allocation of mining sector funds in annual budgets or long-term planning. Thus, earmarking of mining sector revenue sharing funds through the use of local regulations and internalization of externalities can help address the negative impacts of environmental pollution on sea cucumber fishers and ensure the specific use of funds to address externalities caused by mining activities.



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