Master Thesis

The Evaluation of Acid Mine Drainage Management Policy Implementation in Muara Enim Regency, South Sumatera, Indonesia

By:
Franky Armando Hutagalung [s2454025]

Supervisors:

Dr. Laura Franco Garcia

Prof. Dr. J.T.A. Bressers

Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

UNIVERSITY OF TWENTE
Faculty of Behavioural, Management, and Social Sciences
Master of Environmental and Energy Management

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AMD	: Acid Mine Drainage
CIT	: Contextual Interaction Theory
GAT	: Governance Assessment Tool
HSE	: Health Safety and Environment
IMEF	: Indonesia Ministry of Environment and Forestry
KPI	: Key Performance Indicator
MEEA	: Muara Enim Environmental Agency
MER	: Muara Enim Regency
NGO	: Non-Governmental Organization
pH	: Potential of Hydrogen
PROPER	: Program for Pollution Control, Evaluation, and Rating
SOP	: Standard Operating Procedure
SSEA	: South Sumatera Environmental Agency
SSEMRA	: South Sumatera Energy and Mineral Resources Agency
TDS	: Total Dissolved Solid
TSS	: Total Suspended Solid

ABSTRACT

In the case of a policy, even if it has been clearly formulated and stipulated by the policymakers, its existence does not ensure that it will be effectively implemented. The government of Indonesia, as a policymaker, has established a framework for action and determine the policy's goals and targets to implement Acid Mine Drainage (AMD) management policies. To make the implementation of the AMD management policy more effective, all actors involved are expected to share the same vision and collaborate in diminishing the harmful environmental effect of the AMD generation. This study aims to shed light on the implementation of AMD management policy in private coal mining companies in Muara Enim, South Sumatera, Indonesia. This research uses Contextual Interaction Theory, Governance Assessment Tool, and Policy Implementation Effectiveness as the theoretical grounds. This study uses a mixed research method with an emphasis on the quantitative analysis of the data and the whole gathered information. The primary data for this research are acquired via survey and in-depth semi-structured interviews with the management and staff of private coal mining companies, federal, provincial, and local environmental agencies, the representative of Non-Governmental Organizations, and academic researchers. The secondary data are derived from a review of works of literature about AMD management and policy implementation, company documents, company reports on AMD management, monitoring reports from the local environmental agencies, and any other relevant sources. The result of this study revealed that the interaction of the actors involved in AMD management policy implementation was characterized by cooperation. However, the governance contextual circumstances were predominantly assessed as restrictive, and the effectiveness level of AMD management policy implementation was moderately effective. Several recommendations are provided to enhance the implementation of AMD management by performing sustainable mining practices, collaborative governance, strong policy enforcement, as well as recommendations for further research on other policy areas in mining sectors.

Keyword: Acid Mine Drainage, Acid Mine Drainage Management, Policy Implementation, Contextual Interaction Theory, Governance Assessment Tool.

ACKNOWLEDGEMENTS

First and foremost, I would like to convey my sincere gratitude and forever thankful to the Almighty God and my Lord Jesus Christ, for His blessings and mercies to me during the entire period of Master of Environmental and Energy Management (MEEM) program, to Him alone be all the glory and praise. I am thankful to the University of Twente and the University of Padjadjaran for giving me the opportunity to study in double degree (linkage) program between Master of Environmental and Energy Management (MEEM) - University of Twente, the Netherlands and Master of Environmental Science - University of Padjadjaran, Indonesia. My deepest gratitude also goes to the Indonesian Ministry of National Development Planning or Indonesian National Development Planning Agency (Bappenas) as a representative of Indonesia's government for providing me financial support for this Master's degree program.

I would like to express my special thanks and highly appreciation to all my supervisors, Dr. Laura Franco Garcia, Prof. Dr. J.T.A. Bressers, and Dr. Tb. Benito A. Kurnani, Ir., Dip., EST., for valuable and constructive advice, feedback, help, guidance, and motivation throughout the entire period of this Thesis' project. I also appreciate all the interviewees and the participants of this research for providing me valuable information for this Thesis' project.

Lastly, I would like to thank my family, my fellow MEEM-2020 classmates, and all my friends for their love, prayer, encouragement, and support to me during the completion of this masters' program. Thank you.

Franky Armando Hutagalung

The Netherlands, August 21st, 2021

1 INTRODUCTION

1.1 BACKGROUND

Coal is a fossil fuel composed predominantly of vegetation that has been consolidated between other rock strata and altered over millions of years by the combined effects of pressure and heat to form coal seams. Coal is important in the generation of electricity all over the world. Coal-generated power plants right now produce 37% of worldwide power, and coal will still generate 22% of global electricity in 2040, maintaining coal's position as the single largest source of electricity globally (World Coal Institute, 2006).

Indonesia has relatively large mining reserves that can invite many investors to invest in the mining sector. The Government of Indonesia has released numerous regulations and policies in an attempt to optimize mineral wealth for the Indonesian people's welfare. The business dynamic, such as production, export and import operation, environmental management, and others also to follow the activities and growth of mining companies in Indonesia. Indonesia has three distinct types of mining operations, metallic minerals, coal, as well as non-metallic minerals and rock (Indonesian Ministry of Energy and Mineral Resources, 2021) with the proportion seen in Figure 1.

Figure 1 Mining Activities in Indonesia (Indonesia Ministry of Energy and Mineral Resources,2021)

At present, in Indonesia, coal is still one of the most dominant mining sectors because coal is the most logical choice of electricity (World Coal Institute, 2006). Furthermore, based on World Coal Institute (2006), Indonesia is increasing coal mining and coal-powered electricity, mainly driven by a rapidly increasing population, economic growth, and energy demand. According to the data of Indonesian Ministry of Energy and Mineral Resources (2021), since 2009, Indonesia's coal production has grown at a compound yearly rate of 4.58% as seen in Figure 2.

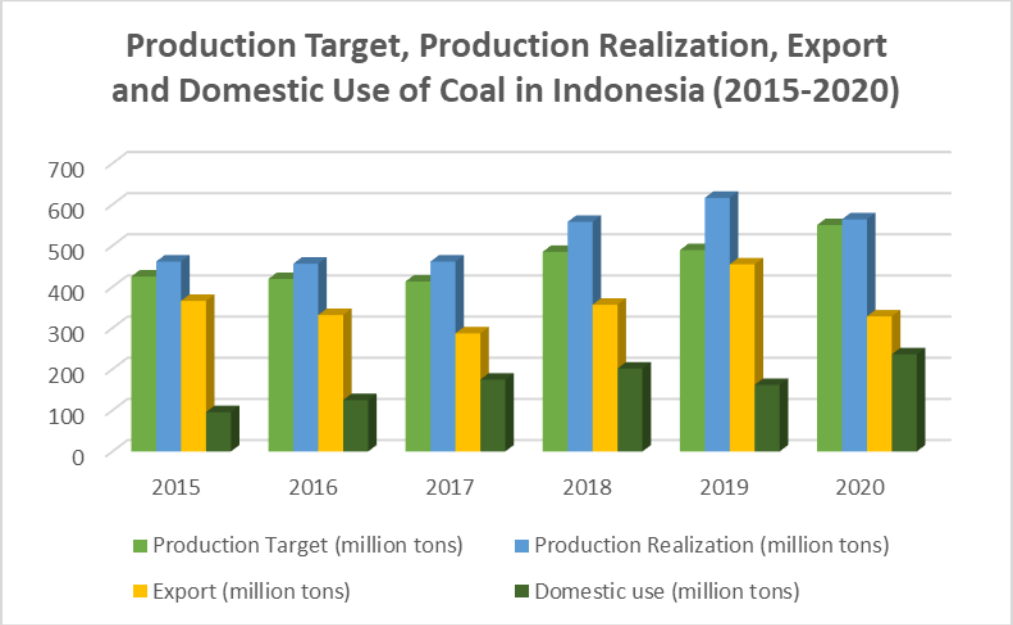


Figure 2 Production Target, Production Realization, Export and Domestic Use of Coal in Indonesia 2015-2020 (Indonesian Ministry of Energy and Mineral Resources, 2021)

In 2020, Indonesia realized 563.95 million tons coal production from 550 million tons coal production expected target, or with a production achievement of 102.54% (Indonesian Ministry of Energy and Mineral Resources, 2021). By its overall production, the proportion of coal exports reached 328.12 million tons (58.18%) and 235.83 million tons were used to meet domestic demand (41.82%)(Indonesian Ministry of Energy and Mineral Resources, 2021). The high number of coal export has made Indonesia become one of the greatest exporters in the world.

The presence of coal mining companies in Indonesia is expected to add to the national and local revenues. Indonesia's coal resources have great potentials to help accelerate regional development, which is expected to be followed by more growth in investment and to open up and expand employment opportunities. The economy will be boosted in the regions and the government revenue will be increased, as well as the proper and correct management

of mining operations will contribute significantly to the process of sustainable development (Ginting, 2010). South Sumatra is one of the largest coal supplier provinces in Indonesia with an overall supply of 56.53 million tons or 9.18 per cent of total domestic coal production, as reported in the performance report of the Ministry of Energy and Minerals Resources in 2019. Muara Enim Regency (MER), is one of the South Sumatera regencies where the coal supply was 5.05% out of 9.18% of the total supply in South Sumatera province. MER's coal demand was fulfilled by PT. Bukit Asam, Tbk., as a public company, as many as 28.07 million tons (90.12%) and 3.07 million tons (9.88%) from private mining companies.

The mining method that is commonly used for coal mining is an open-pit mining system that clears and excavates land and overburdens. The soil and the rocks are then stored in a disposal area or refilled in the excavated pit. Sulphide minerals in the overburden and coal would be exposed, resulting in an increase in the rate of reaction between these minerals with air and water. The reaction of the sulphide minerals and water, can generate Acid Mine Drainage (AMD). A poor AMD management which has been done by the coal mining companies has caused land and water pollution. To lessen the bad effect of AMD pollution, some policies have been issued to regulate AMD. The first policy is the State Ministry of Environmental Decree Number 113/2003 regarding “The Effluent Quality Levels for Coal Mine Operations”. The second is the Minister of Energy and Mineral Resources Decree Number 1827K/30/MEM/2018 regarding “The Fundamentals of Good Mine Operations and Implementation Guidelines”. The third is the Government Decree Number 22/2021 (Appendix VI) regarding “The National Water Quality Standard”. Although the policy has been issued by the government, the implementation of AMD management policies in Indonesia has not been successfully implemented since pollution and contamination continues to occur, the quality of AMD has not met the standards required before it is released to the environment, and people living near the coal mining area have protested and complained regarding the AMD pollution.

Even though those regulations are publicly disclosed and mandated by the government, AMD pollution is still ongoing, for instance, Purnomo (2018) in his research on a private company in MER, entitled “The Technical Analysis of Total Suspended Solid (TSS) Value Decrease in AMD at PT. BAS South Sumatra”, reported that the mean value of TSS in the AMD was 2,884 mg/l. After the AMD was managed and controlled, the TSS value was reduced to 1,780 mg/l and then discharged to the water body (Purnomo, 2018). However, that

value still exceeded the maximum value of TSS quality standard that has been regulated on the State Ministry of Environmental Decree Number 113/2003, which is 400 mg/l in maximum. Ijazah et al. (2016), who studied the effect of coal mine operations on the quality value of Enim River water in MER, found that 72% of MER population who use Enim River as a water source for their daily needs, have been suffering from itchy skin disease, red spots, and scaly skin. Enim River is a river where the majority of mining companies discharge their AMD into it. Furthermore, according to the gathered preliminary information, the Environmental Agency in MER still receives the complaint from the public regarding the AMD's run-off from coal mining sites to river and soil.

Those existing problems show that the AMD management policies in coal mining companies in MER have not been successfully implemented. In Indonesia, there have been several studies related to AMD management, but most of these studies concentrate primarily on technical measurement. There has been no study on the institutional aspects of AMD management. As a result, environmental and social issues cannot be addressed optimally. The success of AMD management can be achieved not only through measurement technically, but also institutionally, to achieve optimum performance. One of them is the application of the policy which is provided and laid down by the government on the format of rules or regulations. Therefore, the policy's implementation process is the main focus of this research.

Contextual Interaction Theory is employed as a conceptual support for this study (Bressers, 2004; Bressers, 2009). Contextual Interaction Theory (CIT) is used since it is considered that the process of policy implementation is multiple actors interconnection activity managed by the actor involved in the implementation of the policy (Bressers et al., 2016). Governance Assessment Tool (GAT), which is based on CIT, is also employed to assess the governance degree of the application of AMD management policy (Bressers et al., 2016).

1.2 PROBLEM STATEMENT

In an ideal world, the policy application, especially the policy related to environmental protection and people's wellbeing, must be performed in an equal way by incorporating all parties and interests. Actors and stakeholders represent the interests of the government, business or private sectors, and the communities. To get a comprehensive understanding of environmental policy application, what needs to be understood is not only which organizations that are responsible for the policy implementation, but also the various

factors that directly or indirectly affect the behaviour of all policy actors. Based on the problems described, this research focused on knowing the governance factors that aid and obstruct the success of the policy implementation related to the AMD management in coal mining companies in Indonesia. In this research, the characteristics of involved actors and their contextual problems in the AMD management policy implementation in Indonesia is also studied. The policy instruments in this context are the regulations in the form of the Decree of the State Minister of Environment Number 113/2003, the Ministerial Decree of Energy and Mineral Resources Number 1827K/30/MEM/2018, and the Government Decree Number 22/2021.

Furthermore, this research concentrates on private mining companies because the AMD management in state-owned mining companies in MER, such as PT. Bukit Asam, Tbk., is relatively good and proven by the acquisition of gold PROPER evaluation. PROPER, which stands for Program for Pollution Control, Evaluation, and Rating, is a public environmental reporting initiative at the national level. According to the World Bank, the goal of this program is to ensure a better environmental management by encouraging industrial compliance with pollution control regulations, facilitating and enforcing the adoption of practices that contribute to "cleaner technology" deployment.

1.3 RESEARCH OBJECTIVE

The purpose of this study is to identify the governance circumstances that adhere and restrict the effective application of government policies related to AMD management in private coal companies in MER, to recognize the actor's characteristics and the background issues that affect AMD management policy implementation in private coal mining companies in MER, to measure the effectiveness of AMD management policy implementation in MER, and to propose strategic approaches, from a governance and actor perspectives, to achieve the effective policy implementation of AMD management in MER. The results of this research are intended to provide additional insight and understanding as well as information that can help the implementation of government policies relevant to the management of AMD. This research's outputs are also intended to be a reference point for the implementation of the AMD management concept which includes different stakeholders. Practically, the objectives of this research are expected to bring benefits to environmental managers and all stakeholders involved and may have an interest in the management of AMD in the future.

1.4 RESEARCH QUESTION

In accordance with the background of the study, problem statement, and the objective of the study, the research question consists of these four (sub)questions:

1. What are the governance circumstances that support and impede the success of AMD management policy implementation in private coal mining companies in MER?
2. How do the characteristics of involved actors influence the AMD management policy implementation in private coal mining companies in MER?
3. How effective is the implementation of AMD management policy in private coal mining companies in MER?
4. What can be the strategic approach, from a governance and actor perspectives, to achieve the effective policy implementation of AMD management in private coal mining companies in MER?

1.5 ORGANIZATION OF THE THESIS

To demonstrate the consistency of the Thesis' elements, the arrangement of this Thesis is as follows:

1. Chapter I outlines the key components of the introduction including background, problem statements, research objectives, and research questions.
2. Chapter II contains a review of literature that presents an overview of theoretical context, as well as other pertinent details related to the scope of the research.
3. Chapter III describes the strategy, methodology, research materials, location of the research, research framework, sampling procedure, and how research questions is addressed by defining data collection, data analysis, and data validation.
4. Chapter IV defines the findings of the study regarding the governance contextual circumstances that affect the implementation of AMD management policy, the actors' characteristics engaged in AMD management policy implementation, and the effectiveness of AMD management policy implementation in MER.
5. Chapter V presents the discussion about the analysis of governance context and actors' characteristics, as well as the proposed strategic approaches from a governance and actors' perspectives to attain the effective policy implementation of AMD management in MER.
6. Chapter VI summarizes the conclusion of the research and the recommendations.

2 LITERATURE REVIEW

This chapter presents an outline of the theoretical approaches which are used to address the research questions and attain the research objectives. The framework is chosen to construct a systematic and coherent literature review because it offers a comprehensive approach to this research by taking into account several valuable aspects that affect the research object. Section 2.1 describes the general theory of Acid Mine Drainage. The concept of a policy, policy implementation, and the effectiveness of policy implementation is then introduced in section 2.2. The Company Performance Assessment Program in Indonesia (Proper Program) will be elaborated in section 2.3. Section 2.4 will discuss about stakeholders on mining sector. Contextual Interaction Theory (CIT) and The Governance Assessment Tool (GAT) are briefly explained in section 2.5 and 2.6, respectively. Lastly, in section 2.7, the analytical framework element will be presented.

2.1 ACID MINE DRAINAGE

Acid mine drainage (AMD) takes place when sulphide substances, including pyrite and marcasite, become oxidized in the absence of alkaline content and form highly acidic and sulphate-rich drainage in the presence of water and oxygen (Skousen et al., 1998). Munawar (2008) stated that, the AMD is created due to the oxidation of sulphide minerals, in particular pyrite (FeS_2), which is primarily found in overload and coal layers and is associated with metal or mineral ores. Furthermore, the pyrite minerals are oxidized when the material is raised to the surface of the earth to create sulfuric acid that is highly acidic (low pH) and dense accumulation of soluble metallic minerals such as iron and manganese. AMD means water released from an active, inactive, or abandoned mine and recovery areas that are comparatively greater total acidity than total alkalinity. Several chemical, biological, and electrochemical reactions are included. Various AMD sources include, among others, drainage from mine rock dumps and open-pit mines, tailings, diffuse seeps, building rocks, rock cuts/chips, and stockpiles (Acharya & Kharel, 2020).

Acid Mine Drainage, based on the content of alkalinity, can be grouped into 5 types (Said, 2018):

1. AMD Type 1 is the AMD that contains little or no alkalinity (pH < 4.5) and consists of dense accumulation of Fe, Al, Mn, and other metallic substances, acids (H^+), and oxygen. AMD type 1 may also refer to AMD with a pH <6 and a net acidity content that is greater than its alkalinity.
2. AMD Type 2 is the AMD that contains high dissolved solids with high levels of ferrous iron and manganese, containing little or no oxygen and a pH > 6. The pH of this type of water can drop sharply under oxidized conditions. Then, that is going to turn into AMD Type 1.
3. AMD Type 3 is the AMD that contains dissolved solids of moderate to elevated concentrations containing low to moderate ferrous iron and Mn concentrations, oxygen-free or low, pH > 6, and alkalinity greater than acidity. It is generally referred to as the drainage of alkaline mines. Under an oxidized condition, the alkaline compounds that are already present in the water neutralize the acids produced by metal hydrolysis and precipitation reactions.
4. AMD Type 4 is the AMD Type 1 which is neutralized to a pH > 6 and contains suspended particles with high concentrations. Precipitation of metal hydroxides in water has not yet occurred. With a sufficient period of residence in the pool, the suspended particles settle.
5. AMD Type 5 is the AMD that has been neutralized to a pH > 6 and contains dissolved solids with high concentrations. After almost all metal hydroxides have been deposited in the sediment pond, the main cations still left in high concentrations of water are generally dissolved calcium (Ca) and magnesium (Mg). Dissolved anions, such as bicarbonates and sulphates, remain in the water. If the neutralization process lacks alkalinity, this AMD type 5 does not form.

The Acid Mine Drainage formation process consists of several process steps, as follows:

1. In the presence of water, the oxidation process of pyrite minerals is the first process. Fe^{2+} is formed in this process from the pyrite decomposition process or the oxidation of pyrite by oxygen. For every mole of oxidized pyrite, this process is a weathering process followed by the process of pyrite oxidation and creates two moles of acidity. In both biotic and abiotic conditions, this process can take place (Gammons et al., 2009).

$$2FeS_2 + 7O_2 + 2H_2O \longrightarrow 2Fe^{2+} + 4SO_4^- + 4H^+ \qquad (1)$$

2. The next process is pyrite oxidation by ferric ions. This process is two to three times faster than oxygen oxidization. Per mole of pyrite, the amount of moles of acidity is also larger. However, only as long as ample ferric ions are available or under acidic conditions, does this process last (Gammons et al., 2009).

$$FeS_2 + 14Fe^{3+} + 8H_2O \longrightarrow 15Fe^{2+} + 2SO_4^{2-} + 16H^+ \quad (2)$$

The pyrite oxidation process thus starts with a process (1) under almost neutral conditions, followed by a process (2) if the conditions become more acidic or the pH is less than 4.5. Fe^{3+} will oxidize pyrite faster than O_2 and faster than O_2 at a low pH (less than 4.5) to oxidize Fe^{2+}. Process (2) is thus regarded as the limiting rate of pyrite oxidation (Munawar, 2008; Gammons et al., 2009).

3. As a result of the conversion of the process-formed ferrous ion (1), the ferric ion is formed and absorbs one mole of acidity, as seen in the process (3). With pH <5 and abiotic conditions, the rate of the process is slow (Munawar, 2008).

$$4Fe^{2+} + O_2 + 4H^+ \longrightarrow 4Fe^{3+} + 4H_2O \quad (3)$$

4. Process (3) shows that oxygen is needed to oxidize ferrous ions on ferries. The ferric ion can undergo oxidation and hydrolysis to form ferric hydroxide (4). The formation of precipitates or precipitates of yellowish-brown ferric hydroxide is highly dependent on pH, that is to say, more so at a pH greater than 3.5 (Gammons et al., 2009).

$$Fe^{2+} + ¼O_2 + 5/2H_2O \longrightarrow Fe(OH)_3 + 2H^+ \quad (4)$$

5. Process (4) is a reversible dissolving-precipitation process that lasts until the pH is equal to 3 and is a source or decrease of Fe^{3+} and is an essential step in the release into the environment of acids. A pyrite mineral oxidation process is obtained if the process (1) to (4) are combined, which is regarded as a general process that produces AMD as below (Munawar, 2008; Gammons et al., 2009).

$$FeS_2 + 15/4O_2 + 7/2H_2O \longrightarrow Fe(OH)_3 + 2SO_4^{2-} + 4H^+$$

The quality of AMD coal mineshaft relies upon the sort of mineral store and its related minerals (Ray & Dey, 2020). AMD can cause a number of potential environmental and human problems. For instance, the effect on water species and ecosystems in the downdrift of a watershed, which results in acidic and soluble metallic minerals, as well as the effect on superficial and groundwater properties (Shimada et al., 2012).

An AMD treatment is often complicated, difficult, and costly. Any discharge from coal mining sites should acquiesce pertinent regulations, laws, and rules on an international, federal, and local level (Acharya & Kharel, 2020). Physical parameters, in particular, TDS (Total Dissolved Solid), TSS (Total Suspended Solid), pH, parameters in chemistry such as sulphate, chloride ions, contaminants of heavy metals, including iron (Fe), manganese (Mn), nickel (Ni), aluminium (Al), lead (Pb), zinc (Zn), cobalt (Co), chromium (Cr), cadmium (Cd), arsenic (As), calcium (Ca), sodium (Na), etc., commonly employed to describe the standard of AMD to be discharged into nature (Ray & Dey, 2020). AMD quality standards in Indonesia is regulated in the Decree of the Indonesian State Minister of Environment Number 113/2003 regarding AMD Quality Standards for coal mining businesses and/or activities. Since the AMD from private coal mining companies in Muara Enim Regency is disposed to the river, it is also essential to include the value standard of the river based on the Government Decree Number 22/2021.

Table 1 AMD quality standards for coal mining businesses and/or activities based on Ministerial Decree for the Environment Number 113/2003 and river water quality standard based on Governmental Decree Number 22/2021

Parameters	Unit	Maximum Level	
		Ministerial Decree for the Environment Number 113/2003	Government Decree Number 22/2021
pH		6-9	6-9
Suspended Residue	mg/l	400	-
Total iron (Fe)	mg/l	7	0,3
Total Manganese (Mn)	mg/l	4	0,1
Total Suspended Solid (TSS)	mg/l	-	40 (River Class 1)
			50 (River Class 2)
			100 (River Class 3)
			400 (River Class 4)

Besides ecological impacts, AMD also generates socio-economic impacts such as the impacts on human health, acid prevention, isolation, neutralization and removal costs, alliances, funding demands, transfer of technology, and policies. Mining companies should develop AMD management plans and control measures or even build treatment schemes that are suitable for climate, topography, policy requirements, AMD hazards forecasting, and thereby minimizing possible ecological and human health issues (Acharya & Kharel, 2020). The existence of a policy is required to mitigate the negative effect of AMD. In the next section, the concept of a policy and its implementation will be discussed.

2.2 THE CONCEPT OF A POLICY, POLICY IMPLEMENTATION, AND THE EFFECTIVENESS OF POLICY IMPLEMENTATION

The meaning of a policy is also conceptualized as a philosophical concept with the terminology of wisdom which is described as the "love of truth". The principle of wisdom is defined as a declaration of willingness or desire which is called political language. The term of a policy is used to describe the actions of one or more actors within a specific area of operation, for instance, an officer, organization, or government agency. A policy is formulated as a decision that outlining the most efficient and most effective way to jointly accomplish the objectives. A policy can be interpreted in terms of the policy content or the editorial formulation of a policy that includes the aims and objectives to be accomplished and the realization of a policy from the implementation processes (Marpaung, 2012).

In essence, the form of a policy issued is to emphasize the objectives and issues for which the policy has been issued. The categorization of such policies are described as follows (Yanuarsih, 2017):

a. *Regulatory policy* is a policy for the enforcement of laws regarding the application of limitations or prohibitions on acts or behavioural actions for an entity or group of people.
b. *Self-regulatory policies* are a policy for a group of people to regulate or control on certain issues.
c. *Distributive policy* is a policy for certain number of citizens concerning the provision of resources and different advantages.
d. *Redistributive policies* are policies that are intentionally issued by policy makers to switch between classes and groups of policy implementers to control wealth, wages, possession, or property rights.
e. *Substantive policies* are policies about what policy makers want or wish to do, with the subject being stressed.
f. *Procedural policies* are policies about who or which actors are interested in policy formulation, as well as how policy formulation is performed.
g. *Material policy* is a policy for the allocation or distribution of actual material resources or intrinsic power or the application of burdens on those who are expected to distribute them.
h. *Symbolic policies* are persuasive policies since only relatively minor benefits or drawbacks can be given by these policies.

i. *Collective Goals Policies* are policies that provide goods, things, and services for the needs of many individuals.
j. *Private Goods Policies* are policies about the procurement of goods or services to benefit certain people or individuals and the people who need them must pay a certain fee.
k. Liberal policies are types of policies that enable politicians, especially those who aimed at extending equal rights, to make social changes.
l. *Conservative policies* are the opposite of liberal policies. This policy assumes that what is already good is adequate to prevent the need for social reform or to slow down and run naturally if social change is needed.
m. *Capitalization policies* are policies that are issued to improve output capacity and are then assigned to those policies that enforce them.
n. *Ethical policies* are policies that can be enforced in an attempt to understand moral problems within the policy-making culture, in other words, to pay attention to the creation of problems to be realized in practice.

Policies relevant to AMD management are regarded as regulatory policy which have established criteria for regulatory compliance for individuals or groups of people regarding restrictions or prohibitions on action or behaviour (Van Meter & Van Horn, 1975). Van Meter and Van Horn identify policy compliance as an attempt made by public agencies within a certain time to enforce policies that have been made or mutually agreed upon. Policy objectives must be clearly defined in policy implementation to be well understood, resources must be given, the command chain must be able to unify and manage the resources, and the processes must be successful in managing individuals and entities engaged in the application of the policy (Van Meter & Van Horn, 1975). Smith (1973) identified four components that are relevant in the policy implementation process under the circumstances of policy application:

1. The idealized policy, namely the idealized interaction patterns that try to induce those who have established the policy.
2. The target groups are identified as those who are expected by the policy to follow new interaction patterns. They are the person who are the most directly impacted by the policy and who need to adapt in order to fulfil its requirements.
3. The implementing organization that is responsible for policy enforcement.

4. The environmental aspect, certain environmental elements that influence or are influenced by the execution of the policies. The general public and the separate special interest groups exist here.

Sadler (1996) defined ‘‘effectiveness" as to whether something works as intended and serves the purpose for which it was planned. Effectiveness is a measure of an organization's success or inability to fulfil its objectives. If an organization succeeds in accomplishing its goals, it is said to be effective (Devi & Basri, 2019). Policy implementation is the process that occurs among the development of a noticeable desire on the segment of the government to act or stop to act and the eventual consequences in the process of measures (O’Toole, 2000). Policy implementation is a stage in the policy process where measures to solve problems are taken and indicated by the implementation of policies on specific targets to accomplish the desired goals (Anderson, 2003).

Policy implementation may also be defined as an activity carried out by the implementers to distribute policy outputs to the target group to achieve the policy (Herdiana, 2018). According to Parsons (2001), to make the policy implementation more effective, the objectives must be clearly defined, resources must be provided, the chain of command must be able to organize and regulate these resources, and systems must be effective in controlling the individuals and organizations involved in policy implementation.

A policy review should be carried out to analyze and assess the available options for implementing the policy. Effectiveness is a measure of accomplishing predetermined objectives. The closer the action is to the indication, the more effective it is. The effectiveness scale is divided into numerous categories, which are as follows (OAS, 2021; Rahayu, 2016):

a. High level effectiveness (91% - 100%), when the initial outcome is attained to a massive proportion and very minor improvements are needed: Very effective.
b. Substantial level of effectiveness (71% - 90%), if the initial purpose is obtained to a great extent and minor improvements are needed: Effective.
c. Moderate level of effectiveness (51% - 70%), when the initial outcome is achieved to some extent and moderate improvements are needed: Moderately effective.
d. Low level of effectiveness (31% - 50%), if the initial goal is attained to a negligible extent and major improvements are needed: Slightly effective.

e. Ineffective (0% - 30%), when the initial outcome is not achieved and fundamental improvements are needed: Not effective.

2.3 COMPANY PERFORMANCE ASSESSMENT PROGRAM IN INDONESIA (PROPER PROGRAM)

According to García et al. (2007), PROPER is notable for disseminating information through a five-colour code, with each participating company assigned a colour based on its environmental status. Black PROPER will be assigned to facilities that made almost no effort to mitigate emissions. Red PROPER indicates that the facility made an effort, but it fell short of legal requirements and had insufficient reporting. Blue PROPER will be given to facilities that complied with legal requirements and reported on a regular basis. Green PROPER will be designed for "forward-thinking" businesses and will be awarded if pollution levels were significantly lower than legally mandated levels and the company performed well in terms of equipment maintenance, reporting, and environmental work. Gold PROPER would be awarded to businesses that met international environmental excellence standards, which included the utilization of clean manufacturing technologies, waste reduction, and pollution control activities.

PROPER is a review of compliance and performance that extends above and beyond compliance with company responsibilities and/or actions in the domains of deterioration control and/or natural destruction, hazardous, and toxic waste management. Water Pollution Management in PROPER is an effort to prevent and control water pollution as well as restore water quality to ensure water quality meets water quality requirements (Wahyudianto & Boedisantoso, 2017).

Policy review should be carried out to analyze and assess the options available for implementing the policy. It is important to consider the stakeholders involved in the mining sector before undertaking a policy review. The explanation for these stakeholders will be clarified in more details in the next section.

2.4 STAKEHOLDERS IN THE MINING SECTOR

The theory of stakeholders posits that businesses are accountable for providing all of their stakeholders with advantages rather than just to clients and owners. Furthermore, Mutti et al. (2012) argued that if a corporation wants to improve community standard of living in a

longer term, it requires to use a network administration pattern that takes a comprehensive approach to respond to stakeholder networks and impact strategies. The stakeholder approach is essential to the debates and critical studies of how environmental policies can resolve the key issues affecting sustainability in developing countries such as degradation of the environment, social vulnerability, and inequality. These are especially useful when exploring sustainability issues in the mining industry. To examine both environmental and social problems, the stakeholder theory approach was used; in particular, a large range of studies was devoted to studying the motives, evolution, and implications of environmental policies, management and leadership (Delmas & Toffel, 2004).

The national government, provincial government, local government, mining companies (operating at the stages of prospecting, exploration, and exploitation), local communities, NGOs, and universities are generally the main stakeholders in the mining sector. The national government is an authority whose actions are aimed at protecting and complying with regulations and policies specifically in the mining sector, but the implementation of mining regulations and policies can be delegated by law to provincial governments (Mutti et al., 2012). The local government is an entity in the locations where mining projects operate and might have the capacity and powers delegated by provincial governments.

The challenges of incorporating mining resources for social and environmental management into national governance systems have been described as being particularly relevant for emerging economies and seeking to ensure environmental sustainability. When more attention is paid to the phases that precede environmental measures, the design and implementation of environmental policies can be made much more effective (Vazquez Brust & Liston-Heyes, 2010). It is imperative to consider the expectations of stakeholders related to the sustainability of the exploitation of natural resources as support and opposition vary based on how communities react individually and collectively to the opportunities and challenges associated with the activities proposed (Ladd, 2013).

The stakeholders and decision makers, with the juggling act at the core of sustainable growth, must balance the current needs against potential risk (Poelzer & Ejdemo, 2018). Perceptions of the sustainability of the mining industry have become increasingly polarized, particularly due to the complexity of the industry and its wide range of stakeholders (Wang et al., 2016; Laurence, 2011; Mudd, 2010). As a consequence, in arrange to reduce the conflict

between mining corporations and the stakeholders, it is crucial for the mining corporations and the decision makers to comprehend the perceptions of any proposed or ongoing activities at both local and sub-national levels (Wang et al., 2016; Walsh et al., 2017).

The characteristics of the stakeholders involved can be analyzed with CIT. The CIT, which allows some measures to explore the characteristics will be more elaborated in section 2.5.

2.5 CONTEXTUAL INTERACTION THEORY

Contextual Interaction Theory (CIT) is employed as a way of comprehending the internal processes that occur once the governance actors have agreed to move forward with the selected policy application (Bressers & de Boer, 2013). CIT places the core of the analysis on the characteristics of actors participating in the policy process, and offers a structure that allows for considering the influence of the external context (Bressers et al., 2016).

This theory can be used in evaluating the implementation of a policy. Two interconnected players are interested in the process of enforcing a policy (Fuchs, 2010, Bressers & de Boer, 2013). The first actor is the implementer or actor who is responsible for the policy implementation. The second is the target group in which this group plays a role in the policy implementation. Bressers and de Boer (2013) claimed that in policy implementation analysis, there are many determinants to achieve effective policy implementation that have been used to evaluate various cases of policy implementation with numerous variables which are presented and accompanied by different combinations of factors.

According to CIT, because the procedure of interaction is anthropogenic, all activities are impacted, including the whole things established by the policy instrument, through the main features of the involved actors (Bressers & de Boer, 2013). These three features are the motivation that could encourage actors to act, their cognitions and information, as well as the power and resources, to give the actors the ability to act independently and to have power for other actors (Bressers, 2007; Bressers, 2009; De Boer & Bressers, 2011; Bressers & de Boer, 2013; Bressers et al., 2016). This approach allows for an initial differentiation that is much more parsimonious between the inner core variables (Bressers & de Boer, 2013). There must be an adequately solid combination of motives, cognitions, and resources among the

participants engaged in the course to allow the process to succeed, as seen in Figure 3 (Bressers, 2007; Bressers, 2009; Boer & Bressers, 2011; Bressers & de Boer, 2013) .

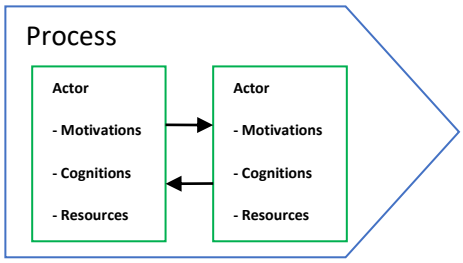


Figure 3 The actor characteristics used in CIT are represented in a process model (Bressers, 2007; Bressers, 2009; De Boer & Bressers, 2011; Bressers & de Boer, 2013)

Thus, the underlying premise of Contextual Interaction Theory is that the policy process courses and outcomes are determined not just by the feeds (for this occasion, the policy instruments attributes), but also importantly by the involved actors' features, namely motivation, information, and power (Bressers, 2004; Bressers, 2007; Bressers, 2009; De Boer & Bressers, 2011). All other factors affect the process held because to a certain extent, one or more of the core characteristics of one or more of the actors is influenced by them. This affects the quality of relevant actors and this also applies to the influence exerted by policy instruments (Bressers, 2004).

Contextual Interaction Theory's fundamental assumptions are very simple and clear. The principal assumptions of the theory are (Bressers et al., 2016):

a. Policy processes are multi-actor engagement systems. When engaging in the process, all people, often representing organizations or associations, or organizations themselves, may be called the actor.
b. Numerous components may have an impact, but only because and as far as how they alter the relevant features of the actors engaged.
c. The relevant characteristics are: motivations, cognitions and resources, also power and capabilities (Knoepfel et al., 2011).
d. Those three features affect one another, though without losing many perspectives, they cannot be limited to two or one (Mohlakoana, 2014).
e. The process is shaped by the characteristics of the actors, but it is also affected in turn by the command and understanding gained during the phases, and could thus alter throughout the phases. There is a complex connection between the fundamental characteristics of the actor that drives processes of social relation and is modified by the system in turn.

Participating actors' deliberate strategies may seek to promote such transitions in other actors as well as with their own community or organization.

f. The actors' characteristics are often affected by the circumstances and transformations of particular contextual circumstances, such as characteristics of the geographical location and previous decisions, which may apply the stage for certain actors while excluding others by the process, among others.
g. The institutional circumstance of the governance reign constitutes the next setting layer. It is the setting on which the GAT focuses.
h. There is another circle that is more inclusive within the system of the broader political, social-cultural, economic, technical context, and issues surrounding this context. Directly or through the governance structures, they may influence the characteristics of the actors.

Those complex layers of background are shown in Figure 4. Those layers are represented as overlying circles where they have a clear possible effect on the characteristics of the participants, suggesting that a larger context does not have to affect governance initially and then the particular case context until it has an impact, although some of its impacts will function like that (De Boer & Bressers, 2011; Bressers et al., 2016). A process of the case affecting the context's evolution is also possible the other way around, but this effect would mainly be restricted to the particular context (Bressers et al., 2016).

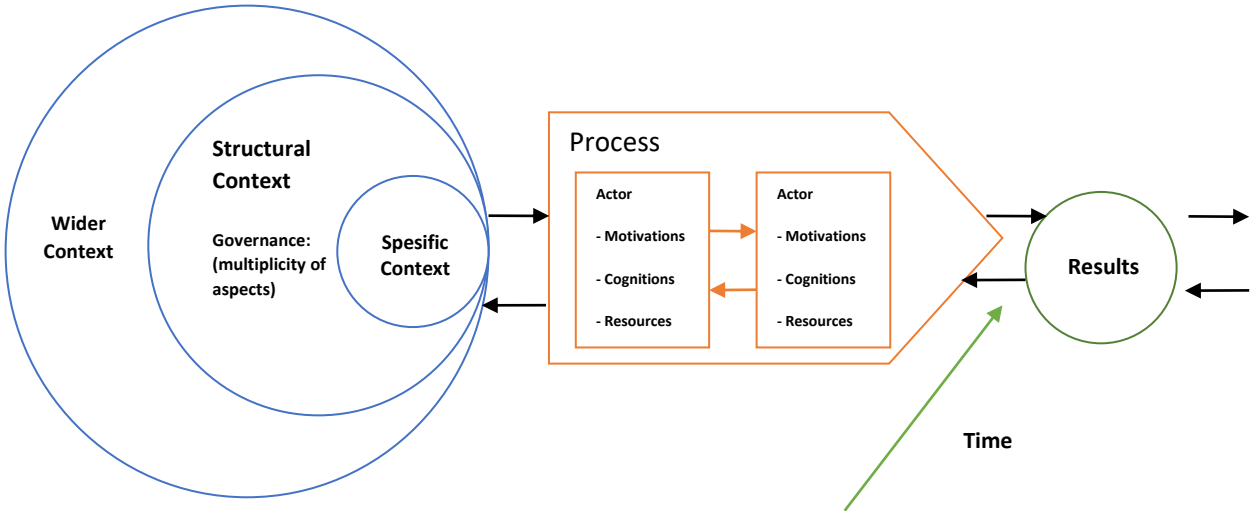


Figure 4 Interaction processes were simultaneously affected by multiple layers of context (Bressers, 2007; Bressers, 2009; De Boer & Bressers, 2011; Bressers et al., 2016)

There are several concepts and other theories that are employed in figure 5. In comparison with Figure 4, this figure also demonstrates the progression of processes

(processes of transition, in the form of processes over time)(Bressers, 2007; Bressers, 2009; De Boer & Bressers, 2011; Bressers et al., 2016).

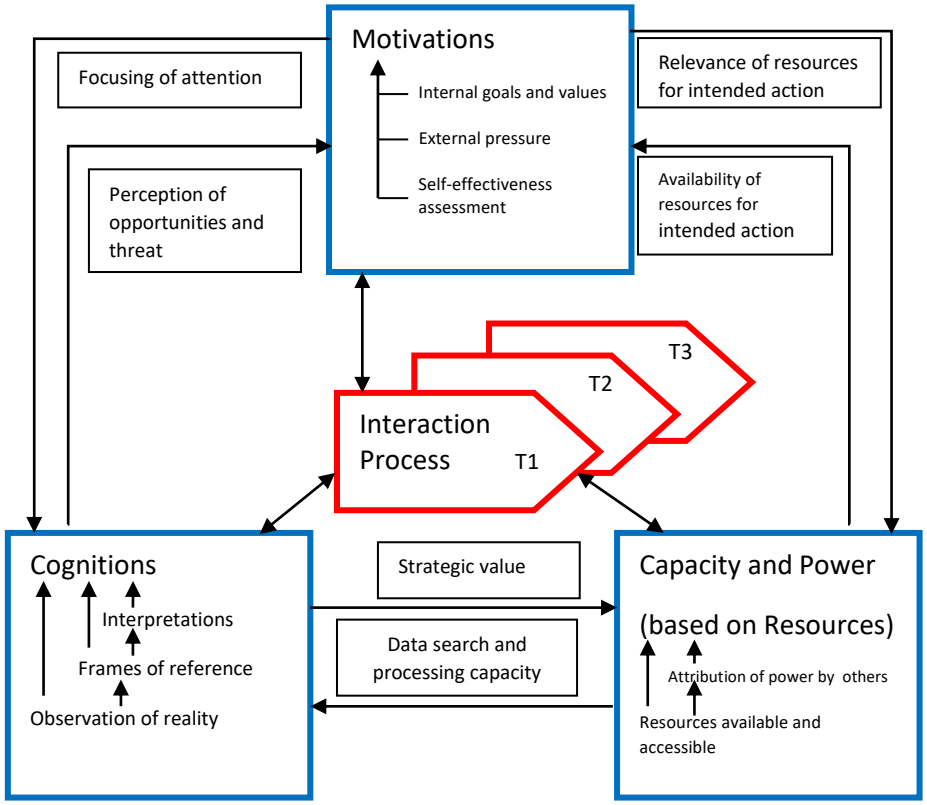


Figure 5 Dynamic interaction between the key actor characteristics that drive social interaction processes and in turn are reshaped by the process (Bressers, 2007; Bressers, 2009; De Boer & Bressers, 2011; Bressers et al., 2016)

Bressers et al. (2016) argued that the basis of behavioural motives, including roles taken in interaction systems, lies in their own goals and values. Furthermore, Bressers et al. (2016) stated that the actors' cognition (interpretation of truth that is considered correct) is not just observation and the ability to process knowledge although these elements are significant and become a source of rapid change with the information technology revolution. While resources are important for providing the capacity to function as attributes of actors, they are also important in the context of relationships as sources of control of the interaction phase (Bressers et al., 2016). This means that the importance of the resource depends on the actions that the actor needs to take (Bressers et al., 2016). The power base is provided by providing the resources needed by other actors to perform the desired action (Bressers et al., 2016).

According to Bressers (2004), a variety of factors influence the relationship between the government and other social actors in the policy implementation process (typically the principal target group, since it has the greatest interest). The theory attempts to explain the differences by categorizing interaction into three types: cooperation ("active cooperation",

"passive cooperation", or "forced cooperation"), "joint learning", and "opposition" (Bressers, 2004). When both parties share a common goal, they are said to be actively cooperating (remembering that the goal also can involve an attempt to restrict the application of the instrument) (Bressers, 2004) . It refers to "passive" collaboration when one of the actors takes a reasonably passive stance approach that neither encourages nor discourages the use of the policy instrument (Bressers, 2004). As a form of passive cooperation, a dominant actor imposes 'forced' cooperation (Bressers, 2004).

When one actor tries to restrict another actor from applying, this is called "opposition", when there is simply a lack of information that hinders implementation, it is referred to as shared learning (Bressers, 2004). In other cases, the responsible authorities and the target group will have no interaction at all (Bressers, 2004). In this case, the instrument's chances of being used are extremely little (Bressers, 2004). Figure 6 illustrates the circumstances of the implementation process, as well as the types of interactions and outcomes that can be anticipated in terms of the instrument's likelihood of use (Bressers, 2004).

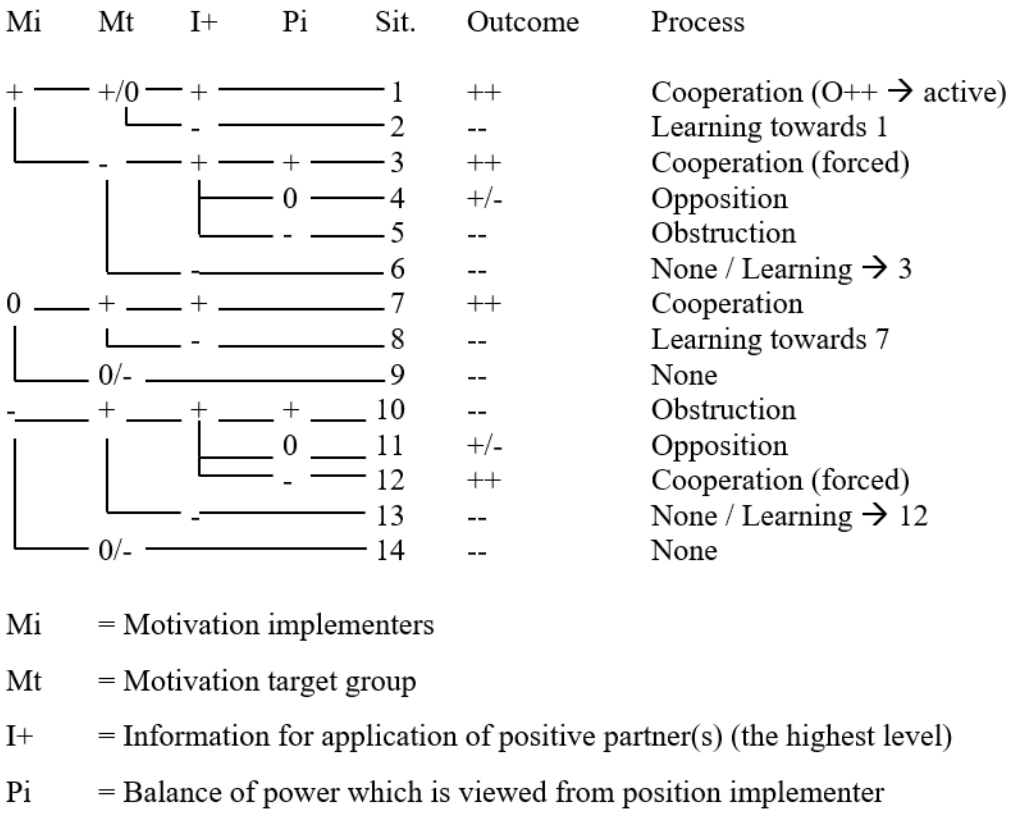


Figure 6 Likelihood of Application (Bressers, 2004)

Bressers (2004) stated that to some extent, the kinds of interactions that may occur at this stage of the process vary from those depicted above. This is due to the fact that the degree of adequate application necessitates a much greater number of components (Bressers, 2004). For example, the issue is not only whether a corporation that requires a permit will achieve one, but also whether the permit will include all of the rules required to obtain the policy objective (Bressers, 2004). Additionally, according to Bressers (2004), the most complex aspect of the government-industry negotiations is definitely the formulation of these regulations. Furthermore, since the use of policy instruments almost always results in an interaction, the result depicted in Figure 6 will be impossible to obtain.

Thus, Bressers (2004) argued that “constructive” and “obstructive” collaboration, “negotiation” and “conflict” (opposition), and “symbolic application” are distinguished, as are often accompanied by learning. When both actors stand to benefit from an improper application, “active obstructive cooperation” occurs (Bressers, 2004). Furthermore, Bressers (2004) argued that the similar fact may arise within “passive” collaboration when one or two actors have a proforma enthusiasm in the instrument's implementation, for example, since outright non-implementation would be overly apparent and problematic in the eyes of higher authorities, but no substantive interests in "adequate" application. Given the numerous variables at play, it's useful to categorize the interaction type "opposition" as "negotiation" or "conflict" (Bressers, 2004).

Bressers (2004) claimed that during a negotiation, the parties strive to accomplish as many of their own objectives as possible by reaching an agreement and when there is an event of a conflict, the target group usually cuts communication channels and encounters the opposing group that unfavourably wields power. This is a situation where a more broadly defined target group has concerns about the validity of the instrument. Finally, depending on the situation, the relation style may be classified as "symbolic" in certain ways, since the instrument's procedural "form" is adhered to strictly, substantive change is frail (Bressers, 2004). In most cases, learning processes can alter these circumstances over time. In terms of the instrument's appropriate application, figure 7 describes the scenarios, predicted interaction types, and expected outcomes.

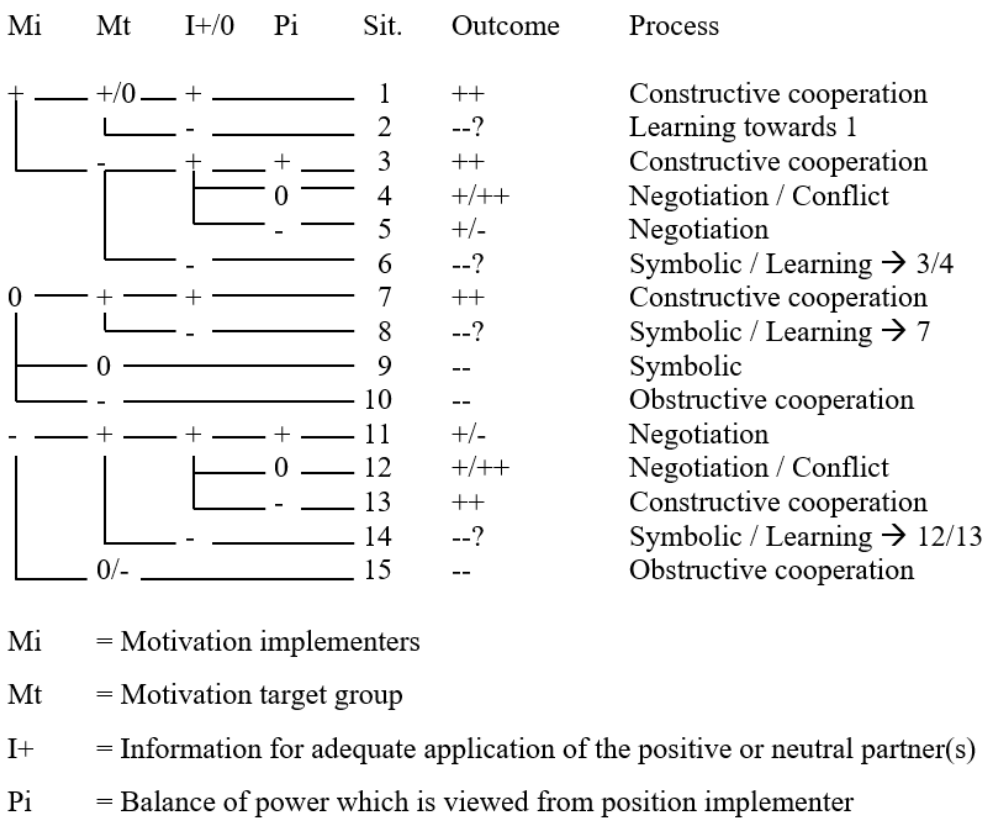


Figure 7 Degree of Adequate Application (Bressers, 2004)

2.6 GOVERNANCE ASSESSMENT TOOL

Bressers et al. (2016) argued that the Governance Assessment Tool (GAT) is embedded in the Contextual Interaction Theory of Policy Implementation. It considers implementation processes not as top-down, but as multiple-actor interlinkage steps which are conclusively guided by participating actors (Bressers et al., 2016).

To methodically clarify the five elements of governance, a series of questions was devised to assist the study of policy and additional actual sources, as well as to coordinate the interpretation of qualitative discussions with the central spokesman (Bressers et al., 2016). An overview is given in Table 2.

Table 2 The major detailed list of questions defining the five governance dimensions for policy implementation (Bressers et al., 2013)

Governance dimension	Main descriptive questions
Levels and scales	What levels of administration are involved, and how are they involved? Which scales are taken into account, and how? To what extent do they rely on one another or are they capable of acting productively? Is there much that has changed over time, or do they appear to be changing over the next few years?
Actors and networks	Who are the actors interested in the practice? What kinds of network connections do they have that aren't related to the case at hand? What are the actors' responsibilities? Which one of the actors is only implied because they are influenced or benefit from the actions taken? What are the points of contention between these parties? What kind of discussions do they have? Is there anybody who can act as a middleman? Is there much that has changed over time, or do they appear to be changing in the upcoming time?
Problem perspectives and goal ambitions	Which opposed point of view on the issue that the public and stakeholders are debating? What are the current policies designed to address in terms of potential disruption? What levels of interruption to regular resource usage are sufficient for various stakeholders? What are the goals outlined in related policy articles and policy declaration? Is there any evidence that any of these have altered throughout the time or do they appear to be changing in the upcoming time?
Strategies and instruments	What policies and measurements are being implemented to address the issue? How do they represent a specific impact approach (regulatory, incentive, demonstrative, vocational, etc.)? Is there much that has changed over time, or do they appear to be changing in the upcoming time?
Responsibilities and resources	Which institutions are responsible for which duties are underneath the appropriate policies and norms? What admissible jurisdiction and other resources have they been offered, or do they already have, for this purpose? What levels of transparency are expected and monitored in their application? Is there sufficient information available about the resource system? Is there much that has changed over time, or do they appear to be changing in the upcoming time?

The Governance Assessment Tool not only includes descriptive questions, but also integrates four consistence parameters to be considered (Bressers & Kuks, 2003; Bressers et al., 2013; Casiano Flores et al., 2017) which are here defined as follows:

a. Extent: Have all appropriate issues for the part or initiative in question been given consideration?
b. Coherence: Do the components of the governing reinforce better instead of contradicting one to another?
c. Flexibility: Is the different path towards the objectives allowed and/or endorsed, relying on chances and risks when they emerge?

d. Intensity: how fiercely do regime segments advocate for improvements in the current system or recent developments?

The evaluative questions regarding to those four parameters are shown in Table 3.

Table 3 Main evaluative questions of GAT (Bressers et al., 2013; Casiano Flores et al., 2017)

Governance dimension	Quality of the governance system			
	Extent	Coherence	Flexibility	Intensity
Levels and scales	Are all applicable levels of government involved in resolving a problem? Are there any apertures or levels that are missing?	Do levels collaborate and believe one another? Is the interdependence of levels acknowledged?	Given the problem at stake, is that conceivable scaling up and scaling down the levels?	Is there a significant effect on behavioral improvement or management reform at a certain level?
Actors and networks	Does anyone need to be involved? Is there anyone who is not interested or who has been excluded?	What are the strengths of stakeholder interactions? What are the mechanisms by which these relationships are organized in balance systems? Do the involved actors have prior proficiency to work cooperatively? Do the stakeholders have mutual faith and dignity?	Is it likely that the new actors will be added, or the prior role will be shifted from one actor to the others for practical reasons? Do the actors have enough 'societal resources' to help each other with their duties?	Is there a lot of tension from an actor or a group of actors to improve their actions or reform their management?
Problem perspectives and goal ambitions	To what degree are different issue viewpoints considered?	To what degree do the different viewpoints and goals complement one another, or are they in rivalry or conflict with one another?	Is it possible to re-evaluate the objectives?	What makes the target goals different from the current system or recent developments?
Strategies and instruments	What are the instruments used in the policy plan and which are not? Is observation and compliance part of the package?	How much of the reward scheme is built on synergy? Are cost-benefit trade-offs and distributional consequences taken into account? Are there any policy instruments that establish overlapping or conflicting incentives?	Are there any possibilities for combining or using various kinds of instruments? Is there an option?	What are the implicit behavior anomalies from the present implementation, and how strict are the instruments on requiring and enforcing it?

Governance dimension	Quality of the governance system			
	Extent	Coherence	Flexibility	Intensity
Responsibilities and resources	Are all roles and obligations certainly defined and supported by resources?	To what degree do delegated roles lead to internal or cross-institutional competence struggles or cooperation? Do the key stakeholders regard them as legitimate?	To what extent is it desirable to merge delegated roles and resources while also maintaining accountability and transparency?	Is the sum of assigned resources adequate to take the necessary step and to produce a desired transformation?

2.7 THEORETICAL FRAMEWORK ELEMENT

The study builds on the AMD theory, the concept of policy, the CIT and GAT by Bressers, and the concept of stakeholders in the mining sector based on the theories, models, and tools provided in the literature review. Figure 8 goes into considerable detail about the importance of this theoretical structure in the research process.

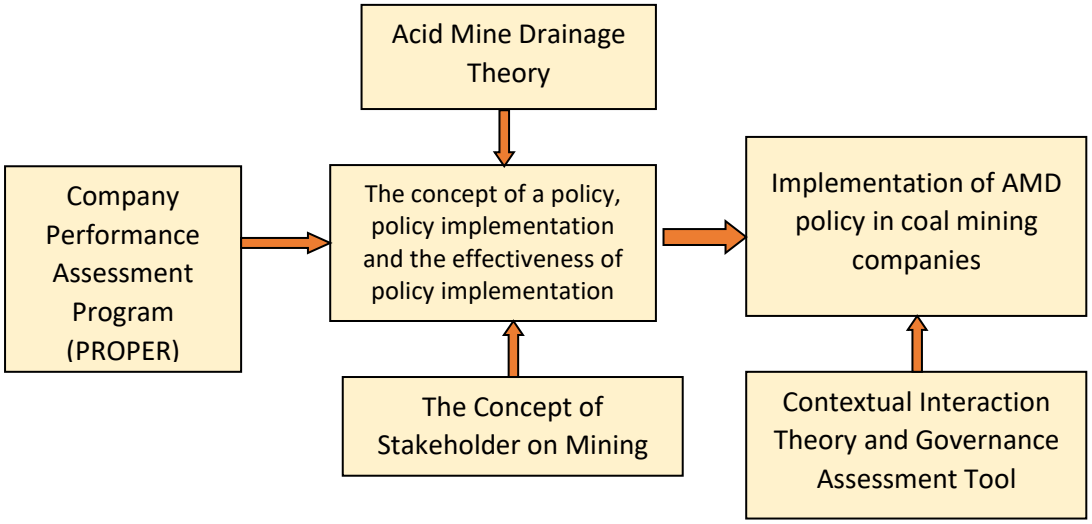


Figure 8 The element of theoretical framework

3 RESEARCH DESIGN

This chapter discusses the research arrangement and the methods to be employed to gather and evaluate the information required to attain the purpose of the research.

3.1 RESEARCH FRAMEWORK

Regarding Verschuren et al. (2010) guidelines, a systematic representation of the research goal should be comprised in the research framework (Verschuren & Doorewaard, 2010). It can therefore be carried out step by step to pursue the purpose of the study. The seven stages in the research framework are elaborated as follows:

Step 1: Characterizing briefly the objective of the research project

This research aims to measure the effectiveness of AMD policy implementation, to identify the governance contexts that favor and hinder the effective application of government policies related to AMD management in private coal companies, to recognize the actor's characteristics and the background issues that affect AMD management in private coal mining companies, to measure the effectiveness of AMD management policy implementation in MER, and to propose strategic approaches, from a governance and actor perspectives, to achieve the effective policy implementation of AMD management in MER. The study results are meant to provide an additional perspective, understanding, and creating knowledge that can contribute to the implementation of government policies that are significant to AMD management. The results of the study should also be an indicator for the application of the AMD management concept involving various stakeholders. In other words, it can be said that the aims of this research are intended in the practical sense to be beneficial for environment managers and all stakeholders who may have an interest in the future management of AMD. Recommendations on influencing policies as well as recommendations for additional technical studies will be provided.

Step 2: Determining the research object

The object of the study analyzed in this study is the AMD management policy and its implementation in MER, South Sumatera, Indonesia.

Step 3: Establishing the nature of the research perspective (Verschuren & Doorewaard, 2010)

The study assesses whether or not the current AMD management policy has been effectively implemented. After explaining this degree of effectiveness, the assessment should offer recommendations to the policy-maker if there is a need to amend or change the policy. The study analyzes the implementation of policy in the management of AMD as a multi-actor interaction mechanism through the CIT and assesses the governance by using GAT.

Step 4: Determining the sources of the research perspective

Based on the empirical literature analysis, the study established a conceptual structure. Table 4 files the theories which are going to be included in this study.

Table 4 Research Perspective Source

Key concepts	Theories and documentation
Acid Mine Drainage	Theory on the Acid Mine Drainage
Policy Implementation	Theory on Policy and the Implementation
Effectiveness of Policy Implementation	Theory on Policy Implementation Effectiveness
Actor's characteristic	Contextual Interaction Theory
Governance context	Contextual Interaction Theory
Stakeholder on Mining	Theory about stakeholder

Step 5: Making a schematic presentation of the research framework

The framework of this study is depicted in Figure 9 below:

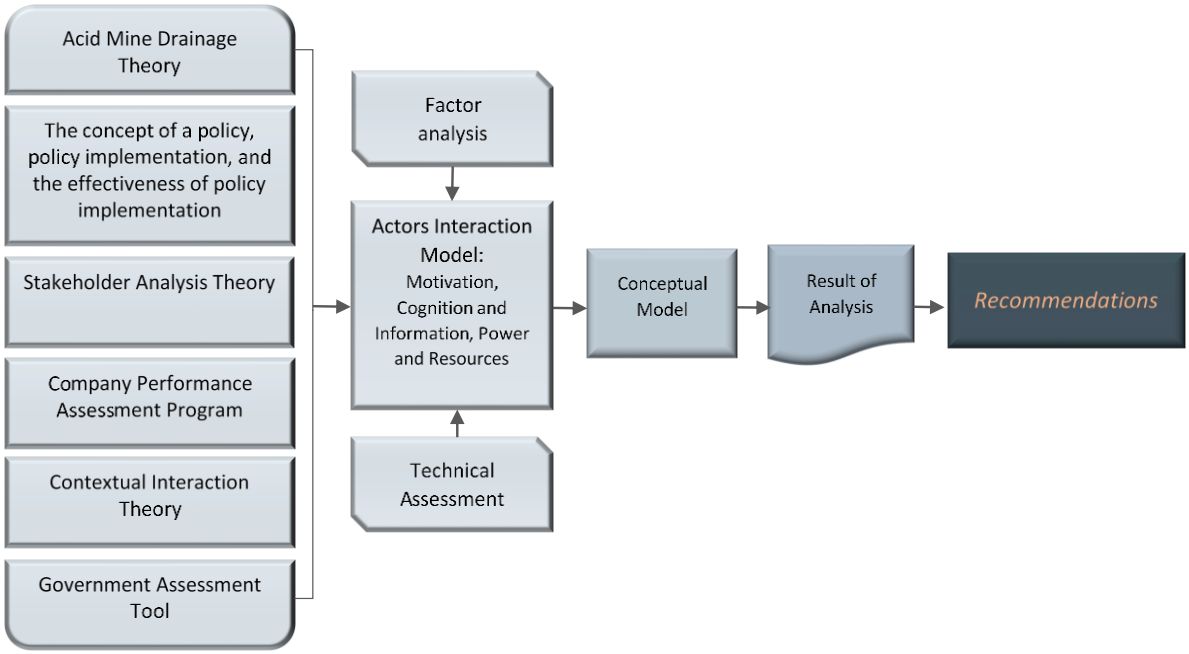


Figure 9 A Schematic Presentation of Research Framework

Step 6: Formulating the research framework in the form of elaborate arguments which are elaborated

(a) Preliminary studies and literature reviewing the policies related to AMD management, analyzing interactions between stakeholders involved in AMD management by using CIT, assessing the governance by using GAT, and defining the effectiveness of policy implementation.

(b) In which the object of the study is measured.

(c) Opposing the analysis' result as the foundation to propose a recommendation.

(d) Recommendation on the most feasible policy that can be applied. The recommendation would address the issues.

Step 7: Checking whether the model requires any change (Verschuren & Doorewaard, 2010)

There is no indication that any change is required.

3.2 DEFINING CONCEPTS

The important conceptions are described as follows:

1. **Acid Mine Drainage** assigns to acidic liquids formed by the weathering of sulfur or sulfide minerals contained in mines, ore, or various forms of waste created by mining activities.
2. **Policy implementation** is the method of carrying out policy decisions taken by the government officials to achieve the goals outlined in the policy decisions.
3. **Actor's characteristic** refers to the characteristics among policy actors at every phase of the policy cycle.
4. **Governance** refers to the processes, measures, and procedures that are used to manage resources and solve public problems.
5. **Stakeholder** is a group of people (individuals, organizations, associations, and/or other smallest parts) who are involved in a policy, project, or program and contribute to and influence the policy, project, or program's final outcome.

3.3 RESEARCH STRATEGY

The approach used in this research is practice-oriented research since the research objective is derived from professional practice and the information generated in the research contributes directly to the professional practice on the implementation of the AMD management policy. The research had been conducted in four phases, the first was the evaluation of governance factors that affect the implementation of AMD policy. The second was the assessment of the characteristics of the actors involved in AMD management policy implementation. The third was the assessment of the effectiveness of AMD policy implementation. Fourth, proposed recommendations for effective AMD policy implementation in private coal mining companies in MER was made.

3.3.1 RESEARCH UNIT

The unit of this study is AMD management, specifically AMD management in private coal mining companies throughout MER, South Sumatera, because the entire study is focused on this area. To determine the sample size, the Slovin formula (1960) is used. The formula is the following:

$n = N / (1+N.e^2)$

Where:

n = number of samples N = total population e = error margin / margin of error

3.3.2 RESEARCH BOUNDARIES

This research does not only concentrate on the policy making, but also the policy implementation. Furthermore, this research does not focus on all industries, but only focuses on the mining industry. This research focuses on private coal mining companies in Muara Enim Regency, South Sumatera, Indonesia. The geographical boundary of this research is limited to MER South Sumatera, to achieve the research objective within a specific time. No other area is considered in this research. The stakeholders and actors, who are analyzed in this research, is limited to those who are involved in AMD management in MER, including those who are working in companies and government agencies involved. The area of this research is shown in Figure 10.

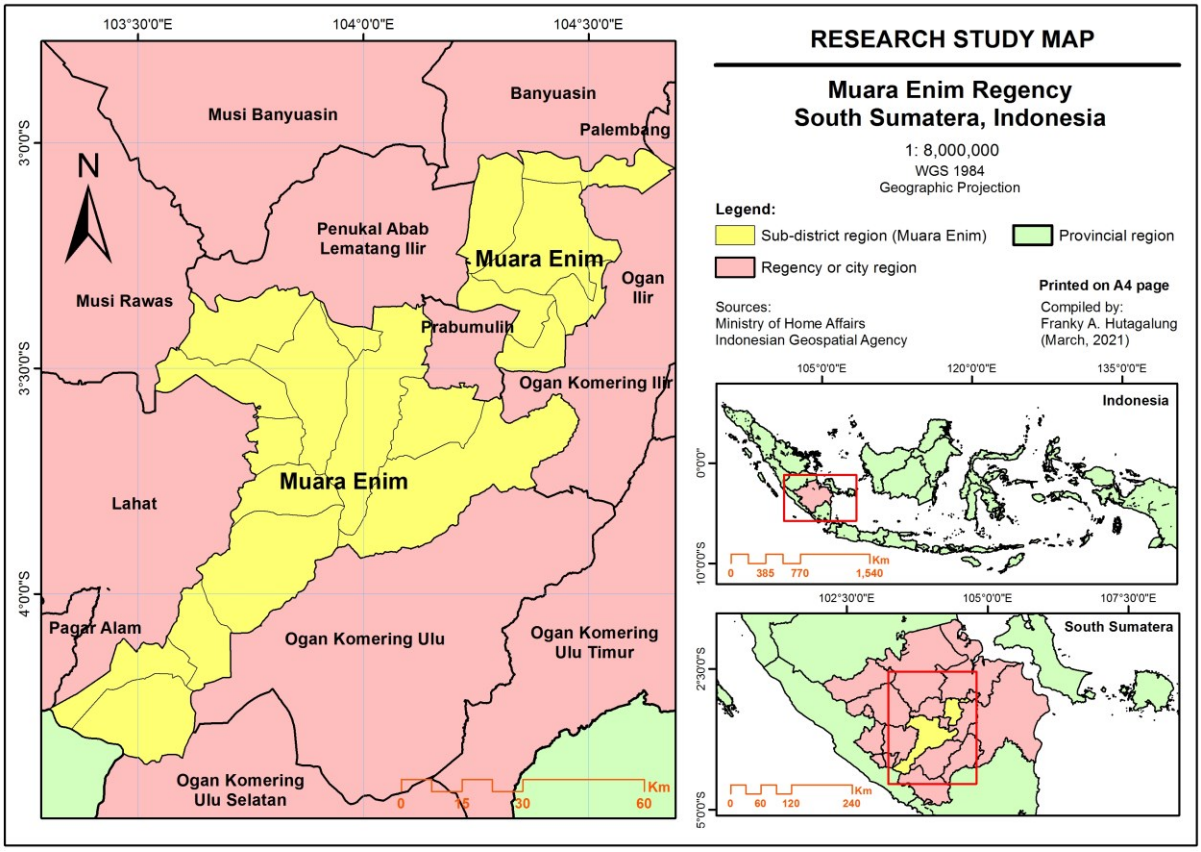


Figure 10 Area of Research (Ministry of Home Affairs and Indonesian Geospatial Agency)

3.3.3 RESEARCH LIMITATION

Many limitations are compounded by the constraints and unpredictable conditions caused by the global pandemic of COVID-19. It is recommended that people stay indoors as much as possible to avoid gathering in groups or meeting new people. Due to the government's social distancing laws, the interviews are conducted entirely online using

conference tools, and contact with informants and supervisors is also conducted entirely online. During the interviews, the internet connection can cause communication problems.

3.4 RESEARCH METHOD

The research methods that are employed to evaluate the implementation of the AMD management policy is the mixed method of analysis, the quantitative and qualitative method (mixed method, but dominantly quantitative). The prevalent quantitative combined approach or mixed method is a research method that in the first steps are the compilation, gathering, and assessment of quantitative data, and afterward in the second steps are the compilation, gathering, and evaluation of qualitative data, which are based on the findings of the quantitative analysis. The quantitative approaches are used to assess the effectiveness of AMD management policy implementation, as well as the governance and actors' characteristics factors that have significant impacts on the ineffective implementation of policies by processing data from the study location using quantitative descriptive analysis. The methods to be applied in this research are:

a. Desk research

   Literature studies are carried out by reviewing a variety of reading materials, including scholarly publications (theses, master theses, and dissertations), scientific papers and articles, documents and operation reports, including various regulations and policies relevant to research issues from various official sources, the details of which can be justified. In this case, this literature and documentation review provides details on the management of AMD.

b. Survey

   The survey consists of a list of statements about research problems, to which respondents are asked to respond. The survey results are used to develop quantitative methods. Respondents are the policy actors (implementer and target group) who carry out the policy's objectives. They are the federal, provincial, and local government officers, as well as the management and employees of private coal mining companies, who are responsible for implementing AMD management policies in MER. The representatives of NGOs and academic experts are also involved in the survey. Owing to COVID-19 pandemic restriction in Indonesia, the surveys are conducted through an online platform.

c. Interview

The interview method applied in this study is the in-depth semi-structured interview technique. In-depth semi-structured interview, namely a series of questions related to AMD management policy to main informants based on interview guidelines collected by the researcher. This is required to collect facts, information, interpretations and answers to questions based on the research questions that have been prepared. The questions asked in the interview guide are not strict, but the questions can evolve depending on the current conditions and the answers provided by the informants, but they are still in the scope of the study. Due to COVID-19 pandemic restriction in Indonesia, the interviews are conducted through an online platform.

The combination of those three research methods is explained in Table 5. The table also relates the methods employed to each sub-question of this Thesis project.

Table 5 Combination of Research Method

Research Questions	Research Method	Target group	Number of target group
What are the governance circumstances that support and impede the success of AMD management policy implementation in private coal mining companies in MER?	Literature Review In-depth semi-structured interview	Government Private companies' representative Academic Researcher NGO representative	Interview: 8 people (six interviewees from government, one from academic researcher and one from NGO)
How do the characteristics of involved actors influence the AMD management policy implementation in private coal mining companies in MER?	Literature Review Survey	Government Private companies' representative	Survey: 15 people from government and 63 people from companies (private sectors)
How effective is the implementation of AMD management policy in private coal mining companies in MER?	Literature Review Survey	Government Private companies' representative	Survey: 15 people from government, 63 people from companies, and 2 people from NGO
What can be the strategic approach, from a governance and actor perspectives, to achieve the effective policy implementation of AMD management on private coal mining companies in MER?	Literature Review In-depth semi-structured interview	Government Private companies Academic Researchers (universities)	Interview: 8 people (six interviewees from government, one from academic researcher and one from NGO)

3.5 RESEARCH MATERIAL

Research material used in this research as follows:

3.5.1 DATA AND INFORMATION

The data and information that are gathered in this research are the primary data and the secondary data, based on the way to gather the data.

a. Primary data

   Primary data is the data that gathered forthrightly from the source following the scope of research and data needs and has not been processed by other people. In this research, primary data in this study is obtained directly in the field from interviews with relevant informants in the implementation of AMD management policy. This kind of data is collected through in-depth semi-structured interviews with informants using interview guidelines. The interview guidelines are compiled with a list of questions that have been prepared in advance.

b. Secondary Data

   Secondary data is data obtained indirectly, because it has been processed and presented by other people. The secondary data required in this study are:

   1. Relevant policy instrument specifically regarding AMD management.
   2. Other data must be obtained along with the development of research.

3.5.2 DATA COLLECTION

The population and sample size of this study are focused on the number of private coal mining companies in Muara Enim Regency. In-depth semi-structured interview is conducted with informants based on the information required. In this analysis, the method used to select the informants is purposive sampling, in which key informants were intentionally selected with a particular goal in mind. The intention here is that the researcher chooses the main informants to be interviewed based on their authority and responsibility, taking into account that the individual is assumed to have sufficient knowledge of the issues related to the implementation of AMD management policies. The criteria of key informant are explained in Table 6.

Table 6 Criteria of key informant on the interview

No.	Key informant	Criteria	Number of interviewees
1.	Representatives of the private coal mining companies which already have AMD management and discharge permits (usually	An individual who has the authority and responsibility to implement AMD management policies in the	Two interviewees

No.	Key informant	Criteria	Number of interviewees
	environmental managers)	company (usually environmental managers)	
2.	Representatives of the government of MER	Officer of government agencies responsible for overseeing and controlling the management of AMD in coal mining companies in MER (usually the officer of Local Environmental Agency)	Six interviewees (two interviewees from each level of government namely federal government, provincial government, municipal government)
3.	Academic experts from the university	The academic expert from universities who concentrate their research in AMD management and policy	One interviewee
4.	Representative of Non-Governmental Organizations (NGOs)	Director or Manager who concern about AMD management in Muara Enim	One interviewee

3.5.3 SOURCE OF DATA AND ACCESSING METHOD

Data Source and Data Collection Process is provided in Table 7.

Table 7 Data/Information, Data Source, and Data Assessing Method

Research Questions	Data/Information	Source of data	Accessing method
What are the governance circumstances that support and impede the success of AMD management policy implementation in private coal mining companies in MER?	**Governance Assessment Tool (Bressers et al., 2013):** Levels and scales	*Primary data:* People: Management of the companies, the representatives of the federal government, provincial government, municipal government, academic expert, and the representative of the NGOs *Secondary data:* Literature	*Questioning* In-depth semi-structured interview *Desk research*
	Actors and networks	*Primary data:* People: Management of the companies, the representatives of the federal government, provincial government, municipal government, academic expert, and the representative of the NGOs	*Questioning* In-depth semi-structured interview

Research Questions	Data/Information	Source of data	Accessing method
		Secondary data: Document of companies' profile and government structure	*Desk research*
	Problem perspectives and goal ambitions	*Primary data:* People: Management of the companies, the representatives of the federal government, provincial government, municipal government, academic expert, and the representative of the NGOs *Secondary data:* Literature	*Questioning* In-depth semi-structured interview *Desk research*
	Strategies and instruments	*Primary data:* People: Management of the companies, the representatives of the federal government, provincial government, municipal government, academic expert, and the representative of the NGOs *Secondary data:* Literature, companies report	*Questioning* In-depth semi-structured interview *Desk research*
	Responsibilities and resources	*Primary data:* People: Management of the companies, the representatives of the federal government, provincial government, municipal government, academic expert, and the representative of the NGOs *Secondary data:* Literature	*Questioning* In-depth semi-structured interview *Desk research*
How do the characteristics of involved actors influence the AMD management policy implementation in private coal mining	**Contextual Interaction Theory: (Bressers, 2004)** Motives (affinity with the implementation goal, actor's	*Primary data:* People: Management and staffs of the companies, the representatives of the	*Questioning* Survey

Research Questions	Data/Information	Source of data	Accessing method
companies in MER?	character and perspective to implementation goal, attitude to the target group or to implementing group, Self-effectiveness assessment, external pressure sources	federal government, provincial government, municipal government *Secondary data:* Literature	 *Desk research*
	Cognition and Information (policy consciousness and awareness for related actors, recognizing policy concern, requirements and advantages, knowledge of actors and qualification, transparency and accessibility of knowledge)	*Primary data:* People: Management and staffs of the companies, the representatives of the federal government, provincial government, municipal government *Secondary data:* Literature	*Questioning* Survey *Desk research*
	Power and resources (capacity or resources such as finance, personnel, and time; control formal and informal)	*Primary data:* People: Management and staffs of the companies, the representatives of the federal government, provincial government, municipal government *Secondary data:* Literature	*Questioning* Survey *Desk research*
How effective is the implementation of AMD management policy in private coal mining companies in MER?	**Company Performance Rating Program's Indicator (Ministry of Environment and Forestry):** **Compliance aspect:** control of AMD contamination and the discharge permit.	*Primary data:* People: Management and staffs of the companies, the representatives of the federal government, provincial government, municipal government, and the representative of NGOs *Secondary data:* Medium-Term Development Plan of Muara Enim Regency on environmental sector (RPJMD), Companies Performance Assessment Program	*Questioning* Survey *Desk research*

Research Questions	Data/Information	Source of data	Accessing method
	Institutional aspect: organizational structure, number of supervisory employees, Standard Operating Procedure (SOP), internal and external coordination and communication, and institutional capacity building	*Primary data:* People: Management and staffs of the companies, the representatives of the federal government, provincial government, municipal government, and the representative of NGOs *Secondary data:* Literature	*Questioning* Survey *Desk research*
	Supervision aspect: supervision intensity and scheme, supervision process, supervision output, Human Resources for supervision, and budget supervision	*Primary data:* People: Management and staffs of the companies, the representatives of the federal government, provincial government, municipal government, and the representative of NGOs *Secondary data:* Literature	*Questioning* Survey *Desk research*
	Complaint and conflict management aspect: public complaint intensity, complaint handling, and conflict resolution, which includes conflict resolution duration, conflict resolution method, and other parties' satisfaction.	*Primary data:* People: Management and staff members of the companies, the representatives of the federal government, provincial government, municipal government, and the representative of NGOs *Secondary data:* Literature	*Questioning* Survey *Desk research*
What can be the strategic approach, from a governance and actor perspectives, to achieve the effective policy implementation of AMD management in private coal mining companies in MER?	Strategy to improve governance	*Primary data:* People: Management and staff members of the companies, the representatives of the federal government, provincial government, municipal government, and the representative of NGOs	*Questioning* In-depth semi-structured interview

Research Questions	Data/Information	Source of data	Accessing method
		Secondary data: Literature	*Desk research*
	Strategy to improve motives, cognition and information	*Primary data:* People: Management and staff members of the companies, the representatives of the federal government, provincial government, municipal government, and the representative of NGOs	*Questioning* In-depth semi-structured interview
		Secondary data: Literature	*Desk research*

3.5.4 ETHIC STATEMENT

This study fully complies with the ethical principles set out in the University of Twente Research Ethics Policy, which involves providing the interviewee with a consent form for the interview approval. The researcher would then seek approval from the Ethics Committee. The interviewees are briefed about the process ahead of time and they have the option to interrupt the interview at any time. The researcher preserves the interviewee's privacy and does not disclose any information that is designated as confidential during the interview. The researcher protected the data's confidentiality and security by storing it on a laptop with password protection and using security software to secure it from hackers and viruses. Furthermore, the information gathered is not exchanged with others, and it is removed when it is no longer needed.

3.6 DATA ANALYSIS

This study employs a variety of strategies to analyze the data. The steps in this study's data analysis are mentioned below.

3.6.1 DATA ANALYSIS METHOD

The collected data is evaluated through qualitative and quantitative research by in-depth semi-structured interviews with key informants, surveys, and a literature review.

1. Qualitative analysis

   In the qualitative data analysis, the data is compiled, categorized, evaluated, and then interpreted in such a way as to be able to respond to research problems. A direct review is often carried out during the interviews by designing the requisite questions to collect the data that are deemed to be saturated and have met the study objectives. GAT is the basis of this analysis. The GAT Assessment Matrix is presented in Appendix I.

2. Quantitative analysis

   The quantitative analysis is employed to measure the effectiveness of AMD management policy implementation and to measure the proportion of actors' characteristics. In the analysis of the effectiveness of AMD management policy implementation, the data gathered is analyzed using a Likert scale measurement. The answer category has three scores ranging from 0 to 2. The scores are then summed up, and the proportion of each aspect's scores is calculated.

% aspect's score = total score / maximum score x 100%

Furthermore, to provide an explanation of actors' characteristics in relation to the problems to be addressed, a descriptive review is performed of the survey answers. The CIT framework is the basis of this analysis. All variables in CIT are assigned a score based on their compliance with all parameters set. Appendix II explains how the score is calculated.

The analysis data are mentioned in Table 8.

Table 8 Method of data analysis

Research Questions	Data/information	Method of analysis
What are the governance circumstances that support and impede the success of AMD management policy implementation in private coal mining companies in MER?	**Governance Assessment Tool: (Bressers et al., 2013)** Levels and scales	Qualitative: assessing the quality of levels and scales feel engaged in implementation in terms of governance Content analysis for literature
	Actors and networks	Qualitative: assessing the quality of stakeholder feel involved in implementation in terms of governance Content analysis for literature
	Problem perspectives and goal ambitions	Qualitative: assessing the quality of actor consider that perspectives and goal ambitions are involved

Research Questions	Data/information	Method of analysis
		Content analysis for literature
	Strategies and instruments	Qualitative: assessing the quality of actor consider that all the strategies and instruments are included Content analysis for literature
	Responsibilities and resources	Qualitative: assessing the quality of actor consider that all responsibilities and resources are clearly assigned Content analysis for literature
How do the characteristics of involved actors influence the AMD management policy implementation in private coal mining companies in MER?	**Contextual Interaction Theory:** **(Bressers, 2004)** Motives (affinity with the implementation goal, actor's character and perspective to implementation goal, attitude to the target group or to implementing group, Self-effectiveness assessment, external pressure sources	Quantitative: analyze the quantitative look at how motives affect the implementation
	Cognition and Information (policy consciousness and awareness for related actors, recognizing policy concern, requirements and advantages, knowledge of actors and qualification, transparency and accessibility of knowledge)	Quantitative: analyze the quantitative look at how information influences the implementation
	Power and resources (capacity or resources such as finance, personnel, and time; control formal and informal)	Quantitative: analyze the quantitative look at how power affect the implementation
How effective is the implementation of AMD management policy in private coal mining companies in MER?	**Company Performance Rating Program's Indicator (Ministry of Environment and Forestry):** **Compliance aspect:** control of AMD contamination and the discharge permit.	Qualitative: evaluate the compliance aspects that affect the effectiveness of AMD policy implementation Content analysis for literature
	Institutional aspect: organizational structure, number of supervisory employees, Standard Operating Procedure (SOP), internal and external coordination and communication, and institutional capacity building	Qualitative: analysis the institutional aspects that influence the effectiveness of AMD policy implementation Content analysis for literature
	Supervision aspect: supervision intensity and	Qualitative: assess the supervision aspect that affect the effectiveness of

Research Questions	Data/information	Method of analysis
	scheme, supervision process, supervision output, Human Resources for supervision, and budget supervision	AMD policy implementation Content analysis for literature
	Complaint and conflict management aspect: public complaint intensity, complaint handling, and conflict resolution, which includes conflict resolution duration, conflict resolution method, and other parties' satisfaction.	Qualitative: evaluate the complaint and conflict management aspect that occupied the effectiveness of AMD policy implementation Content analysis for literature
What can be the strategic approach, from a governance and actor perspectives, to achieve the effective policy implementation of AMD management in private coal mining companies in MER?	Strategy to improve the governance of AMD management	Qualitative: analyze the strategy to improve the governance of AMD management Content analysis for literature
	Strategy to enhance motivation, cognition and information, power and resources	Qualitative: analyze the strategy to enhance the motivation, cognition and information, power and resources Content analysis for literature

3.6.2 DATA VALIDATION

There are two approaches to verify the data analysis for this research based on two separate types of data analysis: qualitative phase and quantitative phase analysis. In the qualitative phase, the triangulation method would be used to prevent research bias, error, and misinterpretation by contrasting the results to the theories and other research findings that have been tested throughout the research. In this analysis, the triangulation approach is used by comparing the data and information gathered through interviews with key informants, in accordance with literature review and the viewpoint of the research context. The information gathered from key informant interviews is then analyzed and categorized. Parts of the information gathered during the interviews were also double-checked with informants from other groups participating in the implementation of the policies. Triangulation can also be done to find study data by combining various approaches and sources. Validation of quantitative data analysis is performed in the quantitative phase using triangulation based on the accuracy measure of a rating scale or instrument for quantitative data analysis.

3.6.3 ANALYTICAL FRAMEWORK

This study's analytical framework begins with the notion of Acid Mine Drainage (AMD) caused by private coal mining companies' activities in Muara Enim Regency (MER), South

Sumatera. Since AMD has caused some environmental damages, the government issued the AMD management policies in the form of a regulatory policy. This research is designed to deliver information about the policy application process by reviewing the literature on AMD management, and AMD management policy. Prior to analyzing how the implementation process occurred, an important step should be taken by evaluating the factors influencing policy implementation. Following that, the researcher would examine the implementation process using CIT and GIT. The analysis produces a result that depicts the motivation, information, and power characteristics of the actors influencing the implementation of AMD management policy. This analysis' findings are used to make recommendations to all stakeholders. The analytical framework of this study is shown in figure 11.

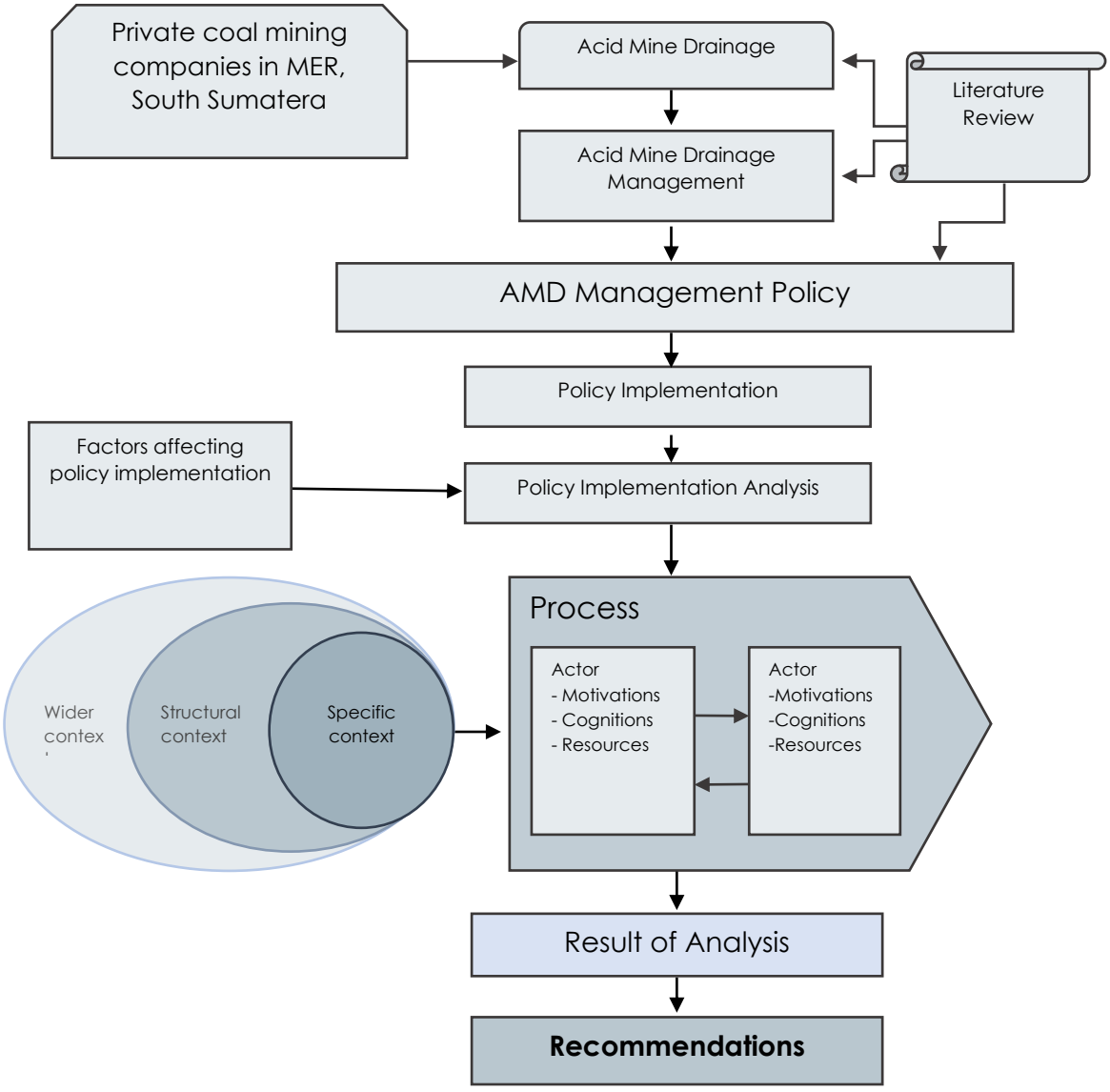


Figure 11 Analytical Research Framework (Adopted from Bressers, 2009)

4 FINDINGS

In this chapter, the research results are presented. The results are gathered by applying the methodology of the research. This chapter is divided into three sections to answer the first, second, and third sub-question. The first section of this chapter explains the government context of AMD management policy implementation in private coal mining companies in MER. The second section presents the characteristics of the actors involved in AMD management policy implementation in MER. Lastly, the effectiveness of AMD management policy implementation in MER is described in the third section.

4.1 GOVERNANCE CONTEXT OF AMD MANAGEMENT POLICY IMPLEMENTATION

A governance is regarded as a better way to develop and implement policies since it entails more stakeholder participation and acknowledges the multiple levels and multiple actors' characteristics of how sectors of society are governed (Bressers & Kuks, 2013). However, the Governance Assessment Tool that is used in this study understands the governance in a more neutral way, as an account of the institutional setting in which the policy processes take place. The assessment of the governance setting is conducted to evaluate the governance factors that supports or restricts the implementation of AMD in Muara Enim Regency, as well as to analyze the factors that support and hinder the success of AMD policy implementation. Furthermore, since the implementation of AMD management involves various actors, the assessment of involved actors' characteristics that influence the AMD management policy implementation in MER is essential.

To evaluate the complete governance context and to allow the reflection about the way of governance element reinforces or hinders the application of policy, the Governance Assessment Tool (GAT) can be used (Bressers et al., 2016). Throughout the perspective of a multiple actors interconnection system, the GAT centres on the parameters and variabilities of the implementation procedures themselves, with a focus on the manner of the governance framework that encourages or discourages the represented implementation courses (Lordkipanidze et al., 2019). The GAT is used on the basis of the evaluative questions and the answers delivered by respondents in the interviews to achieve the objective of this

research. The evaluative questions that are asked to the interviewees are described in Appendix III. The interviews are conducted with eight key informants from different levels who have authorities and responsibilities in AMD management policy implementation. The levels that participated in the interview are presented in Table 9.

Table 9 Participants in the Interview

Federal Level	Provincial level	Municipal level	External level
Directorate Performance Assessment of Hazardous Waste and Non-hazardous Waste Management (Ministry of Environment and Forestry)	Environmental Agency of South Sumatera Province	Environmental Agency of Muara Enim Regency	Wahana Lingkungan Hidup (Walhi) as a representative of Non-governmental Organization
Directorate Water Pollution Mitigation (Ministry of Environment and Forestry)	Energy and Mineral Resources Agency of South Sumatera Province		Representative of Acid Mine Drainage expert
			Representative of the private coal mining companies in Muara Enim Regency

There are five governance aspects that either encourage or discourage the governance setting for AMD management implementation. The elaborations of those five governance dimensions shared by the interviewees are described here below.

4.1.1 LEVELS AND SCALES

In general terms, the extent, the flexibility, and the intensity of the levels and scales were assessed as moderate, whereas the coherence was assessed as low. The brief explanations of those four criteria are elaborated as follows:

Extent was assessed as moderate, therefore supportive. The ***extent*** has been improved by the engagement of multiple levels in AMD management policy implementation. According to the interviewees, the public administrative levels that are involved in the AMD management policy implementation are the federal level, provincial level, and municipal level. The Ministry of Environment and Forestry, as a representative of the federal level, has developed rules and guidelines for AMD management, one of them is the standard quality of AMD before it is discharged into water bodies. Additionally, as stated in the policy, the federal government is responsible to control and monitor the AMD management in the companies that are located in interprovincial areas.

South Sumatera Environmental Agency (SSEA), as a representative of the provincial level, has the authority to control and monitor the AMD management in the companies that are located in cross-district areas. The municipal government, represented by Muara Enim Environmental Agency (MEEA), has the right to control and monitor AMD contamination in the municipal area. Besides that, the municipal government has a role to issue AMD discharge permits to the companies that generate AMD. The organizational structure of South Sumatera Environmental Agency is presented in Figure 12 and the organizational structures of Muara Enim Environmental Agency are described in Figure 13.

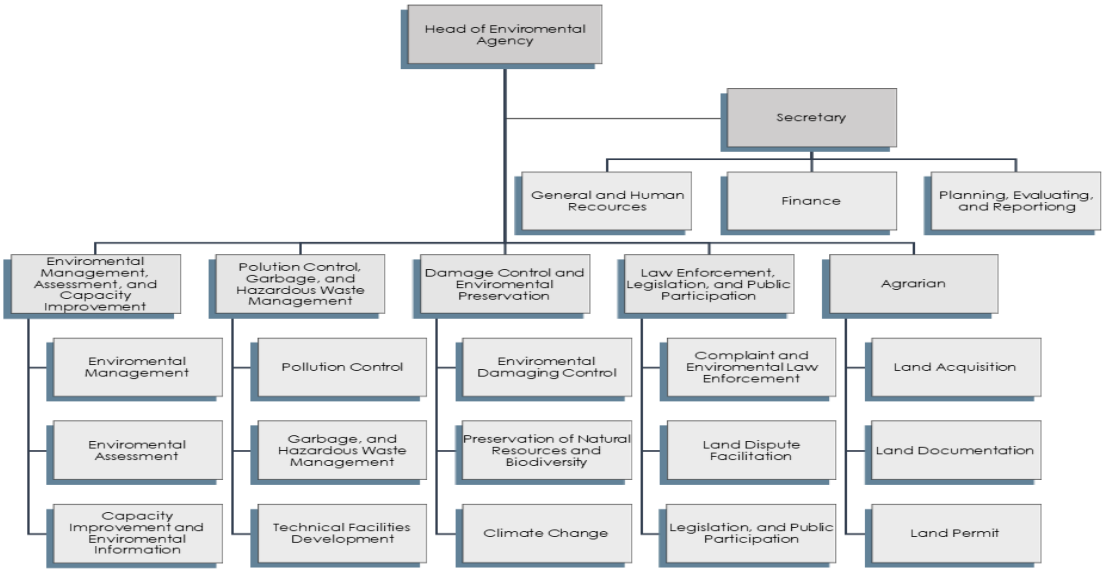


Figure 12 Organizational structure of South Sumatera Environmental Agency (SSEA, 2021)

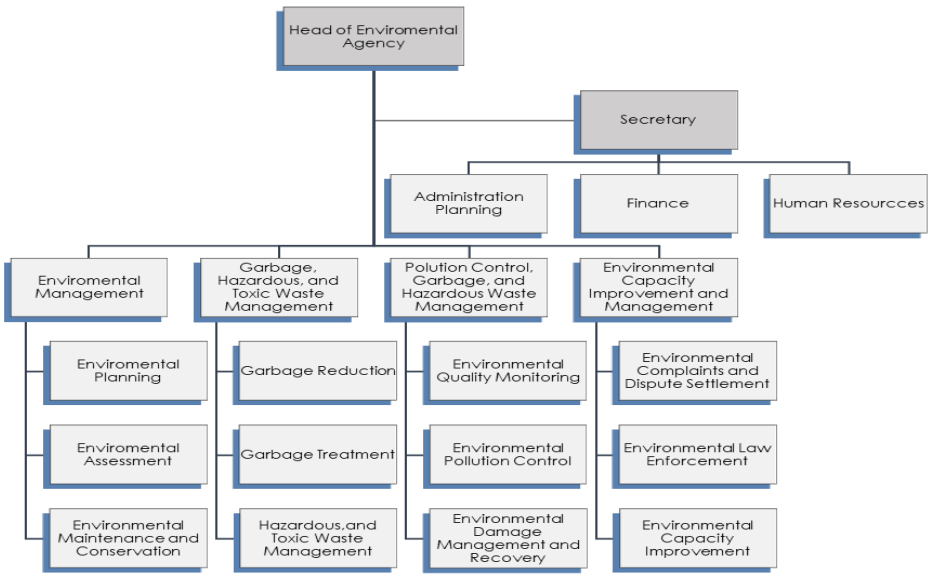


Figure 13 Organizational structure of Muara Enim Environmental Agency (MEEA, 2021)

The provincial and municipal government are responsible for carrying out supervision, monitoring, and assessment activities, also establishing programs to oversee the AMD management in the companies. In the context of controlling AMD pollution, the federal government, provincial government, and municipal government are authorized to:

a. determine the carrying capacity of the pollution load;
b. carry out the inventory and identification of pollutant sources;
c. determine AMD standard quality requirements for the application to land and water;
d. define the requirements for AMD disposal into water sources;
e. monitor the water quality in water sources; and
f. monitor other factors that influence changes in the soil and water quality.

Each provincial and municipal government has some programs related to environmental management and AMD management in particular. The programs are displayed in Table 10.

Table 10 Provincial and Municipal Government Program (SSEA, 2020; MEEA, 2020)

Provincial Government Program	Municipal Government Program
The environmental damage and/or pollution control program	The district/municipality environmental pollution control and environmental damage management program
The environmental water pollution prevention program	The environmental planning, protection, management, and program
The environmental damage control in mining sector program	The district/municipality pollution prevention and environmental damage protection program
The permit granting, environmental development, and environmental supervision for environmental protection and management program	The pollution and damage remediation program
	The permit granting, environmental development, and environmental supervision for environmental protection and management program

The ***extent*** of the levels and scales is decreased by the absence of international level in AMD management policy implementation. Since the AMD problem is already a worldwide concern, it is not only the federal, provincial, and municipal levels that should be engaged, but also the international level.

Coherence was assessed as low, thus restrictive. The restrictive ***coherence*** of the levels and scales has been considered because based on the interviews, some of the administrative levels did not have the impression of being enough involved and they

interacted only in certain phases of AMD management, for instance, the representatives of the provincial level and municipal level stated that they were rarely engaged in the policy-making process, especially the policies that were issued by the federal government. This situation reduces the ***coherence*** of the levels and scales. The lack of interaction occurs because not all regions in Indonesia face the same AMD challenges and lack of media for such collaboration (A. Munawar from National Development University, online interview, June 10, 2021). The interaction among administrative levels might occur in both formal and informal contexts. In a formal sense, the interaction across the same administrative levels is more interesting than the interaction across the different administrative levels, with usually certain actors of one level are only allowed to interact with certain actors in the other levels, for example, the top management at one level in the company frequently communicate with the top management at another level.

The other example is the Head of Mining Engineering or Health, Safety, and Environment (HSE) superintendent are frequently interacting with the head of the government agency. Engineers, staffs, and operators are not entitled to interact directly with the head of the government agency unless they are accompanied by the Head of Mining Engineering or HSE superintendent. The ***coherence*** has also decreased by the lack of collaboration among different levels. Working together presents several challenges, the majority of which occur at different levels. Unifying the opinions of two separate levels frequently takes a long time, for instance, there has been a disagreement between the federal and municipal level in Muara Enim, which has resulted in the constraints of providing licenses to the companies for two years (E.P. Bakri, IMEF, online interview, May 24, 2021). Interaction among different administrative levels has been feasible to do informally, but not for critical matters.

Flexibility was assessed as moderate, therefore supportive. The ***flexibility*** of the levels and scales has been improved since there is a possibility to involve extra other levels that are relevant. The international level is relevant to be engaged in AMD management in Indonesia as a source of information and experience. The other external levels are also possible to engage in the AMD management policy implementation in MER and this opportunity boosts the supportive ***flexibility***. However, there is no possibility to upscale or downscale the level because each level already has its own roles and responsibilities. This circumstance lessens the ***flexibility*** of the levels and scales. Moreover, the bureaucratic or

hierarchical structures in the government system in Indonesia render that upscaling or downscaling the level become more challenging (Meidiana and Arbiwahono, MEEA, online interview, May 24, 2021; E.P. Bakri, IMEF, online interview, May 24, 2021; A. Fuadi, IMEF, online interview, May 29, 2021; B. Yusnan, SSEA, online interview, June 2, 2021).

Intensity was assessed as moderate, therefore supportive. The supportive ***intensity*** of levels and scales has been considered because all administrative levels that are engaged in AMD management policy implementation press for management improvement and there is no certain level that acts as a champion. However, the distribution of power among the federal, provincial, and municipal government is still unbalance that makes the ***intensity*** of the levels and scales has dwindled. The federal level, as a policymaker, has the most power and capacity, so if there are difficulties relating to AMD management and the provincial and municipal government are unable to address the issue, it may seek assistance from the federal government (Meidiana and Arbiwahono, MEEA, online interview, May 24, 2021; B. Yusnan, SSEA, online interview, June 2, 2021; A. Sentanu, SSEMRA, online interview, June 8, 2021).

An assessment of levels and scales is inextricably linked to the evaluation of the actors and networks involved in AMD management implementation. The actors and networks analysis are used to determine and comprehend the level of collaboration and cooperation among the actors involved. The analysis of actors and networks are discussed in section 4.1.2.

4.1.2 ACTORS AND NETWORKS

In the actors and networks dimension, the important thing is not only the existence of various stakeholders outside of the actors who are formally or financially involved, but also their status in the system or their level of engagement and influence (Bressers et al., 2013). In general term, the extent and intensity of actors and networks were evaluated as moderate, while coherence and flexibility were rated low. A comprehensive description of those four criteria is presented as follows:

Extent was assessed as moderate, therefore supportive. The involvement of multiple actors in AMD management policy implementation such as environmental agencies as a representative of the government, private sectors, NGO, academic experts, and society, increases the ***extent*** of the actors and networks. The private sector or the company is the important actor in the implementation of AMD management policy in Muara Enim (E.P.

Bakri, IMEF, online interview, May 24, 2021). The companies are required to handle their own AMD appropriately. To achieve the quality standards, the companies must have specific methodology and technique for AMD management depends on the resources they have. Furthermore, in AMD management, the companies are also required to develop their own Standard Operating Procedures (SOP) (E.P. Bakri, IMEF, online interview, May 24, 2021).

The Ministry of Health, provincial, and municipal agency of health as the part of government actors are also relevant actors but they are not involved in AMD management (A. Fuadi, IMEF, online interview, May 29, 2021). This condition reduces the ***extent*** of the actors and networks. According to Fuadi (IMEF, online interview, May 29, 2021), the Ministry of Health and the local Agency of Health should be engaged in AMD management because AMD pollution has a significant impact on societal health. The Health Department can conduct the test for AMD that is produced by the companies. The test is carried out to ensure that the AMD produced by the company is safe for people's health.

Furthermore, the absence of environmental auditor and native headman of Muara Enim Regency also has decreased the ***extent*** of the actors and networks. The environmental auditor should also be involved because the management of AMD is considered as a high-risk operation and it needs an environmental audit. An auditor is an independent person that can assess the company's compliance to the policies. The native headmen of the communities are considered as important actors who are not involved in the AMD management (F.P. Sopah, Walhi, online interview, June 7, 2021). Actually, the native headmen do not know much about the governance structure because they are not a part of it, but they perceive much about the culture of the people who live near the mining site and they also know the state of the area. If there is an issue of AMD pollution to the community, the native headmen can assist the companies and the government's representatives to discuss with the society.

Coherence was assessed as low, thus restrictive. The restrictive ***coherence*** of actors and networks has been considered because some actors were only engaged in a certain phase of AMD implementation. NGOs, are rarely involved in AMD management unless there are public complaints about AMD pollution. Furthermore, some concerns that decrease the ***coherence*** of the actors and networks such as academic experts are solely involved to do research, but they are not involved to provide relevant feedback to the companies or governments. In addition, academia and NGOs are only engaged in the planning phase of AMD management which becomes one of the parts of the Environmental Impact

Assessments that is usually called AMDAL. The engagement is carried out because academic experts and NGOs are typically included as AMDAL commission members. After AMDAL is approved and the environmental permit is obtained, AMD management is fully managed by the companies during the implementation stage, with no involvement from NGOs or academia. If there are revisions in AMD management implementation that differ from the plans outlined in the AMDAL documents, NGOs might be re-involved as an assessor to provide advice and input to the companies regarding the revision of AMDAL documents. The company's AMDAL documents are used as a basis for NGOs to conduct an investigation if there is an AMD pollution that has an impact on society.

The other circumstances that weaken the ***coherence*** of the actors and networks are political actors, such as board members of representatives. They are only involved if the member of their constituency files a complaint about AMD pollution to them. When there is a complaint from the communities, the board members usually take part in performing inspections of the company. The restrictive ***coherence*** has been taken into account because societies are only involved in the planning phase. Based on the rules, the companies are obliged to publicly announce the planned activities for AMD management and the location for AMD management, so that people living around the AMD location are aware that an AMD treatment installation will be built near their residences. Moreover, regarding the engagement of society, some private coal mining companies in Muara Enim have hired some qualified members of the local communities as employees, since the companies assume that the local communities are usually more concerned with the environment. The recruitment of some local communities to become the company's personnel who manage the AMD is projected to make AMD management more effective (A. Rais, private sector MME, online interview, June 6, 2021).

The *incoherency* of actors and networks has been considered since the mutual trust among the actors has been relatively poor, particularly among the government and the corporations. It is difficult for the government to trust the corporations because the corporations measure the parameter of the quality standard that is required in the policy only once a month and send the report of AMD management to the government every three months (A. Fuadi, IMEF, online interview, May 29, 2021). Since the report on AMD management activities is provided to the government every three months, it is difficult for the government to re-check the report's accountability. If the report is sent at least once a month,

the government can do a re-check to ensure the condition stated in the report. The government will have a high degree of trust in the company if the company is accountable by sending their report once a month and following all the procedures required, for example, if the company performs measurements or checks the quality of AMD parameters (pH, suspended residues, iron, and manganese) in a certified laboratory, the government can trust the results of such measurements. Currently, the certified laboratories are unable to check all the samples of AMD from the companies, so that some of AMD samples from some companies are checked in the uncertified laboratory (B. Yusnan, SSEA, online interview, June 2, 2021; A. Rais, private sector MME, online interview, June 6, 2021). In addition, the company has a lack of trust in NGO because some NGOs tend to be provocative, spread incorrect information in the mass media, and do not provide solutions for the improvement. In contrast, the level of public trust in NGOs remains reasonably high, and the community continues to have high expectations of NGOs since, according to the community, NGOs are the closest partner for the community and serve as a bridge between society and the government (F.P. Sopah, Walhi, online interview, June 7, 2021).

The restrictive ***coherence*** of the actors and networks has also been considered since the communication among actors is limited; regular meetings are held just twice a year at most. The meeting takes place only when there is a problem related to AMD management or when the government performs supervisory in the company. Some conflicts are still found in the interaction process which can address ***incoherence*** in the governance structure. The most common conflict is between the company and the community, which accuses the company that pollutes the environment. When this type of conflict arises, the government normally acts as a mediator.

Flexibility was assessed as low, ***thus restrictive.*** The restrictive ***flexibility*** of the actors and networks has been considered because the possibility to include new actors is there, but if the condition remains normal, the involvement of new actors is not needed. The possibility to engage new actors will occur if only there is a problem arise in the future that force the company to involve new actors, such as involving internal environmental auditor or environmental consultant. That situation reduces the ***flexibility*** of the actors and networks. Sharing social norms is still feasible because every actor requires the existence of other actors to collaborate. However, the government system in Indonesia is limited by some restrictions

that do not allow for the change of leadership (Meidiana and Arbiwahono, MEEA, online interview, May 24, 2021). This state causes the ***inflexibility*** of the actors and networks.

Intensity was assessed as moderate, therefore supportive. The Ministry of Environment and Forestry, as the representative of the federal government, exerts the most significant pressure on AMD management policy implementation. It has a department, called Directorate General of Law Enforcement, that is tasked with enforcing policies. The presence of this directorate gives a significant impact on behavior's change of the company, decision making in the company, and the impact of management change in the company, so that it favours the ***intensity*** of the actors and network. The Directorate General of Law Enforcement performs some procedures to identify companies that break the policies. If a breach is discovered, the government will impose the sanction ranging from light to severe, and the corporation will be given a time limit to repair the faults or accomplish the tasks assigned by the government.

Following the analysis of the actors and network, the problem perspectives and goal ambitions in the implementation of AMD management must be addressed. If there are stakeholders who are not involved, it will cause problems in achieving goals. An analysis of the problem perspectives and goal ambitions is needed to determine whether the goals are mutually supportive and whether these goals are rational or even too strict and too ambitious. The analysis of the problem perspectives and goal ambitions is explained in detail in section 4.1.3.

4.1.3 PROBLEM PERSPECTIVES AND GOAL AMBITIONS

The problem perspectives and goal ambitions dimension are used to pay an attention to the degree to which the viewpoints are followed or incorporated and to what extent they have significant implications not only for the objectives, but also for the selected strategies and instruments (Bressers et al., 2013). In general terms, all four criteria namely the extent, the coherence, the flexibility, and the intensity of the problem perspectives and goal ambitions are assessed as low. The brief statements of those four criteria are explained as follows:

Extent was assessed as low, thus restrictive. The restrictive ***extent*** of problem perspectives and goal ambitions has been regarded because of the hierarchical and bureaucratic government system in Indonesia. Due to the hierarchical and bureaucratic structure, not all the stakeholders' perspectives are considered in current AMD management

policies (A. Fuadi, IMEF, online interview, May 29, 2021). Furthermore, NGOs, academic experts, and consultants are not engaged in the rehabilitation and preservation phase of AMD management. As a consequence, it decreases the ***extent*** of the problem perspectives and goal ambitions. The involvement of NGOs, academic experts, and consultants in rehabilitation and maintenance of AMD management installation is important because the installation of AMD management is fragile and needs to be rehabilitated to avoid problems, such as the collapse of settling pond that can pollute the river and the inability of the people to use the river's water.

The other circumstances that restrict the ***extent*** of the problem perspectives and goal ambitions is the underrepresentation of a mature evaluation of the catchment area and settling pond capacity in tolerating AMD flow in the rehabilitation phase and in the ongoing AMD management policy (Meidiana and Arbiwahono, MEEA, online interview, May 24, 2021). Mature evaluation is required to comprehensively investigate the river's ability to accommodate AMD discharges pouring into the river, so that there is no run-off in the river when it receives the load of AMD. Those kinds of evaluations can be conducted by academic experts or consultants. Regarding the preservation of the catchment area, the Regent of Muara Enim has issued a decision letter addressing the company's obligation to plant trees around the mining site's border and the Enim river's border, so that the tree's roots can avoid erosion and landslides. The NGOs, as the representatives of the society, ensure that the companies had planted the trees around the mining site's border as stated in the Regent's decision letter. The decision letter from the Regent is issued since ecological disasters such as floods that happen frequently in Muara Enim Regency nowadays (F.P. Sopah, Walhi, online interview, June 7, 2021). Flooding has never occurred in this location during the rainy season in the past. It occurs as a result of a change in the landscape caused by the onset of mining activity. Moreover, in the past, the community used to use the Lematang River, which is the estuary of the Enim River, as a source of drinking water, but since the presence of coal mining in Muara Enim, the water from the river can no longer be consumed. One of the causes of this issue is AMD pollution on the river.

Another problem that should be considered in AMD management is the quality of AMD generated by the companies are also diverse, thus there is no single AMD management strategy that can solve all AMD problems. However, based on the condition of the AMD, the geology condition, or the characteristics of the AMD, the companies can combine several types of AMD management techniques. In addition, academic experts are also not engaged in

this stage though they have capabilities to help the companies to combine it or to find the efficient AMD management methods that can be used by the companies to solve the problems. This circumstance also shortens the ***extent*** of the problem perspectives and goal ambitions.

AMD management is divided into several stages, beginning with planning and progressing through construction, monitoring, and evaluation (E.P. Bakri, IMEF, online interview, May 24, 2021). The companies should have a plan for how to handle AMD during their planning activities. The companies should consider where will it be discharged? What is the initial condition of the water body before AMD is released into it? What are the consequences for the water bodies after AMD is disposed into it? The other important thing of AMD management planning that should be considered is how to limit the flow of AMD in the surface water flow system to make it easier to manage and to avoid the AMD flows into the underground water system. AMD will be tough to manage if it gets into the underground water system. As a result, AMD's management planning must be comprehensively planned.

The restrictive ***extent*** of problem perspectives and goal ambitions is also considered since AMD management orientation in the companies remains prevalent in the "end of pipe" approach, with most companies today focusing solely on how to handle AMD to achieve quality standards. Ideally, AMD management should focus more on the entire process, including the planning, production, and operation process, so that the companies will produce AMD that is pollutant-free and has a low level of deviation from the quality standard (F.P. Sopah, Walhi, online interview, June 7, 2021). This measure can benefit the company's cost efficiency, for instance, the company generates AMD with a pH of 4 from its mining operations and most of the company's attention is on how to treat the AMD with a pH of 4 to become a pH of 6 or more. By doing the cleaner production and some innovations in its whole operations from planning, production, and operation, the company may generate AMD with a pH of 6 or even more, thus the company does not need to spend a lot of money to process AMD from a pH of 4 to a pH of 7 or even they do not produce AMD if they can.

Coherence was assessed as low, thus restrictive. The ***coherence*** of problem perspectives and goal ambitions has been weakened as companies face problems when they have to prioritize profit goals or sustainability goals, since the cost of AMD management is quite high but not directly beneficial for the company (A. Rais, private sector MME, online interview, June 6, 2021). On the one hand, the sustainability goal is to safeguard the

environment from harm. Even further, the companies will earn great profits from their operations. As a result, there is a contradiction between the goals that will be attained, which decreases the ***coherence*** quality of problem perspectives and goal ambitions. If a corporation intends to conduct mining operations, it must be ready for all implications, including the readiness to allocate the budget for environmental management in their operations.

Flexibility was assessed as low, thus restrictive. The ***flexibility*** of the problem perspectives and goal ambitions has dwindled since there is no possibility to re-assess the goal of the policy until the new governmental actors are elected (A. Fuadi, IMEF, online interview, May 29, 2021). The election of municipal, provincial, and federal government occurs every five years. Once a new government actor is selected, each level must create its own goals, but must be in line with the goals of the upper level. Additionally, regarding the goals, there are various opinions among the actors about the AMD management goals. The government believes that AMD management objectives are not extremely rigorous and the procedures to achieve the goals are fairly clear. In contrast, in the company's perspective, AMD management objectives are highly demanding for the companies because some companies assume that AMD's quality criteria are tough to meet and strict, as a result, it causes the lack of ***flexibility*** of problem perspectives and goal ambitions. The companies assume that the goals that require the use of specific technologies will burden moderate and small-scale companies with limited resources.

Intensity was assessed as low, thus restrictive. From companies' perspective, the goal is challenging to fulfil because the companies believe that the quality standards specified by the policy cannot be applied uniformly among the companies since several factors influence the variation of AMD quality. This condition has caused the problem perspectives and goal ambitions' ***intensity*** is uneven and fragmented. Several factors influence the variation of AMD quality such as the mining area's location, geographical circumstances, soil conditions, and so on. Companies that are located in remote areas with high metal and sulphide soil will produce AMD with poor quality, making it harder to attain the AMD quality standards. Furthermore, some matters lessen the ***intensity*** quality of problem perspectives and goal ambitions, for instance, the company sometimes receives a lot of interference and pressure from other parties on policy enforcement in obtaining the goals. The company hopes that AMD management policies will be easier to implement in the future.

In contrast, NGOs assume that the AMD management goals are too permissive and should be stricter and more ambitious to avoid the accumulation of AMD's impact. In addition, according to NGOs' perspective, some policy objectives are not synchronized with one another and some of the goals are not relevant anymore to the current condition. One of them is the goal of AMD quality standards released in 2003. This means that during 18 years, the policy has not been revised or updated to reflect the current situation. Ideally, a policy should be modified or amended if it is not relevant anymore with the present situation. Actually, the federal government has had a plan on replacing some old policies with a new policy, adding some parameters based on the current situation, but the plan has not been realized yet since some companies disagree and refuse to consent to the change of that policies because the companies assume that it will be more difficult to comply than the previous one.

Apart from considering the problem perspectives and goal ambitions, strategies and instruments are also essential to determine and assess the context of the policy itself, whether it is robust or fragmented and whether it is well or poorly implemented. In addition, an assessment of the performance of instrument enforcement in AMD management is also required. The analysis of strategies and instruments are elaborated in section 4.1.4.

4.1.4 STRATEGIES AND INSTRUMENTS

In general terms, the extent and the flexibility of the strategies and instruments are evaluated as moderate, while the coherence and the intensity are evaluated as low. The brief descriptions of those four criteria are explained as follows:

Extent was assessed as moderate, therefore supportive. The supportive ***extent*** of strategies and instruments is considered because several policy instruments have been applied in AMD management policy implementation. Regulations, permits, sanctions, and financial instruments such as fines and compensation are the policy instruments applied in AMD management. If the government discovers a violation of the AMD quality requirement, a fine will be imposed. The fine is estimated based on the unit price of the pollutants by multiplying the excess percentage of the amount of pollutant load above the quality standard limit, the AMD discharge flow, and the pollution periods. Nevertheless, the application of the fine is scarce at this moment. Sanction, in the form of administrative sanction is the instrument that is regularly employed by the government. The other instrument that is usually applied in

AMD management is the compensation for land degradation caused by AMD pollution. The compensation is given by the company to the society whose agriculture land is damaged by AMD's flow. The polluter (company) will involve other parties such as the Agriculture Department to verify and review the amount of the compensation.

There is also a well-known instrument in the Indonesian mining industry which is called reclamation guarantee. This guarantee is given when the companies start their operations. When a mining site or mining location is closed, the company must carry out the reclamation. Since the AMD management is also one of the parts of the reclamation stage for mining site closure, the reclamation guarantee instrument can also be applied for AMD management if mining activities have ceased (post-mining). Furthermore, the ***extent*** of the strategies and instruments is also increased because, besides the financial instruments, there are also social instruments such as environmental campaigns, seminars on new policies, dialogues, capacity building, and awareness, in which companies are usually involved. Unfortunately, those instruments are applied rarely at this moment and make the ***extent*** of the strategies and instruments is not highly supportive.

Coherence was assessed as low, thus restrictive. The ***coherence*** of the strategies and instruments has been weakened since the existing system restricts the policy instruments to collaborate and produce synergy internally and externally. The restrictive ***coherence*** of strategies and instruments has also been regarded because some conflicts usually arise when an instrument is implemented, for instance, when sanctions are imposed on the companies, the companies sometimes disagree with the sanctions. To address this, the government, who imposes sanctions, conducts re-verification to confirm the truth. There is no contradiction among the instruments in AMD management policies, but some instruments are still difficult to apply due to insufficient human and financial resources of the government. Fortunately, there is one thing that promising a positive impact on AMD management in Muara Enim Regency and can improve the ***coherence*** of the strategies and instruments in the future. The federal government is currently proposing to implement the AMD quality standard online monitoring program. It's known as SPARING. SPARING is an online system that companies should utilize as a tool to measure the value of four parameters (pH, suspended residual, iron, and manganese) in real-time, allowing the government at all levels to monitor the quality of the AMD generated by the companies. By applying this, it is expected that AMD management will be better in the future.

Flexibility was assessed as moderate, therefore supportive. There is still an option to use and combine various instruments that are allowing more ***flexibility*** to the strategies and instruments. Essentially, the imposition of the instrument is required to improve the company's compliance. The instruments can be enforced concurrently and there is a chance to combine the instruments, for example, if a company violates the policies, the government may apply both a sanction and a fine. There is no instrument overlapping one to another. The incentive instrument is difficult to implement due to the government's restricted budget and bring certain degree of ***inflexibility***. However, the disincentive is still possible to apply. Before 2007, Muara Enim's government has ever imposed a levy on industries that discharge wastewater, including coal mining companies that discharged AMD. This levy is applied to gain revenue for the municipality. This revenue is expected to fund the river rehabilitation and restoration. Nonetheless, to implement this instrument properly, the government must provide supporting facilities and infrastructures. The cost of those facilities and infrastructures was rather expensive, so due to the government's budget limit, the government cannot follow the requirement and the levy policy was eventually repealed.

Intensity was assessed as low, thus restrictive. The ***intensity*** of the strategies and instruments is lacking because it is difficult to adequately enforce the instruments since there is a lot of intervention and pressure about the application of the instrument. Currently, step-by-step approaches to enforce the instruments are still applied, for instance, if a company violates the policies, the company will be punished with light sanctions for the first time. If the sanctions are ineffective, the government will impose severe sanctions. The other concern that decreases the ***intensity*** of the strategies and instruments, is the existing policies do not specifically regulate and take into account some factors that should be considered, such as soil conditions in mining sites, hydrological conditions, the topography of the mining area, whether it is close to a river, a sea, or adjacent to a mountain (Meidiana and Arbiwahono, MEEA, online interview, May 24, 2021). These variables will affect the quality of AMD produced as well as the design of AMD management systems; for example, if the settling pond is built on sandy soil, the concerns that arise are how will the settling pond be designed? What should be considered in the construction of AMD management installations if the soil has a high porosity? Those considerations are intended to prevent avalanche and settling pond leakage. Furthermore, taking these considerations into account, aims to help AMD management effectively, such as make the suspended residual particles contained in AMD

easier to settle, because if the suspended residual is difficult to settle, the quality standard for suspended residuals that stated in the AMD policy will be difficult to meet.

Not only it is necessary to have strategies and instruments in place when implementing policies, but it is also reasonable to acknowledge the responsibilities and resources to do so. The concern that frequently arises is whether the responsibilities are clearly delegated or not and whether the resources allocated to carry out these responsibilities are sufficient or not. To comprehend this, the evaluations of responsibilities and resources are required, as outlined in section 4.1.5.

4.1.5 RESPONSIBILITIES AND RESOURCES

In general terms, all four criteria namely the extent, the coherence, the flexibility, and the intensity of the responsibilities and resources are evaluated as low. The comprehensive statements of those four criteria are presented as follows:

Extent was assessed as low, thus restrictive. The government organizational structures define the responsibilities clearly and each field has its own role and responsibility in AMD management. The Minister, the Governor, and the Regent are the person in charge of making decisions at the federal level, provincial level, and municipal level respectively. On the private sectors' side, the authority for making decisions is on the top management level, but the technical concern is still on the environmental department. However, only a few of those responsibilities are facilitated with sufficient resources to facilitate the proper implementation of AMD management. Insufficient resources restrict the ***extent*** of the responsibilities and resources. In comparison to the number of mining companies that should be monitored by the government, the amount of available human and financial resources, particularly in provincial and municipal government, is insufficient.

The restrictive ***extent*** has also been considered since the federal level does not fulfil its responsibilities and let the municipal and provincial government to fix the problem and make decisions by themselves if the federal level thinks that the problem with AMD management can be handled by the municipal and provincial government. If the problem is tough to fix and requires more levels of involvement, then the federal government will involve in decision-making process. Thus yet, so far, no major problems have occurred in Muara Enim regency, so the municipal and provincial government have already made some decisions about AMD management in Muara Enim.

Coherence was assessed as low, thus restrictive. The ***coherence*** of the responsibilities and resources has been decreased by some matters, for instance, the presence of the conflict and the assigned responsibilities cannot support the coherence of the organization because the responsibilities are fragmented. Conflicts sometimes occur when people involved in AMD implementation program disagree about how responsibility is assigned. Furthermore, several rules in Indonesia make the combination and integration of the responsibilities on the government side is challenging and it contributes to ***incoherency*** of responsibilities and resources. In the private sector side, integrating the responsibilities is also quite difficult, because each responsibility has its own set of consequences, and the tasks and the duties cannot be compounded or integrated. The situation lessens the ***coherence*** quality of responsibilities and resources. KPIs (Key Performance Indicators) are used in the company to measure performance in carrying out responsibilities. When responsibilities are not carried out optimally, the chance to develop conflicts arises.

Flexibility was assessed as low, thus restrictive. The restrictive ***flexibility*** of resources and responsibilities is considered because both the government and the company have limited resources. The ***flexibility*** of the resources and responsibilities is lacking because the responsibility cannot be pooled or integrated into efficient accountability processes and structures due to insufficient resources. The resources should be allocated based on the intricacy of the responsibility. When compared to provincial and municipal government, the federal government should be granted a larger budget and a lot of employees. In addition, to improve the effectiveness of AMD management supervision, the government supervisors from the federal level should ideally have specified skills and capacities. The competence can be fostered by assigned responsibilities when senior and junior staffs are working together to undertake supervision, monitoring, and controlling for the companies, so that the competence can be built through the given roles. When junior staff members perform their duties together with the senior staff members, they can learn more about AMD management by the transfer of knowledge. Furthermore, the ***inflexibility*** of resources and responsibilities is taken into account since some companies are not accountable enough because not all reports presented by the company determine the true situations. When the government confirms and rechecks the situation on the site, it is discovered that the condition described in the report is different with the actual situation.

Intensity was assessed as low, thus restrictive. The resources and responsibilities dimension has low quality of ***intensity*** because the government typically finds difficulties to allocate the resources (money, legal rights, equipment, and personnel) for monitoring and assessing the AMD management policy's implementation when it is compared to current workloads. The current resources owned by the government are insufficient to attain the intended goal and objective, as a consequence, it causes an imbalance ***intensity***. The government's strategy to solve this issue is determining the budget priority, for example, by prioritizing the evaluation and supervision only in big and moderate-scale companies that generate a large amount of AMD. This condition might cause that the supervision and the evaluation of AMD management are not comprehensive in all types of companies and reduces the ***intensity*** of resources and responsibilities.

Based on the previous explanation, the result of the assessment of the extent, the coherence, the flexibility, and the intensity are concluded and described in Table 11.

Table 11 Assessment Result

Dimensions	Extent	Coherence	Flexibility	Intensity
Levels and scales	*Moderate*	*Low*	*Moderate*	*Moderate*
Actors and Networks	*Moderate*	*Low*	*Low*	*Moderate*
Problem perspectives and goal ambitions	*Low*	*Low*	*Low*	*Low*
Strategies and instruments	*Moderate*	*Low*	*Moderate*	*Low*
Responsibilities and Resources	*Low*	*Low*	*Low*	*Low*
Assessed as:	***Moderate (Supportive)***	***Low (Restrictive)***	***Low (Restrictive)***	***Low (Restrictive)***

According to Table 11, it can be inferred that the extent was assessed as moderate, making it the only supportive quality, while the coherence, the flexibility, and the intensity had a low evaluation, making them the restrictive quality. The assessment's result shows that the governance context is low to moderate and tends to be restrictive to the implementation of AMD in Muara Enim Regency. The GAT is firmly established in a CIT that examines different actors' characteristics who participated in the policy application activity. It

considers implementation as interaction procedures that are conclusively handled by multiple actors. The assessments of the characteristics of actors involved are explained in Section 4.2.

4.2 CHARACTERISTICS OF ACTORS

When the policy processes are regarded as a processes of social engagement that is essentially powered by participating actors, it stands to a reason to situate the actors and their primary features in the centre in every systematic pattern and to develop a wider description about the progress and the outcomes of the system from the beginning (Bressers & de Boer, 2013). The fundamental characteristics of actors provide diverse viewpoints on social interaction processes and are quite effective in describing the dynamics of the process (Owens, 2008).

Those three main actor characteristics are the motivations, cognitions and information, as well as the power and resources of the actors (Bressers & de Boer, 2013). Interactions between implementers and targets group are prevalent during policy implementation (Bressers, 2004). The survey was conducted by asking the questions that are presented in Appendix IV and V. The survey questions were addressed to 15 implementers and 63 target group representatives, and the results of the survey are described as follows:

4.2.1 MOTIVATION

According to the calculation, the implementer's motivation was positive, with a result of **+0.51**. This result demonstrates that implementers were still interested in being engaged in the application of AMD management policies. Most of the implementers affirmed that their organization's goals align with AMD management's goal and they concerned about the amount and the impact of AMD produced by the companies. They also recognized that appropriate AMD management contributes favorably, both directly and indirectly, to their organization and they had a responsibility to ensure that all of the policy's necessities have complied.

The motivation of the target group was also positive, with a result of **+0.61**. The target groups, represented by the employees of private coal mining companies in Muara Enim Regency, are still eager to implement AMD management policies at their companies. Most of the target groups agreed that the company where they work has a vision that is consistent with the government's AMD management policy objectives. Furthermore, most of the target

groups also acknowledged that AMD management practices contribute positively, either directly or indirectly, to the company's purpose.

Most of the target groups expressed a willingness to participate and contribute to the implementation of AMD management policies in their enterprises, as well as to collaborate with other actors/stakeholders in the implementation of AMD management policies. Although the motivation of the target group is positive, there is still a doubt among the target groups about whether the AMD management that they do in their company would be economically beneficial to their companies or not. Ten of the 63 target groups believed that the AMD management that they do, can give economic benefits to their company. The calculation of motivation's score is described in Table 12.

Table 12 Analysis Result of Motivation

	M (+) average	M total	Proportion	Assessed as:
Implementer	**4.53**	**6**	**+0.51**	**Positive**
Target group	**8.84**	**11**	**+0.61**	**Positive**

In the policy implementation, actors' motivation has an important connection with actor's cognition and information. Actors' cognition and information should be developed to estimate and quantify their proportion in AMD management policy implementation. Section 4.2.2 explains the results of the cognition and information analysis from the actors involved.

4.2.2 COGNITION AND INFORMATION

The calculation shows that implementers' cognition and information result in a negative score, whereas target groups' cognition and information result, were in a positive score. The results of the implementers and target group's cognition and information were **-0.29** and **+0.42**, respectively. Based on the survey, the implementers' cognition was negative since some of them did not fully understand the concept of AMD management and they did not aware that AMD management should be done not only technically but also institutionally. Furthermore, according to the survey, some of the implementers' obligations were not performed properly, such as:

a. Assessing the company's report on iron (Fe) and manganese (Mn) properties;
b. Providing advice to enterprises on how to reduce the amount of AMD produced by the companies, how to reduce the erosion caused by AMD flow in the mining site, and how to utilize environmentally friendly substances to neutralize AMD.

In terms of information, the implementers indicated that they did not have easy access to all of the information relevant to AMD management. The sources of knowledge were fairly restricted, for example, a book about AMD management, scientific paper, or success story from other regions that were successful in managing AMD. In contrast, the target group's cognition and information are positive. Most of the target groups answered that they had sufficient knowledge about environmental impact of AMD. They recognized that the government's goal in enacting the policy is to safeguard the environment from AMD damage.

Most of the target groups also stated that their company has been granted a disposal permit by the government to discharge their AMD into water bodies. Disposal permit is one of the primary requirements that the corporation must accomplish before discharging their AMD into the environment. Furthermore, most of the target groups also stated that there are Standard Operating Procedures (SOP) in their company and the SOP is clear and easy to comprehend. Some of the target groups claimed that they regularly conduct periodic checking on pH and suspended residues on AMD management, but some of them did not state that they always monitor Fe and Mn levels on a regular basis, as mentioned in the rules. Regarding the information, almost all target groups stated that it is easy for them to get sufficient information about AMD.

The majority of target groups also did not comprehend that AMD management is carried out not only technically but also institutionally. Only 9 out of 63 target groups believe that the AMD management should be done technically and institutionally. In terms of information, according to the survey results, only 26 of 63 target groups can easily get necessary information about the AMD management from books, research papers, and experiences from other companies or regions. The calculation of cognition and information score is presented in Table 13.

Table 13 Analysis Result of Cognition and Information

	C (+) average	C total	Proportion	Assessed as:
Implementer	**5.33**	**15**	**-0.29**	**Negative**
Target group	**15.61**	**22**	**+0.42**	**Positive**

After assessing the proportion of motivation, cognition, and information on the implementers and target groups, a measurement of the proportion of the third core actor's characteristics, namely power and resources, will be performed to determine and comprehend

whether the power and resources owned by the implementer and target group are adequate and balance. Section 4.2.3 contains the result of the power and resources analysis.

4.2.3 POWER AND RESOURCES

According to the survey results, the implementers' and target group's power and resources were both negative, with results of **-0.51** and **-0.25**, respectively. Based on the survey result, the negative scores were obtained because:

a. The implementers and target group had an insufficient number of personnel for AMD management;
b. The implementers and target group had inadequate personnel who are fully capable and have knowledge and experience in managing AMD appropriately and effectively, providing advice, mentoring, and information about AMD management;
c. Insufficient funding provided to the implementers and target groups. The implementers required sufficient budget to supervise and monitor AMD management in the companies and the target group require an adequate budget to manage AMD properly;
d. The implementers did not have enough time to monitor and supervise AMD management in the companies;
e. The target groups had inadequate appropriate technology, equipment, and machinery to manage AMD.

Though the target group's power and resources were unfavorable, there were still positive aspects in the target group's power and resources. According to the survey results, nearly all target groups claimed that the environmental managers in their companies were caring and responsible about the AMD management and the companies always submit AMD management action report to the government regularly as part of their responsibilities. The calculation of power and resources' scores is explained in Table 14.

Table 14 Analysis Result of Power and Resources

	P (+)	P total	Proportion	Assessed as:
Implementer	**2.47**	**10**	**-0.51**	**Negative**
Target group	**4.87**	**13**	**-0.25**	**Negative**

Based on the explanation, it can be inferred that the sort of interaction that occurs on the target group is characterized by "cooperation" whereas the interaction on the implementers is characterized by "learning toward cooperation". The complete analysis of the motivation,

cognition and information, as well as power and resources, are described in Appendix VI and VII. The overall score of those three fundamental characteristics of the implementers and target groups is presented in Table 15.

Table 15 Overall Score of Three Main Characteristics

	Motivation	Cognition and Information	Power and Resources	Type of interaction
Implementers	+0.51	-0.29	-0.51	***Learning toward cooperation***
Target group	+0.61	+0.42	-0.25	***Cooperation***

That result might be a bit surprising because, in the governance context analysis, it is found that conflicts sometimes arise, while the result of motivation shows that the target groups and the implementers are positively motivated. These issues will be discussed briefly in chapter 5.

Following an evaluation of the governance setting and the characteristics of the relevant actors, it is essential to assess the effectiveness of AMD management policy application as a part of comprehensive evaluations of AMD management policy. This effectiveness measurement is a specific benchmark for determining whether the policy is functioning successfully or not. If it is not, a strategic measure is required to improve the implementation of AMD management policies becomes more effective. The effectiveness measurement and the proposed strategic approach will be described in detail in Section 4.3.

4.3 EFFECTIVENESS OF AMD POLICY IMPLEMENTATION

This section discusses the effectiveness of AMD policy implementation as well as the strategic approach from the governance and actors' perspective to improve the effectiveness of AMD policy implementation. To realize the environmental interest, the government has attempted to manage the environment to avoid and slow the pace of deterioration in environmental quality and function. The current focus of environmental management in Indonesia is on sustainable development. This is specified in the 2020-2024 National Medium Term Development Plan (RPJMN) with the objective of achieving a sustainable environment. Based on that vision, the Ministry of Environment and Forestry has a vision to achieve environmental sustainability for the community welfare through the realization of high-quality environments, the optimization of environmental economic benefits in a fair and

sustainable manner, the embodiment of community empowerment, and good governance (Ministry of Environment and Forestry, 2020).

The vision and mission of environmental management in Indonesia are relevant with the environmental management vision and mission of MER, as revealed in the Muara Enim Medium Term Development Plan (RPJMD) 2018-2023. The Muara Enim Regency government is dedicated to create an environment that fosters the growth of good governance. MER government supports the assessment of industry actors' performance in environmental management as stated in RPJMD 2018-2023, the increasing role of industrial actors in conducting environmental management, the fulfilment of environmental regulations, and the value addition to natural resource preservation, energy conservation, and community development (Muara Enim Regency, 2019).

The mining sector, as one of Muara Enim Regency's priority sectors for the environmental management, is expected to carry out its environmental management in line with Muara Enim Regency's mission and vision. One method to accomplish this is by the appropriate management of waste generated by the mining sector and industrial activities such as AMD management. The AMD management entails not only the duties and responsibilities of one party, but also the duties and responsibilities of all parties involved.

The corporation, as an industrial actor, is responsible to manage AMD within its organization, whereas the government, as a policymaker, is responsible to establish AMD management policies. The effectiveness level measurement of AMD management policy implementation is carried out to determine the level of AMD management policy implementation in Muara Enim Regency. The indicators of the company's performance rating program in environmental management (Proper) that are defined by the Ministry of Environment and Forestry are adopted and modified as the effectiveness level measurement criteria. To assess the effectiveness of AMD management, four factors must be considered: compliance, institutional, supervision, and complaint and conflict management aspects (Wahid et al., 2015). Based on the surveys conducted to the representatives of the private sectors and the government officers, the effectiveness rate of AMD management policy implementation in Muara Enim Regency is explained as follows:

a. Compliance aspect

The indicators that are included in the compliance aspect are the control of AMD contamination and the discharge permit existence. In this regard, the companies'

adherence to the government's legal and policy obligations was evaluated. Based on the findings and analysis, it was determined that the compliance aspect obtained a score of 73.92%, as shown in Table 16.

Table 16 Result and Analysis of Compliance Aspects

Indicator	Criteria	Sub Criteria	Score	Obtained score
The control of AMD Pollution	Quality standards	All parameters of AMD have met the quality standards	2	1.54
		There are parameters of AMD that have not met the quality standards	1	
		All parameters of AMD do not meet the quality standards	0	
	Monitoring	Monitoring of AMD is routinely conducted every month	2	1.53
		Monitoring of AMD is held every semester or per year	1	
		Do not monitor AMD	0	
	Reporting	Reports from companies held regularly every month	2	1.31
		Reports from the companies held each semester	1	
		Reports from the companies held once a year or the companies do not send the report	0	
Discharge Permit existence	Discharge permit existence	All companies have discharge permits and they are still in active period	2	1.53
		There is company that has no discharge permit or discharge permit is still on process	1	
		All companies have no discharge permit	0	
Total score				**5.91**
Maximum score				**8**
% Compliance score				**73.92**

b. Institutional aspect

The indicators of the institutional aspect are organizational structure, number of supervisory employees, Standard Operating Procedure (SOP), internal and external coordination and communication, and institutional capacity building. According to the data and analysis, the institutional aspect got a score of 55.66%, as can be seen in Table 17.

Table 17 Result and Analysis of Institutional Aspects

Indicator	Criteria	Sub Criteria	Score	Obtained Score
Organizational structure	Department / Organizational structure	There is a certain department (in the company)/certain unit (in government agencies) that manages and supervises the AMD management with a clear job description	2	1.19
		There is a department (in the company)/unit (in government agencies) that manages and supervises the AMD management but not specifically or still integrates with the others department or units	1	
		There is no department (in the company)/unit (in government agencies) that manages and supervises the AMD management	0	
	Number of supervisory personnel	Personnel more than 2 person per AMD management unit and/or supervision unit	2	1.31
		Personnel around 1-2 person per AMD management unit and/or supervision unit	1	
		One personnel in two or more units	0	
	Standard Operational Procedure (SOP)	SOP related to AMD management is complete	2	1.43
		SOP related to AMD management is partially complete	1	
		No SOP related to AMD management	0	
Coordination and Communication	Internal	Coordination and communication are always conducted clearly, straightforward, and assertive based on the existing roles and responsibilities in the organizational structure	2	1.15
		Coordination and communication have not been fully clearly conducted, straightforward, and assertive based on the existing roles and responsibilities in the organizational structure	1	
		There is no clear, straightforward, and assertive coordination and communication	0	
	External	Always establish coordination and communication with the companies, governments, communities, and NGOs in the AMD management and monitoring	2	1.20
		Coordination and communication with the companies, governments, communities, and NGOs are not intense	1	

Indicator	Criteria	Sub Criteria	Score	Obtained Score
		No coordination and communication with the companies, governments, communities, and NGOs	0	
Institutional capacity building	Education and Training	Training related to the AMD management is conducted every year	2	0.41
		Training related to AMD is conducted every 2 years	1	
		Training related to AMD is conducted more than 2 years or never	0	
Total score				**6.68**
Maximum score				**12**
% Institutional score				**55.66**

c. Supervision aspect

The indicators of the supervision aspect are supervision intensity and scheme, supervision process, supervision output, human resources for supervision, and supervision budget. The supervision aspect had a score of 66.05%, according to the data and analysis, as figured in Table 18.

Table 18 Result and Analysis of Supervision Aspects

Indicator	Criteria	Sub Criteria	Score	Obtained Score
Supervision intensity and scheme	Supervision intensity	Supervision of the AMD management is conducted routinely every 3 months from outside parties (Government) and routinely every month by the company's supervisor	2	1.51
		Supervision of the AMD management by the government is not routine (once a year or more) while supervision of the company is routine every month	1	
		There is no supervision of the AMD management from both government and company	0	
	Supervision scheme	Routine and unannounced	2	1.73
		Incidental only	1	
		No supervision	0	
Supervision process	Supervision process	Comprehensive on all process of AMD management	2	1.25
		Not comprehensive or partially on certain process of AMD management	1	
		No supervision	0	
Supervision output	Supervision output	Always written in supervision agenda or supervision report	2	1.35

Indicator	Criteria	Sub Criteria	Score	Obtained Score
		Only some are written (partially)	1	
		Unwritten	0	
	Supervision follow-up	The recommendations are always followed up by the companies to enhance the AMD management to be more effective	2	1.26
		Only some of the recommendations are followed up (partially)	1	
		No follow-up	0	
Human resources	Supervision personnel	All supervisors in government agencies as well as in companies have qualification	2	0.99
		Only some of the supervisors in government agencies as well as in companies have the qualification	1	
		Most of them do not have the qualification	0	
Budget	Supervision budget	Sufficient budget with the same priority as other programs	2	1.17
		Low priority budget	1	
		No budget	0	
Total score				**9.25**
Maximum score				**14**
% Supervision score				**66.05**

d. Complaint and conflict management aspects

The indicators that are included in the complaint and conflict management aspects are public complaint intensity, complaint handling, and conflict resolution which includes conflict resolution length, conflict resolution method, and other party satisfaction. As shown in table 19, the complaint and conflict management aspects reached a score of 58.85% based on the result and analysis.

Table 19 Result and Analysis of complaint and conflict management aspect

Indicator	Criteria	Sub Criteria	Score	Obtained Score
Public complaint intensity	Number of public complaints	0 - 5 public complaints/year	2	1.26
		6 -10 public complaints/year	1	
		More than 10 public complaints/year	0	
Complaint handling	Number of handled public complaints	All of public complaints are handled and followed up	2	1.04
		Not all public complaints are handled and followed up	1	
		No follow up at all	0	
	Mediation/court	All of public complaints are resolved by mediation or no public complaints are resolved in the court	2	1.42
		Not all of public complaints are resolved by mediation or only some	1	

Indicator	Criteria	Sub Criteria	Score	Obtained Score
		of them are resolved by mediation		
		All of public complaints are resolved in the court	0	
Conflict resolution	Conflict resolving duration	Conflict resolution is conducted within 0–30 days	2	1.28
		Conflict resolution is conducted within 1–6 months	1	
		Conflict resolution is conducted for more than 6 months	0	
	Conflict resolving method	Win-win solution by paying compensation to all the people who have suffered from AMD pollution	2	1.01
		Not all who suffer receive compensation, or only some who suffer are compensated	1	
		No compensation paid	0	
	The satisfaction of other parties	All parties are satisfied with the results of the community complaints' handling	2	1.05
		Only some of the parties are satisfied	1	
		Most of the parties or all parties are unsatisfied	0	
Total score				**7.06**
Maximum score				**12**
% Complaint and conflict management score				**58.85**

Based on the previous explanation, it can be concluded that AMD management in Muara Enim Regency was **moderately effective**, with a score of **63.62%**, as shown in table 20.

Table 20 Overall Effectiveness Score

Aspect	Effectiveness score (%)	Effectiveness rate
Compliance aspect	73.92	Effective
Institutional aspect	55.66	Moderately effective
Supervision aspect	66.05	Moderately effective
Complaint and conflict management	58.85	Moderately effective
Average	***63.62***	***Moderately effective***

Although the type of interaction among actors involved in implementing AMD management policies is characterized by "cooperation" on the target groups and "learning toward cooperation" on the implementers, the analysis results still show that the governance context is restrictive and the policy implementation is only moderately effective. Strategic approaches are required to overcome the restriction of governance setting and make it more supportive, as well as to make the interaction among actors becomes more cooperative. The discussion and the proposed measure will be elaborated comprehensively in Chapter 5.

5 DISCUSSION

This chapter focuses on interpreting the findings of the research. This chapter is divided into two sections. The first section elaborates the governance context and actors' characteristics and the second section proposes the strategic approach to improve the effectiveness of AMD management policy implementation to answer the fourth sub-question.

5.1 GOVERNANCE CONTEXT AND ACTORS' CHARACTERISTICS

Contextual Interaction Theory (CIT) that was developed by Bressers (2004), focuses on the actors who determine whether they are eager or not to support the implementation of the policy. This study also provides insight into the internal process and how governance and actors' characteristics influence the success of policy implementation. According to CIT, different sorts of interactions are produced by the combination of actor characteristics. By using CIT, it is also feasible to compare the predicted type of interaction and the actual type of interactions that occur in the policy implementation process. Some external elements, such as the governance factors, influence the characteristics of the governance actors. The Governance Assessment Tool (GAT) that is used in this research, has the function to determine the degree of supportiveness of those governance settings.

In the development of CIT, there are two parties involved in the implementation of the policy, one is responsible for the implementation which is called implementer and the other is the target group. Basically, the prediction of the sort of interaction on the AMD management policy implementation, is that the implementers are highly motivated to implement the policy while the companies, as the target groups, are not eager to support the implementation because it restricts them. As a consequence, the sort of interaction between the implementers and the target groups depends on their cognition and information, as well as power and resources. If there is sufficient cognition and information, the distribution of power and resources makes the difference. However, based on the data and information gathered on this research, the motivation of the implementers and the target groups, as well as the cognition and information of the target groups were positive, while the cognition and information of the implementers were negative, and both implementers and target groups had lack of power and resources.

If the methodology and CIT flowchart are followed strictly, the sort of interaction that happened on the target groups in the implementation of AMD management policy was characterized by "cooperation". The CIT implicitly referred that this situation was "cooperation" because it was defined that positive motivation on both sides creates more pluses than minuses on the scoring table, but the situation here was a bit different and maybe the end of the result should not be positive. A "real" positive motivation is considered when the target groups are fully motivated to cooperate and they are eager to push forward. However, in this case, they were not fully motivated and they were not eager to pursue the implementation of the AMD policy. The positive result of motivation was obtained maybe just because they are prepared to cooperate. So, in this case, it can be interpreted that the motivation of the target group was more neutral. It also can be said that the interaction was characterized by "cooperation" but one of the type of "stumbling forward together" since the motivation of the target group was rather neutral than positive and they both have to learn a lot while underway.

In addition, in the theory, the "cooperation" interaction is attained because the rule states that the information provided by the positive actor is considered. Based on the CIT, it is stated that it is sufficient if one positively motivated actor has adequate information. However, in this case, it might not be sufficient because the positive motivations of the implementers and the target groups were lukewarm and not so much eager to push forward. The target groups had all the information but they must convey the information by themselves since the implementers had lack information. If this condition is combined with the positive motivations of the implementers this makes one think that the bottle neck is not the company resistance, but lack of understanding at the implementers' side. This circumstance impedes the implementation, since normally the target groups really expect a learning influence from the implementers. Furthermore, this situation also makes the implementers assuredly dependent on the information from the target groups and while this information should be used to force the target groups when necessary. This is an extremely weak and vulnerable position for the implementers, especially since those both sides, implementers and target groups, have a lack of resources. To avoid this weak position, the implementers surely need to engage in a learning process to become a more equal partner for the target groups, not just the partner that has the right to interfere.

According to CIT, the poor implementation was not so much explained by the conflicting motivations, but more by lack of knowledge and lack of resources. Normally they try to work together, nevertheless, with a few of knowledge and resources, the implementation is still lacking. Based on that brief explanation, it can be inferred that the picture that emerged from the flowchart model of the last version of CIT might not be correct, interpreted with the situation in this case, with the result that both sides were lukewarm motivated and also because they did not have many resources, and the government even also had lack of information that made they were more dependent on what companies shared with them. This sort of situation can be inferred into a rather "symbolic" situation.

Furthermore, the second issue that should be discussed, is the contradiction that emerged since the governance context assessment results explained that the conflicts still emerged when implementing the AMD management policy, but the results of the actors' characteristic assessments, indicated that the implementers and the target groups were quite motivated. It implies that there are some kinds of contradictions. The contradiction might be caused by some reasons. The first reason is that the interviews were conducted with the majority of people who were working on policy schemes, and they might be positively motivated for their job even if their companies did not always support them. The second reason is that interviews were conducted mostly for sets of managers in governance analysis, whereas staff members were questioned for actor' characteristic analysis.

The staff members, as a target group, who may have a different vision with the implementers, might be favourable on the vast majority of issues, but this does not rule out the possibility that they are highly negative on one or two issues. It is not impossible if there is an individual who lacks motivation in a few aspects or issues. This indicates that while the majority of the indicators in this study are regarded as positive, there might be negative on one or two specific ones and still result in a positive motivation score. Since a few aspects of motivations are very negative, they can still engage the conflicts. Combined with a lack of good personnel, insufficient resources and information, and a condition of poor implementation, make the conflicts continue to arise.

Conflicts sometimes emerge because the implementers and target groups have disagreements on AMD management and treatment strategies. The target groups believe that the implementers do not properly comprehend the state of the AMD generated by each company. The target groups assume that they are more familiar than the implementers on the

condition of AMD generated by the companies where they work. While the implementers feel that they are responsible and have the authority to monitor the AMD management in the companies and the companies have to follow all the recommendations from the government as the implementers of the policy. Additionally, the mining companies, as the target groups, are prone to experience some conflicts with the government. This is owing to the many parties' interests in developing the relationships and interactions to accomplish the intended goals. Limited resources and lack of mutual trust between the government and mining companies create a growing number of social clashes and disputes, and then potentially leading to conflict.

A lack of motivation might reduce the desire to collaborate. As a result, it leads to a conflict. The managers of the companies and the leaders of government agencies have emerged as the primary actors who have an important role in the conflict. They are the ones who should be actively involved in conflict situations. They are expected to act as intermediaries in disputes between the implementers and the target groups. They should have adequate skills in the dynamics of conflict to discover constructive solutions.

There are always aspirations expressed and addressed by each group in a conflict situation among the mining companies and the government. Conflicts can arise when the aspirations of one group are not recognized by the others. In principle, conflicts can be prevented by constructive conflict management, dialogue among the conflicting parties, and direct communication. To avoid conflicts, the government, as the implementers of AMD management policy, should be transparent. Conflicts are sometimes needed since it can be a part of individual dynamics and a reaction to a move into better improvement. The existence of conflict will be beneficial if its resolution is supported by the top management of the companies or the leader of government agencies. Conflicts can also be useful if it provides additional motivation such as opportunity to improve capability, communication, and coordination by working together to find a solution and to improve competitive performance.

5.2 STRATEGIC APPROACH

The strategic approaches, from a governance and actor perspectives, to achieve the effective policy implementation of AMD management in MER are presented as follows:

5.2.1 STRATEGY FROM GOVERNANCE PERSPECTIVE

Dealing with AMD has proven challenging for the government and the mining corporations (Tempelhoff & Winde, 2013). AMD has recently received extensive media coverage, and as its possible influence on the environment as well as human healthiness and welfare becomes more apparent because it becomes a global political concern (Feris. L & Kotzé. LJ, 2014). Since the AMD problem is already a global concern, international level involvement is possible, so that Indonesia can learn from other countries where the AMD management is already advanced. The designation of powers among the municipal, provincial, and federal government should be defined appropriately. The government should be fair since there are a lot of political reactivity surrounding mining sector businesses (Tempelhoff & Winde, 2013). Coordination and communication across levels must also be reinforced by conducting regular meeting to discuss AMD management and share expertise and experience. A commission or agency that connects and facilitates communication and coordination among levels is urgently required in AMD management to improve collaboration among levels.

Governments, private sectors, academic experts, non-governmental organizations (NGOs), and communities should have a strong relationship in AMD management. The challenge is that the ‘team effort' is absent and everyone tries to enhance their consciousness regarding the problem by themselves and blaming those they believe are responsible rather than working together (Naidoo, 2015). The companies that manage the AMD should have a good relationship with the governments, commercial sectors, academic experts, non-governmental organizations (NGOs), and communities. All actors involved should have mutual trust in one another. In the future, governments and companies should support programs that involve the public in AMD management. The community's participation is also necessary. Companies will face increased social pressures in the future. The community will be more critical of the environment and its consequences. Furthermore, because AMD concerns are long-term, the topic of AMD will be extremely difficult for academic experts and researchers to address in the future. There should be a platform for communication where AMD management can be discussed.

Naidoo (2015) argued that the mass media which notifies the people about the consequences and harshness of AMD is undoubtedly the most significant public moderate for raising awareness and providing a facility to the public to inform AMD social-relation effect.

The important thing is, it is critical to evaluate either the public news focus primarily on personal instances, technological strands, or socioeconomic implications. In addition, the mass media should set a balance prominent on the environment quality and socioeconomic dimension of AMD on its focus.

The company also needs consultants who have specialists and advisers on how to take care the environment and to work for sustainable strategies onwards which comprise repairing the damage (Naidoo, 2015). An experienced and accredited consultant should be involved since they have skill and extensive expertise in advising governments and corporations on AMD management processes and procedures in order to meet the AMD quality standard. The consultants are also considering the people's needs and health by driving the people conscious about the effects of AMD, as well as support for socioeconomic improvement (Naidoo, 2015).

The scientific community, such as consultants and academic experts, should include and trust indigenous knowledge. Indigenous knowledge and lived experiences, such as the effects of mining on communities, should be acknowledged, as should community engagement in decision-making process that affects their life (Mpofu et al., 2018). The scientific community's decisions will then be approved by bureaucrats who see them as trustworthy servants so that the non-scientific communities can help the scientific groups and the policymakers in making some decisions on AMD management by articulating indigenous knowledge and lived experiences.

Management conflict strategy is essential to improve the quality of the AMD management governance. Conflict resolution focuses on resolving the underlying root of the problem. Conflict management assigns to possible strategies of controlling a disagreement as well as discovering long-term procedures to rectify the problems (Abioro & Ekpudu, 2019).

Based on the findings, several policies are still deemed to be inconsistent with other policies and to be irrelevant to the current circumstances. The government should reconsider the policies that are out of synchronization with one another and reassess the policies that are no longer relevant to the current situation. Policies that are no longer relevant should be revised or amended to ensure that AMD management goals are accomplished. Furthermore, the enforcement of policies and instruments should be more vigorous, so that corporations are more prone to comply with the policies.

A strategic approach from the actors' perspective is also required to complete the strategic approach from the governance perspective, because the analysis results of the actors' core characteristics show that some of the actors' characteristics still have negative values. Section 5.2.2 discusses some strategies for improving actors' characteristics.

5.2.2 STRATEGY FROM ACTORS' PERSPECTIVE

According to the results of calculations and analysis based on the CIT, the sort of actor interaction process that occurs on the target groups is characterized by "cooperation" at situation number one, while the interaction process on the implementers is characterized by "learning towards cooperation" at the situation number two as shown in Figure 14.

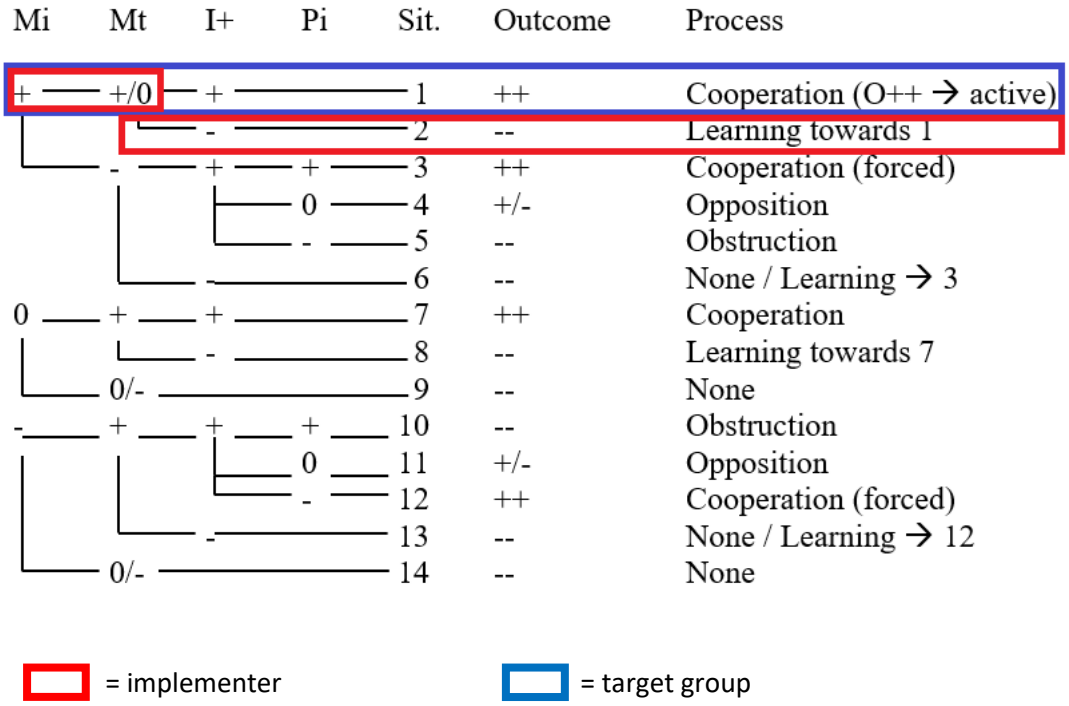


Figure 14 The implementation process of AMD management policy

The strategies to improve motivations, cognitions and information, as well as power and resources are still needed. The following are the proposed strategies based on the informants, the literature, and the researchers.

5.2.2.1 STRATEGY TO INCREASE MOTIVATION

Bressers (2009) emphasized motivation as a fundamental characteristic of the actors that manage societal interactivity mechanisms, which sequentially affect the processes. In addition, motivations can sometimes be viewed as "intervention points" in and of themselves

(Bressers, 2009). The approaches listed can be regarded as strategies for increasing the motivation of implementers and target groups.

5.2.2.1.1 The company should commit to occupational health and safety

Mining activities in Indonesia are one of the most essential contributors of revenue for the country and region, but they are fraught with danger, occupational health, and safety issue. The workers in mining companies, for example, are particularly vulnerable to safety and health risks, such as the employees who are working in AMD's management departments. They are in danger of being contaminated with harmful AMD compounds. The companies that are devoted to occupational health and safety in all activities will keep their employees' motivation to perform well and safely in AMD management. The employees who are worrying about their health and safety in their workplace will be unable to concentrate on their work.

5.2.2.1.2 Reward

The people working in AMD management might be rewarded in the form of financial or non-financial rewards for their achievements. Financial rewards can be in the form of incentives or bonuses, whilst non-monetary rewards can be in the form of recognition. Recognition is an expression of appreciation for a worker's accomplishments, and it is essential for workers. When employees feel underappreciated, their motivation suffers.

5.2.2.1.3 Conviction to the economic benefits of AMD management

According to the survey results, the implementers and target groups were not persuaded that AMD management may deliver economic benefits to corporations and their organizations. In principle, proper and comprehensive AMD management will give not only ecological and societal advantages, but also financial profits to implementers and target groups. If the corporation, as a target group, has carried out proper and effective AMD management, from planning to evaluation, the company will prevent future costs associated with AMD pollution, such as compensation costs to communities who are affected by AMD pollution. Furthermore, the organization will save the money on rehabilitation of AMD installations. If AMD management installations fail due to ineffective AMD management, much money will be spent on rehabilitation. Appropriate and effective AMD management can also give indirect economic benefits to the implementers, such as the elimination of the necessity for stringent supervision and monitoring and the expenditure of a substantial budget for supervision. Since the actor's motivation is strongly linked to actors' cognition and

information, measures to improve cognition and information are also required. The strategies are discussed in detail in section 5.2.2.2.

5.2.2.2 STRATEGY FOR IMPROVING COGNITION AND INFORMATION

Mohlakoana (2014) stated that the cognition is related to an actor's information processing capabilities and how it affects to the interaction process. It also focuses on how the actors' conception of reality affects the interaction process, as well as how knowledge and information about other actors and the provided factors affect the interaction procedure (Mohlakoana, 2014). The approaches that can be the option to improve cognition and information are presented as follows:

5.2.2.2.1 Training

Based on the research findings, cognition and information on implementers were negative. To assist the companies on AMD management, the implementers must establish necessary proficiency. Training demonstrates to be a factor in improving the workforce's cognition to achieve organizational goals (Kulkarni, 2013). As a result of good training programs, important company goals are attained. Hence, training is critical for providing a proactive attitude to the organization (Kulkarni, 2013). According to the research findings, cognition and information on implementers were negative. To assist the target groups on AMD management, the implementers must establish the necessary proficiency. It is intended that after training, the implementers will have a comprehensive understanding of the concept of AMD and its management. Furthermore, after the training, the implementers are expected to give advice and assist to the target groups on how to limit the quantity of AMD produced in mining activities, reduce the erosion at mining sites, and utilize environmentally friendly materials to neutralize AMD.

5.2.2.2.2 Cooperation with academic experts in AMD management

The implementers and target groups, may face a lack of knowledge. This issue might be caused by a lack of access to diverse sources of knowledge about AMD management, such as literature and book. Cooperation with academic experts may be the best solution to this problem, allowing the implementers and target groups to obtain access to scientific sources of information concerning AMD management. Collaboration between the academic experts, implementers, and target groups can also lead to an innovation in the development of effective and efficient AMD management strategies.

5.2.2.2.3 Coordination and communication with other parties outside Muara Enim Regency

Coordination and communication with other municipal or provincial governments, or even the other coal mining corporations in other districts that are successful in AMD management and have a lot of experiences in AMD management, can be one of the strategies to increase implementers' and target groups' cognition and information. This plan is expected to assist the companies, as well as the governments of South Sumatra province and Muara Enim regency to learn more about AMD management.

Aside from the strategies to amplify motivation, as well as cognition and information, the proposed actions to strengthen power and resource are also described in section 5.2.2.3.

5.2.2.3 STRATEGY TO INCREASE POWER AND RESOURCES

Owens (2008) stated that when the implementer's motivation is positive and the target group's motivation is neutral or positive, the theory ignores power and, by expansion, some matters of ability. The idea implies that on the condition of the main actors' motivation is positive of the policy (or if the aim is neutral), the actors are eager to collaborate and the power as a limiting factor is not going to be a role (Owens, 2008). However, to make the interaction flawless, it is also necessary to boost power and resources. The following strategies can be identified as solutions for increasing power and resources.

5.2.2.3.1 Funding

This approach may be appropriate for an organization or company that does not have a sufficient budget for AMD management. The availability of financing is critical to the successful implementation of AMD management. The financial capacity of the organization or company might become a barrier to the application of this proposed action since each company or organization has a varied financial capacity. This measure is also relatively tough to adopt on the implementers' side because the budgeting procedures on government organizations is dependent on the government's financial status. The approach that is acceptable to the government entities is to employ the budget allocation based on the priority scale.

5.2.2.3.2 Competence-based recruitment and selection

Employee recruitment and selection based on competency is also expected to decrease human resource difficulties faced by the implementers and target groups. Employee

recruitment and selection must be more stringent in order to select the personnel with the capacity and experience in the field of AMD management.

5.2.2.3.3 Knowledge transfer management

This scenario can be applied by the implementers and target groups with a limited number of skilled staffs. Personnel with appropriate capacity and experience in AMD management can share their knowledge and experience to those who have insufficient capabilities.

6 CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the responses to the research questions, as well as the recommendations that are intended to act as a reference for implementing AMD management, as stated in the research objective. The following are the conclusions and recommendations:

6.1 CONCLUSIONS

This research has evaluated the implementation of AMD management policies in private coal mining companies in Muara Enim Regency, South Sumatera, Indonesia. The assessment was conducted by assessing the governance factors according to Bressers et al., (2016). Through the evaluation, it was possible to identify whether the governance contextual conditions either facilitated or constrained the AMD policy implementation. The evaluation included the observation of the characteristics of the actors engaged, measurement of the effectiveness level, and providing a strategic approach, from a governance and actor perspectives, to establish the effective AMD management policy implementation in MER. The frameworks employed in this research were Governance Assessment Tool (Bressers et al., 2016), Contextual Interaction Theory (Bressers, 2004), and Policy Implementation Effectiveness (Wahid et al., 2015; IMEF, 2020; OAS, 2021). In this study, a mixed research method approach was applied with an emphasis on quantitative analysis. The data and information were gathered through a survey, an in-depth semi-structured interview, and a desk research. The informants who were interviewed were the key informants. They were purposefully chosen with a specific goal in mind and the informants should be competent on the issues regarding the implementation of AMD management policies based on their authority and responsibility.

The first sub-question of this research is about the governance factors that support and impede the success of AMD management policy implementation in private coal mine companies in MER. Based on the result of this research, the governance contexts in which AMD management policies were implemented were ***mostly restrictive***. The Governance Assessment Tool was used to evaluate those governance settings. When employing GAT, four consistency parameters had to be taken into account: extent, coherence, flexibility, and

intensity. The result of the analysis showed that only the extent is rated as moderate, indicating that it is supportive, while the coherence, flexibility, and intensity are assessed as low or restrictive. Based on the interview with key informants, it can be inferred that the government's bureaucratic and hierarchical structure, an imbalance in power distribution, a lack of coordination among actors, a lack of policy enforcement, and insufficient resources were all becoming the contributing factors (Meidiana and Arbiwahono, MEEA, online interview, May 24, 2021; E.P. Bakri, IMEF, online interview, May 24, 2021; A. Fuadi, IMEF, online interview, May 29, 2021; B. Yusnan, SSEA, online interview, June 2, 2021; A. Rais, private sector MME, online interview, June 6, 2021).

The second sub-question of this study is regarding the characteristics of involved actors that influence the AMD management policy implementation in MER. Based on the result of this study, the type of interaction on the target groups was characterized by ***"cooperation"*** and the type of interaction on the implementer is characterized by ***"learning toward cooperation"***. The motivation of the implementers and the target group were positive because most of them expressed their desire to engage in and participate in AMD management policies implementation. In addition, the motivation of the implementers and the target groups was positive because the AMD management policies' goals aligned with the objectives of implementers' institutions and target groups' companies. However, the implementers' cognition and information, as well as the implementers' and target group's power and resources, were still negative, due to the lack of knowledge and understanding of the implementers, as well as the power and resources disparity among the implementers and target groups.

The third sub-question of this research is concerning the effectiveness of AMD management policy implementation in private coal mining companies in MER. The result showed that the effectiveness of AMD management policy implementation in MER was ***moderately effective***, with an average percentage score of ***63.62***%. According to the results of the analysis, only one of the four components of effectiveness assessment, namely compliance aspects was rated as effective, while the institutional aspects, supervisory aspects, complaint and conflict management aspects, were rated as moderately effective. These conditions revealed that the average level of effectiveness of AMD management policy implementation in MER was moderately effective. The moderate effective level was obtained

as a consequence of institutional weaknesses and insufficiency of addressing complaints and conflicts associated with AMD management.

The fourth sub-question of this study is about the strategic measures from the perspectives of governance and actors, to achieve the effective policy implementation of AMD management in MER. The strategic approaches from the governance perspective that can be addressed to improve the effectiveness of AMD policy implementation are mainly the strategies for the levels and scales, actors and networks, problem perspective and goal ambitions, strategies and instruments, as well the responsibilities and resources. The strategies can be in the form of balanced power distribution, strong engagement, coordination, and communication across levels and actors. Furthermore, from the perspective of the actors, the strategies that can be applied such as company commitment to occupational health and safety, employee reward, conviction in the economic benefits of AMD management, funding, training, competence-based recruitment and selection, and knowledge transfer.

6.2 RECOMMENDATIONS

There are a few recommendations for the practitioners and stakeholders involved in AMD management policy implementation as well as for further research. Firstly, sustainable mining practices as an integrated aspect of the societal and ecological responsibility of the mining industry sector, can be applied by the companies. Sustainable mining practices focus on how the company operates and conducted its mining activities in sustainable manner at all levels. Through sustainable mining practices from the planning to the evaluation, the company can reduce the amount of AMD generation. Mining corporations are expected to create and share values and responsibilities connected to economic, environmental, and social challenges as part of their competitive advantage through sustainable mining operations.

The second recommendation is the application of collaborative governance that emphasizes the powerful engagement of stakeholders in a collective decision-making procedure and fostering shared understanding. Collaborative governance provides the clarity of direction and implementation guidelines of AMD management to optimize the performance of AMD management by creating an institutional structure that enhances the governance structure and makes it more inclusive.

The third recommendation is that a strong policy enforcement must be carried out by the authorized parties so that all violations related to AMD management can be avoided and the environment can be preserved. The policy will be successfully enforced if all parties engaged to support and commit to the consequences of all policy violations.

The fourth recommendation is for further research to widen the applicability of Governance Assessment Tools and Contextual Interaction Theory Policy for other empirical studies such as in water management, waste management, waste water management in Indonesia, or other policies in mining sectors, such as air pollution prevention policies, mining restoration policies, and reclamation policies, or for other regencies in Indonesia where AMD management policy implementation remains a challenge since there are some regencies in Indonesia where coal mining companies still operate their mining operations and face some AMD management issues.

REFERENCES

Abioro, M., & Ekpudu, J. E. (2019). *Conflicts Management Strategies: A Tool for Industrial Harmony*. *Izvestiya. Journal of Varna University of Economics*, *63*(1), 19–34.

Acharya, B. S., & Kharel, G. (2020). *Acid mine drainage from coal mining in the United States – An overview*. *Journal of Hydrology*, *588*, 125061. doi:10.1016/j.jhydrol.2020.125061.

Anderson, J. E. (2003). *Public policy making: An introduction. Boston: Houghton Mifflin Company*, 34.

Boer, C. De, & Bressers, H. (2011). *Contextual interaction theory as a conceptual lens on complex and dynamic implementation processes*. *Challenges of Making Public Administration and Complexity Theory Work*, 1–39.

Bressers, H. (2004). *Implementing sustainable development: How to know what works, where, when and how*. *Governance for Sustainable Development: The Challenge of Adapting Form to Function*, 284–318.

Bressers, H. (2007). *Contextual Interaction Theory and the issue of boundary definition: Governance and the motivation, cognitions and resources of actors*. *Governance An International Journal Of Policy And Administration*, January, 1–31.

Bressers, H. (2009). *From public administration to policy networks: Contextual interaction analysis*. In *Rediscovering public law and public administration in comparative policy analysis: a tribute to Peter Knoepfel* (pp. 123–142).

Bressers, H., Bressers, N., Kuks, S., & Larrue, C. (2016). *The Governance Assessment Tool and Its Use*. In *Governance for Drought Resilience: Land and Water Drought Management in Europe* (pp. 45–56). doi:10.1007/978-3-319-29671-5.

Bressers, H., & de Boer, C. (2013). *Contextual Interaction Theory for assessing water governance, policy and knowledge transfer*. *Water Governance, Policy and Knowledge Transfer: International Studies on Contextual Water Management*, 36–54. doi:10.4324/9780203102992.

Bressers, H., de Boer, C., Lordkipanidze, M., Özerol, G., Vinke-de Kruijf, J., Furusho, C., Lajeunesse, I., Larrue, C., Ramos, M.-H., Kampa, E., Stein, U., Tröltzsch, J., Vidaurre, R., & Browne, A. (2013). *Water Governance Assessment Tool - With an Elaboration for Drought Resilience*. 1–42.

Bressers, H., & Kuks, S. (2013). *Water governance regimes*. *International Journal of Water Governance*, *1*(1), 133–156. doi:10.7564/12-ijwg1.

Bressers, H. T. A., & Kuks, S. M. (2003). *What does governance mean? From concept to elaboration*. *Achieving Sustainable Development: The Challenge of Governance Across Social Scales*, 65–88.

Casiano Flores, C. (2017). *Context matters: water governance assessment of the wastewater treatment plant policy in Central Mexico* (Issue March).

Casiano Flores, C., Özerol, G., & Bressers, H. (2017). *"Governance restricts": A contextual assessment of the wastewater treatment policy in the Guadalupe River Basin, Mexico*. *Utilities Policy*, *47*, 29–40. doi:10.1016/j.jup.2017.06.006.

Delmas, M., & Toffel, M. W. (2004). *Environmental Management Practices : 222*, 209–222.

Devi, D., & Basri, M. (2019). *Effectiveness of the Implementation of Village Fund Allocation (ADD) in Improving Physical Development of Linsowu Village, Kulisusu District, North Buton Regency*. *Rez Publica*, *5*(3), 1–13.

Feris. L, & Kotzé. LJ. (2014). *Authors : L Feris and LJ Kotze The Regulation of Acid Mine Drainage in South Afrika : Law and Governance Perspectives*. *17*(5).

Fuchs, D. (2010). *The consumer as a driving force behind the greening of industry : the question of policy instrument choice The Consumer as a Driving Force behind the Greening of Industry : The Question of Policy Instrument Choice*.

Gammons, C. H., Harris, L. N., Castro, J. M., Cott, P. a., & Hanna, B. W. (2009). *Creating lakes from open pit mines : processes and considerations, with emphasis on northern environments-Canadian Technical Report of Fisheries and Aquatic Sciences 2826*. *Fisheries (Bethesda)*, *867*, 1–117.

García, J. H., Sterner, T., & Afsah, S. (2007). *Public disclosure of industrial pollution: The PROPER approach for Indonesia*. *Environment and Development Economics*, *12*(6), 739–756. doi:10.1017/S1355770X07003920.

Ginting, D. (2010). *Policies and Prospects for Coal Management in Indonesia*. *Geological Resources Bulletin*, *5*(1), 43–49. doi:10.47599/bsdg.v5i1.255.

Government of Indonesia. (2021, January 2). *Ministerial Decree for the Environment Number 113/2003.* Retrieved from *http://jdih.menlhk.co.id/uploads/files/KLHK menlhk 8312020090150*.

Government of Indonesia. (2021, January 2). *Ministerial Decree of Energy and Mineral Resources Number 1827K/30/MEM/2018*. Retrieved from https://jdih.esdm.go.id/storage/document/ KeputusanMenteri%ESDM%18272018.pdf.

Government of Indonesia. (2021, February 4). *Government Decree Number 22/2021.* Retrieved from https://peraturan.bpk.go.id/Home/Details/161852/pp-no-22-tahun-2021.

Herdiana, D. (2018). *Public Policy Socialization: Understanding and Basic Concepts*. *Scientific Journal of Academic People's Insights*, *I*(3), 13–26.

I. Rahayu. (2016). *Distribution of the Effectiveness of the Raskin Program in Tabanan District* (Vol. 147).

Indonesian Ministry of Energy and Mineral Resources. (2021, January 4). *Mining Permit in Indonesia*. Retrieved from https://modi.minerba.esdm.go.id/pimpinan/perizinan?t=2021.

Knoepfel, P., Larrue, C., Varone, F., & Hill, M. (2011). *Public policy analysis*. *The Policy Press, Bristol.*

Kulkarni, P. (2013). *A Literature Review on Training & Development and Quality of Work Life*. *International Refereed Research Journal*, *IV*(2), 136–143.

Ladd, A. E. (2013). *Stakeholder perceptions of socioenvironmental impacts from unconventional natural gas development and hydraulic fracturing in the increasing numbers of americans are being targeted by industry advertising campaigns extolling the virtues of the " Natural G*". *Journal of Rural Social Sciences*, *28*(2), 56–89.

Laurence, D. (2011). *Establishing a sustainable mining operation: An overview*. *Journal of Cleaner Production*, *19*(2–3), 278–284. doi:10.1016/j.jclepro.2010.08.019.

Lordkipanidze, M., Bressers, H., & Lulofs, K. (2019). *Governance assessment of a protected area: the case of the Alde Feanen National Park. Journal of Environmental Planning and Management*, *62*(4), 647–670. doi:10.1080/09640568.2018.1441014.

Marpaung, M. (2012). *The Effectiveness of the Implementation of the Housing Financing Liquidity Facility (FLPP) Policy for Home Prosperity Tapak in Bekasi Regency.* University of Indonesia.

MEEA. (2021, May 26). *Organizational structure and program of Muara Enim Environmental Agency 2021*. Retrieved from https://www.muaraenimkab.go.id/web/1235.

Ministry of Environment and Forestry. (2021, May 27). *Indonesia Ministry of Environment and Forestry Strategic Plan 2020-2024*. 1–97. Retrieved from https://www.menlhk.go.id/ site/single_post /3298/renstra-klhk-tahun-2020-2024.

Mohlakoana, N. (2014). *Implementing the South African free basic alternative energy policy: a dynamic actor interaction*.

Mpofu, C., Morodi, T. J., & Hattingh, J. P. (2018). *Governance and socio-political issues in management of acid mine drainage in South Africa*. *Water Policy*, *20*(1), 77–89. doi:10.2166/wp.2017.068.

Mudd, G. M. (2010). *The Environmental sustainability of mining in Australia: key mega-trends and looming constraints*. *Resources Policy*, *35*(2), 98–115. doi:10.1016/j.resourpol.2009.12.001.

Munawar, A. (2008). *Acid Mine Drainage Management: Principles and Application*. In *Journal of Chemical Information and Modeling* (Vol. 53, Issue 9).

Mutti, D., Yakovleva, N., Vazquez-Brust, D., & Di Marco, M. H. (2012). *Corporate social responsibility in the mining industry: Perspectives from stakeholder groups in Argentina*. *Resources Policy*, *37*(2), 212–222. doi:10.1016/j.resourpol.2011.05.001.

Naidoo, S. (2015). *An assessment of the impacts of acid mine drainage on socio-economic development in the Witwatersrand: South Africa*. *Environment, Development and Sustainability*, *17*(5), 1045–1063. doi:10.1007/s10668-014-9589-7.

O'Toole, L. J. (2000). *Research on Policy Implementation: Assessment and Prospects*. *Journal of Public Administration Research and Theory*, *10*(2), 263–288. doi:10.1093/oxfordjournals.jpart.a024270.

OAS. (2021). *Implementation of FATF's ML/FT International Recommendations in the Region: achievements and gaps*.

Owens, K. A. (2008). *Understanding how actors influence policy implementation. A comparative study of wetland restorations in New Jersey, Oregon, The Netherlands, and Finland*. Universiteit Twente.

Parsons, W. (2001). *Modernising Policy-making for the Twenty First Century: The Professional Model*. *Public Policy and Administration*, *16*(3), 93–110. doi:10.1177/095207670101600307.

Poelzer, G. A., & Ejdemo, T. (2018). T*oo Good to be True? The Expectations and Reality of Mine Development in Pajala, Sweden*. *Arctic Review on Law and Politics*, *9*(0), 3–24. doi:10.23865/arctic.v9.674.

Ray, S., & Dey, K. (2020). *Coal Mine Water Drainage: The Current Status and Challenges*. *Journal of The Institution of Engineers (India): Series D*, *101*(2), 165–172. doi:10.1007/s40033-020-00222-5.

Regency, M. E. (2021, May 25). *Muara Enim Medium Term Regional Development Plan 2018-2023*. Retrieved from http://simren.muaraenimkab.go.id//filerpjmd/RPJMDFINAL2018-2023.pdf.

Said, N. I. (2018). *Water Treatment Technology of Acid Mine Drainage "Alternative Technology Selection." Indonesian Water Journal*, *7*(2). doi:10.29122/jai.v7i2.2411.

Shimada, H., Kusuma, G. J., Hiroto, K., Sasaoka, T., Matsui, K., Gautama, R. S., & Sulistianto, B. (2012). *Development of a new covering strategy in Indonesian coal mines to control acid mine drainage generation: A laboratory-scale result*. *International Journal of Mining, Reclamation and Environment*, *26*(1), 74–89. doi:10.1080/17480930.2011.608505.

Skousen, J., Rose, A., Geidel, G., Foreman, J., Evans, R., & Hellier, W. (1998). *Handbook of technologies for avoidance and remediation*. 1–6.

Smith, T. B. (1973). *The policy implementation process*. *Policy Sciences*, *4*(2), 197–209. doi:10.1007/BF01405732.

SSEA. (2021, May 27). *Organizational structure and program of South Sumatera Environmental Agency 2021*. Retrieved from http://dlhp.sumselprov.go.id/struktur-organisasi.

Tempelhoff, J. W., & Winde, F. (2013). *Acid mine water drainage in South Africa: policy, economic issues and public concerns*. In *Water Services Management and Governance. Lessons for a sustainable future.* (pp. 2–12).

Van Meter, D. S., & Van Horn, C. E. (1975). *The Policy Implementation Process: A Conceptual Framework*. *Administration & Society*, *6*(4), 445–488. doi:10.1177/009539977500600404.

Vazquez Brust, D. A., & Liston-Heyes, C. (2010). *Environmental management intentions: An empirical investigation of Argentina's polluting firms*. *Journal of Environmental Management*, *91*(5), 1111–1122. doi:10.1016/j.jenvman.2010.01.005.

Verschuren, P., & Doorewaard, H. (2010). *Designing a Research Project* (M. J. Mellion (ed.); Second edi). Eleven International Publishing.

Wahid, I. M. A., Gunawan, B., & Husodo, T. (2015). *The Effectiveness of the Implementation of the Coal Mining Amdal of PT. Adaro Indonesia Tabalong Regency, South Kalimantan Province* (Issue 1). University of Padjadjaran.

Wahyudianto, F. E., & Boedisantoso, R. (2017). *Application of PROPER as a Tool to Trigger Sustainable Industrial Technology Innovation*. *IPTEK Journal of Proceedings Series*, *0*(1), 59–64. doi:10.12962/j23546026.y2018i1.3347.

Walsh, B., van der Plank, S., & Behrens, P. (2017). *The effect of community consultation on perceptions of a proposed mine: A case study from southeast Australia*. *Resources Policy*, *51*, 163–171. doi:10.1016/j.resourpol.2016.12.006.

Wang, L., Awuah-Offei, K., Que, S., & Yang, W. (2016). *Eliciting drivers of community perceptions of mining projects through effective community engagement*. *Sustainability (Switzerland)*, *8*(7). doi:10.3390/su8070658.

World Coal Institute. (2006). *Focus & Activities of the World Coal Institute*.

Yanuarsih, R. (2017). *Effectiveness of Online Taxi Policy in Surabaya*. *Effectiveness of Online Taxi Policy in Surabaya*, *1*(22), 1–10.

APPENDIX I: GAT ASSESSMENT MATRIX

(Bressers & de Boer, 2013; Casiano Flores, 2017)

Governance dimension	Quality of the governance system			
	Extent	Coherence	Flexibility	Intensity
Levels and scales	**High**. All level feels engaged **Moderate**. Most of level feel engaged **Low**. The minority level feels engaged	**High**: All levels are cooperating **Moderate**: Most levels are cooperating **Low**: Minority levels are not cooperating	**High**: There is a chance to move up and down levels, depending on the issue **Moderate**: There is a chance to create agreements among the levels depending on the issue **Low**: There is no chance to move up and down between the levels	**High**: All levels are working together to effect behavioural change or management improvement **Moderate**: Any level is working together to lead behavioural change or management improvement **Low**: No level is working together to lead behavioural change or management improvement.
Actors and networks	**High**. All stakeholders are engaged **Moderate**. Most of stakeholders feel engaged **Low**. The minority of stakeholders feel engaged	**High**: There is mutual trust in all interactions that are institutionalized and stable **Moderate**: The majority of interactions are institutionalized and stable, and there is mutual trust **Low**: Some interactions have been institutionalized, and there is a lack of mutual trust	**High**: There is a chance to include new actors, change leadership, and share social capital **Moderate**: There is a chance to involve new actors, change leadership, and/or share social capital **Low**: There is a chance to involve new actors, change leadership, or share social capital	**High**: There is a collision between various actors that can have a significant effect on behavioural transformation or management reform **Moderate**: The intensity has been fragmented. Only one or a few actors are attempting to have a significant impact on behavioural change or management reform **Low**: No actor is attempting to have a significant effect on behavioural change or management reform

Governance dimension	Quality of the governance system			
	Extent	Coherence	Flexibility	Intensity
Problem perspectives and goal ambitions	**High**. All perspectives are included **Moderate**. Most of perspectives are included **Low**. Minority of perspectives are included	**High**. All goals support one to another **Moderate**. Most goals support one to another **Low**. Competition among goals	**High**. There is a chance to re-evaluate goals **Moderate**. Goals can be re-evaluated partly **Low**. There is no chance to re-evaluate goals	**High**. The perspectives are generally in agreement on how to accomplish the objectives and step away from the status quo **Moderate**. The majority of the actors agree on their perspectives on how to accomplish the objectives and step away from the status quo **Low**. No strong agreement among the actors' perspective
Strategies and instruments	**High**. No instruments or strategy are absent **Moderate**. Few instruments or strategies are absent **Low**. An important number of instruments or strategies are absent	**High**. The system enables policy instruments to work together to create synergy (internally and externally) **Moderate**. Internally, the framework allows for the development of synergy among policy instruments, but it suffers from external incoherence **Low**. No contradictions and overlaps in the policy instruments are generated by the system, whether internally and/or externally	**High**. Different instruments may be combined or used **Moderate**. Instruments are combined in part **Low**. There is no chance to combine or use different instruments	**High**. For strongly enforced instruments, there is a low requirement for behavioural deviation from current practice **Moderate**. Requirement for behavioural deviation in certain activities, as well as compliance issues in particular areas **Low**. High demand for behavioural deviation in practices, as well as compliance issues.

Governance dimension	Quality of the governance system			
	Extent	Coherence	Flexibility	Intensity
Responsibilities and resources	**High**. All responsibilities are clearly assigned, and adequate resources are provided **Moderate**. The majority of responsibilities are clearly assigned with adequate resources **Low**. There are few clearly assigned responsibilites with adequate or inadequate resources	**High**. Responsibilities foster cooperation among organisations, and resources are expended in a consistent manner **Moderate**. The majority of responsibilities foster collaboration among organizations, and only a small portion of resources are expended in a consistent manner **Low**. Create competence and conflict among organizations, and resources are not expended in a consistent manner	**High**. The delegated tasks can be pooled with appropriate accountability mechanisms **Moderate**. While it is possible to pool assigned roles, there are no effective accountability structures in place **Low**. There is no chance to combine the responsibilities that have been assigned	**High**. There are the tools needed to make the desired changes **Moderate**. Some resources are needed to obtain the desired changes **Low**. The resources required to affect the desired improvements are in high demand

APPENDIX II: FORMULATION FOR CIT

The following is the formulaic expression for the probability of implementing something at all (Bressers, 2005):

Likelihood to implement at all = (M+) x (I+) x [1- (M-) x (P-)]

Where : (M+) is degree of positive motivation of the positive actor

: (I+) is completeness of needed information of the positive actor(s)

: (M-) is degree of negative motivation of negative actor

: (P-) is the balance of power as viewed from the most negative actor where:

(0.0 = negative actor has no power)

(0.5 = balanced power)

(1.0 = negative actor has all power)

The Proportion's score:

Proportion score of motivation = $\frac{M+}{M\ total}$

Proportion score of cognition/information = $\frac{C+}{C\ total}$

Proportion score of power = $\frac{P+}{P\ total}$

By using those formulation of calculation, the score is on a scale of 0.0 - +1.0. However, the negative response would lead to reduced score for variable motivation by 0.5 to change the scale (0.0 to +1.0) to (-0.5 to +0.50). In the end score (-0.50 to +0.50) is converted into (-1.0 to +1.0) scale by multiplying the previous score with 2 (Owens, 2008). The following scale is how to configure the scale result for motivation.:

-1.0 to -0.21 = negative

-0.20 to +0.20 = neutral

+0.21 to +1.00 = positive

APPENDIX III: LIST OF INTERVIEW QUESTIONS

A. Levels and scales

1. What levels of administrative are engaged in the implementation of AMD management policy? Are there any external levels engaged? Are there any administrative levels lacking that could have been relevant?
2. Do all administrative levels feel engaged so far? Do they cooperate one to another?
3. Is it possible to involve extra other levels when at some point they become relevant?
4. Do all administrative levels press for management improvement? Does a certain level act as a champion to press for management improvement?

B. Actors and networks

5. Are there actors left out that are relevant for the implementation of AMD management policy?
6. Are there any mutual trusts in all institutionalized and stable interactions? Are they feel engaged? Are there still any conflicts in the interaction process? If there are any conflicts, how can they manage the conflicts?
7. Are there any chances to take into account new actors, change leadership, and share social capital? If so, how strong is the chance's intensity?
8. Are there any actors who exert the most pressure on the AMD management policy implementation that can have a significant effect or have more influence on behavioural transformation, management reform, or decision-making? If so, is the effect remain static or varies?

C. Problem perspectives and goal ambitions

9. Are there certain problem perspectives that are underrepresented in the ongoing AMD management policy?
10. Do the goals support one to another? Are there any competitions or conflicts among goals?
11. In your perspective, how do you perceive the implementation process of AMD management policy in private coal mining companies? Is it too strict and rigid with certain stringent procedures or is that quite dynamic? If it is too strict, in your opinion, what are the main factors affecting the restriction? Are there any chances to re-assess the goals?
12. Do you experience the objectives as pressing hard and challenging?

D. Strategies and instruments

13. What kind of policy instruments (incentives, permits, etc.) and strategies are included and implemented in the AMD management policy? Are there instruments excluded that could have a significant contribution?

14. Does the system enable policy instruments to work together to create synergy (internally and externally)? Are there any conflicts regarding those instruments and strategies? Are there any policies (besides AMD management policies) that contradict or oppose to AMD management policies?
15. Are there any chances to combine the instruments or use different instruments?
16. Are the instruments enforced properly? Are the instruments faced some issues during the enforcement? What are the most important instruments and strategies for effectively implementing the AMD management policy?

E. Responsibilities and resources

17. Who are essentially responsible for making decisions in AMD management policies? Are all the responsibilities clearly designated and adequate resources provided?
18. Do the responsibilities promote organizational cohesion and consistent resource allocation? How are the resources allocated in general to achieve the goals of AMD management policy? Can the assigned responsibilities foster competence? Are there any conflicts arising as a result of these responsibilities?
19. Can the responsibilities be combined or integrated within effective accountability processes and structures? If so, how are they combined?
20. Are the allocated resources sufficient like money, legal rights, equipment, and staff to implement the AMD management policy and achieve the desired change and improvement? Are there any other resources needed to obtain the desired change and improvement?

APPENDIX IV: LIST OF SURVEY QUESTIONS FOR TARGET GROUP

a. Motives

Motives		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
Affinity with the implementation goal	My company's goals are in line with the AMD management policy's goal			
	AMD management policy contributes positively (both directly and indirectly) to my company's goals			
Actor's character and perspective to the implementation goal	I support my company if the AMD management program is implemented in compliance with the government's standards			
	My company concerns about the environmental effects of AMD in mining operations and with the amount of AMD generated during each mining operation			
Attitude to the target group	I think that AMD management is crucial and AMD management can give positive impacts on environmental management in my company			
	I think that managing AMD is an integral part of managing the mining environment as a whole			
	My company is economically benefited by AMD's management policy			
	I assume that there will be some changes situation before and after implementing AMD management policy			
	I believe that the AMD management conducted by my company will motivate or encourage other companies to do the same			
Self-effectiveness assessment	I have to contribute and participate in the implementation of the AMD management policy in my company			
	I am collaborating with other actors and stakeholders to put the AMD management policy into action			

b. Cognitions and Information

Cognitions and Information		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
Policy consciousness and awareness	I understand the goals of the Acid Mine Drainage (AMD) management policy			
	My company has permit from the government to manage AMD and discharge it to the environment after it has been treated			
	My company arranges regular plan to manage AMD (weekly, monthly, annually)			
	I am aware that my company plays a critical role in implementing the AMD management policy in Muara Enim Regency (MER)			
Recognizing policy concern	My company checks pH value in treated AMD regularly			
	My company checks residual suspended value in treated AMD regularly			
	My company checks iron (Fe) value in treated AMD regularly			
	My company checks manganese (Mn) value in treated AMD regularly			
Technical requirements	My company minimizes the erosion (caused by AMD flow) by planting vegetation crops			
	My company constructs sufficient sewer to avoid the AMD flows directly to the water bodies (rivers, lakes, etc.)			
	My company constructs the settling pond to collect the AMD			
	My company is doing passive treatment and/or active treatment of AMD			
	My company is using the environmentally-friendly substances to neutralize the AMD			
Knowledge of actors and qualifications	I recognize that mining activities in Indonesia can give either positive and/or negative impacts			
	I recognize that the presence of AMD can cause the negative impacts since it has chemical substances that can endanger human and living things			
	I acknowledge briefly the concept of AMD generation and its management			

Cognitions and Information		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
	I acknowledge that the proper AMD management is not only doing technical but also institutional adaptations along AMD policy implementation			
Transparency and accessibility of knowledge and information	I can get adequate information how to manage AMD properly			
	I can access all the AMD management information easily			
	There is a Standard Operating Procedure of AMD management in my company			
	The procedure is clear and understandable			
	I am aware that my company is willing to continue implementing AMD management in the future			

c. Power and Resources

Power		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
Capacity and resources (personnel, finance, time)	My company has sufficient number of human resources to manage AMD			
	My company has some personnel who is capable and knowledgeable to manage AMD properly and effectively, provide advice, guidance, and information about AMD management			
	My company has sufficient technology, equipment, and machinery to manage AMD			
	My company allocate adequate budget to manage AMD			
	My company arrange the well-planned time schedule to manage the AMD			
	My position in the company has an effect on AMD management's decision-making			
	Political actors support the implementation of the AMD management policy			
Control	There are monitoring and evaluation procedure of AMD management in my company			

Power		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
	There is a department that has a responsibility to manage AMD in my company			
	Task divisions regarding AMD management are fair and balance			
	Environmental manager has a responsibility of AMD management implementation in my company			
	Chief director/CEO has a full responsibility of AMD management in my company			
	My company reports an environmental management action (including AMD management) to the government regularly			

APPENDIX V: LIST OF SURVEY QUESTIONS FOR IMPLEMENTERS

a. Motives

Motives: Implementer		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
Affinity with the implementation goal	My organization's goals are in line with AMD management policy's goal			
	AMD management policy contributes positively (both directly and indirectly) to my organization's goals			
Actor's character and perspective to implementation goal	My organization concerns about the environmental effects of AMD in mining operations and about the amount of AMD generated by the companies			
Attitude to the implementing group	I think that managing AMD is an integral part of managing the mining environment as a whole			
Self-effectiveness assessment	My organization is responsible to ensure that policy requirements are fulfilled			

b. Cognitions and Information

Cognitions and Information		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
Policy consciousness and awareness	I understand that the goal of the Acid Mine Drainage (AMD) management policy is to protect the environment from AMD pollution			
Recognizing policy concern	My organization review the report of pH value checking in treated AMD from the company			
	My organization review the report of residual suspended value checking in treated AMD from the company			

Cognitions and Information		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
	My organization review the report of iron (Fe) value checking in treated AMD from the company			
	My organization review the report of manganese (Mn) value checking in treated AMD from the company			
Technical requirements	My organization give information or guidance for the companies how to minimize the erosion (caused by AMD flow)			
	My organization give information or guidance for the companies how to constructs sufficient sewer to avoid the AMD flows directly to the water bodies (rivers, lakes, etc.)			
	My organization give information or guidance for the companies how to constructs the settling pond to collect the AMD			
	My organization give information or guidance for the companies how to do passive treatment and/or active treatment of AMD			
	My organization suggests the companies how to use the environmentally-friendly substances to neutralize the AMD			
Knowledge of actors and qualifications	I acknowledge briefly the concept of AMD and its management			
	I acknowledge that the proper AMD management is not only doing technical but also institutional adaptations along AMD policy implementation			
Transparency and accessibility of knowledge and information	I can get adequate information how to manage AMD properly			
	I can access all the AMD management information easily			

Cognitions and Information		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
	There is a Standard Operating Procedure of AMD management supervision and monitoring in my organization			

c. Power and Resources

Power		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
Capacity and resources (personnel, finance, time)	My organization has sufficient number of human resources to supervise and monitor AMD management implementation in the companies			
	My organization has some personnel who is capable and knowledgeable to supervise and monitor AMD management properly and effectively, provide advice, guidance, and information about AMD management			
	My organization allocate adequate budget to supervise and monitor the AMD management policy			
	My organization allocate adequate time to supervise and monitor the AMD management policy			
	My organization has an authority to supervise and monitor the AMD management policy			
	My position in the organization has an effect on AMD management's decision-making			
Control	There is a department that has a responsibility to monitor and evaluate the implementation of AMD management policy			
	Task divisions regarding monitoring and evaluation of AMD management policy implementation are fair and balance			

Power		YES	NO	DO NOT KNOW
Indicators	**Survey Questions**			
	The head of environmental division (national, provincial, local) and has a responsibility of AMD management implementation in my company			
	My organization make monitoring and evaluation report for AMD management policy implementation regularly			

APPENDIX VI: POSITIVE RESPONSE AND PROPORTION OF THE IMPLEMENTER

Name of Respondent	POSITIVE RESPONSE		
	Motivation	Cognition and Information	Power and Resources
Respondent 1	4	5	2
Respondent 2	5	5	1
Respondent 3	4	5	2
Respondent 4	5	5	2
Respondent 5	4	5	2
Respondent 6	5	5	2
Respondent 7	4	5	3
Respondent 8	5	6	3
Respondent 9	5	6	2
Respondent 10	5	6	3
Respondent 11	5	4	4
Respondent 12	5	6	2
Respondent 13	4	4	3
Respondent 14	4	6	2
Respondent 15	4	7	4
Average	***4,53***	***5,33***	***2,47***

Name of Respondent	PROPORTION		
	Motivation	Cognition and Information	Power and Resources
Respondent 1	0,33	-0,33	-0,6
Respondent 2	0,67	-0,33	-0,8
Respondent 3	0,33	-0,33	-0,6
Respondent 4	0,67	-0,33	-0,6
Respondent 5	0,33	-0,33	-0,6
Respondent 6	0,67	-0,33	-0,6
Respondent 7	0,33	-0,33	-0,4
Respondent 8	0,67	-0,20	-0,4
Respondent 9	0,67	-0,20	-0,6
Respondent 10	0,67	-0,20	-0,4
Respondent 11	0,67	-0,47	-0,2
Respondent 12	0,67	-0,20	-0,6
Respondent 13	0,33	-0,47	-0,4
Respondent 14	0,33	-0,20	-0,6
Respondent 15	0,33	-0,07	-0,2
Average	***0,51***	***-0,29***	***-0,51***

APPENDIX VII: POSITIVE RESPONSE AND PROPORTION OF THE TARGET GROUP

Name of Respondent	POSITIVE RESPONSE		
	Motivation	Cognition and Information	Power and Resources
Respondent 1	7	13	6
Respondent 2	8	16	5
Respondent 3	7	15	5
Respondent 4	9	16	6
Respondent 5	7	14	5
Respondent 6	8	12	5
Respondent 7	10	13	6
Respondent 8	7	13	4
Respondent 9	8	12	4
Respondent 10	9	17	5
Respondent 11	8	13	4
Respondent 12	11	20	5
Respondent 13	8	16	6
Respondent 14	9	18	5
Respondent 15	11	20	4
Respondent 16	9	11	4
Respondent 17	10	22	5
Respondent 18	11	15	5
Respondent 19	10	18	4
Respondent 20	7	17	6
Respondent 21	8	16	4
Respondent 22	8	15	4
Respondent 23	11	15	4
Respondent 24	11	20	6
Respondent 25	9	14	5
Respondent 26	8	15	4
Respondent 27	9	16	5
Respondent 28	10	14	5
Respondent 29	9	13	4
Respondent 30	9	17	6
Respondent 31	10	18	4
Respondent 32	9	16	5
Respondent 33	9	15	4
Respondent 34	8	13	4
Respondent 35	8	16	5
Respondent 36	7	12	5
Respondent 37	11	14	4

Name of Respondent	POSITIVE RESPONSE		
	Motivation	Cognition and Information	Power and Resources
Respondent 38	11	16	6
Respondent 39	9	15	4
Respondent 40	9	13	5
Respondent 41	10	16	5
Respondent 42	8	15	5
Respondent 43	8	16	5
Respondent 44	9	18	5
Respondent 45	9	18	5
Respondent 46	9	19	6
Respondent 47	9	19	6
Respondent 48	9	19	5
Respondent 49	9	19	6
Respondent 50	9	19	6
Respondent 51	9	12	4
Respondent 52	9	19	6
Respondent 53	8	15	4
Respondent 54	9	19	6
Respondent 55	8	17	5
Respondent 56	10	12	4
Respondent 57	7	13	4
Respondent 58	9	13	4
Respondent 59	8	13	5
Respondent 60	9	17	6
Respondent 61	9	12	4
Respondent 62	8	14	4
Respondent 63	8	16	5
Average	***8,84***	***15,61***	***4,87***

Name of Respondent	PROPORTION		
	Motivation	Cognition and Information	Power and Resources
Respondent 1	0,27	0,18	-0,08
Respondent 2	0,45	0,45	-0,23
Respondent 3	0,27	0,36	-0,23
Respondent 4	0,64	0,45	-0,08
Respondent 5	0,27	0,27	-0,23
Respondent 6	0,45	0,09	-0,23
Respondent 7	0,82	0,18	-0,08
Respondent 8	0,27	0,18	-0,38
Respondent 9	0,45	0,09	-0,38
Respondent 10	0,64	0,55	-0,23

Name of Respondent	PROPORTION		
	Motivation	Cognition and Information	Power and Resources
Respondent 11	0,45	0,18	-0,38
Respondent 12	1,00	0,82	-0,23
Respondent 13	0,45	0,45	-0,08
Respondent 14	0,64	0,64	-0,23
Respondent 15	1,00	0,82	-0,38
Respondent 16	0,64	0,00	-0,38
Respondent 17	0,82	1,00	-0,23
Respondent 18	1,00	0,36	-0,23
Respondent 19	0,82	0,64	-0,38
Respondent 20	0,27	0,55	-0,08
Respondent 21	0,45	0,45	-0,38
Respondent 22	0,45	0,36	-0,38
Respondent 23	1,00	0,36	-0,38
Respondent 24	1,00	0,82	-0,08
Respondent 25	0,64	0,27	-0,23
Respondent 26	0,45	0,36	-0,38
Respondent 27	0,64	0,45	-0,23
Respondent 28	0,82	0,27	-0,23
Respondent 29	0,64	0,18	-0,38
Respondent 30	0,64	0,55	-0,08
Respondent 31	0,82	0,64	-0,38
Respondent 32	0,64	0,45	-0,23
Respondent 33	0,64	0,36	-0,38
Respondent 34	0,45	0,18	-0,38
Respondent 35	0,45	0,45	-0,23
Respondent 36	0,27	0,09	-0,23
Respondent 37	1,00	0,27	-0,38
Respondent 38	1,00	0,45	-0,08
Respondent 39	0,64	0,36	-0,38
Respondent 40	0,64	0,18	-0,23
Respondent 41	0,82	0,45	-0,23
Respondent 42	0,45	0,36	-0,23
Respondent 43	0,45	0,45	-0,23
Respondent 44	0,64	0,64	-0,23
Respondent 45	0,64	0,64	-0,23
Respondent 46	0,64	0,73	-0,08
Respondent 47	0,64	0,73	-0,08
Respondent 48	0,64	0,73	-0,23
Respondent 49	0,64	0,73	-0,08
Respondent 50	0,64	0,73	-0,08
Respondent 51	0,64	0,09	-0,38

Name of Respondent	PROPORTION		
	Motivation	**Cognition and Information**	**Power and Resources**
Respondent 52	0,64	0,73	-0,08
Respondent 53	0,45	0,36	-0,38
Respondent 54	0,64	0,73	-0,08
Respondent 55	0,45	0,55	-0,23
Respondent 56	0,82	0,09	-0,38
Respondent 57	0,27	0,18	-0,38
Respondent 58	0,64	0,18	-0,38
Respondent 59	0,45	0,18	-0,23
Respondent 60	0,64	0,55	-0,08
Respondent 61	0,64	0,09	-0,38
Respondent 62	0,45	0,27	-0,38
Respondent 63	0,45	0,45	-0,23
Average	***0,61***	***0,42***	***-0,25***

APPENDIX VIII: CONSENT FORM

CONSENT TO TAKE PART IN RESEARCH STUDY INTERVIEW

The Evaluation of Acid Mine Drainage Management Policy Implementation in Muara Enim Regency, South Sumatera, Indonesia

		Yes	No
-	I, ……. ……., agree to take part in this research study interview of my own volition.	☐	☐
-	I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.	☐	☐
-	I accept that I have the right to refuse to allow data from my interview to be used after it has taken place, in which case the content will be deleted.	☐	☐
-	I have had the purpose and nature of the study explained to me and I have had the opportunity to ask questions about the study.	☐	☐
-	I agree to my interview being audio-video-recorded.	☐	☐
-	I understand that all information I provide for this study will be treated confidentially.	☐	☐
-	I understand that in any report on the result of this research my identity will remain anonymous if preferred to be so. This will be done by not explicitly mentioning my name and disguising any details of my interview which may reveal my identity or the identity of people I speak about.	☐	☐
-	I understand that I am entitled to access the information I have provided after the interview.	☐	☐
-	I understand that I am free to contact any of the people involved in the research to seek further clarification and information.	☐	☐

The names of the people involved in this study who guarantee the agreed-upon use of this consent and the answer provided during the interview are mentioned below.

Researcher:

Franky Armando Hutagalung

Research Supervisor:

1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Participant:

Signature of participant

Date:

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya, Meidiana dan Arbiwahono, setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:

Meidiana
Tanggal: 24 Mei 2021

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya, E. P. Bakri, setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:

E. P. Bakri
Tanggal: 28 Mei 2021

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya A. Fuadi, setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:

A. Fuadi
Tanggal: 29 Mei 2021

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya, B. Yusnan, setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

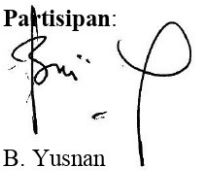
Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:



B. Yusnan
Tanggal: 02 Juni 2021

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya, A. Rais, setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:

A. Rais
Tanggal: 6 Juni 2021

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya, F.P. Sopah, setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

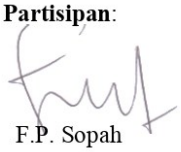
Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:



F.P. Sopah
Tanggal: 7 Juni 2021

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya, A. Sentanu, setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

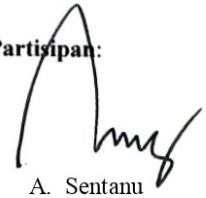
Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:



A. Sentanu
Tanggal: 8 Juni 2021

PERSETUJUAN UNTUK BERPARTISIPASI DALAM WAWANCARA PENELITIAN

Evaluasi Implementasi Kebijakan Pengelolaan Air Asam Tambang di Kabupaten Muara Enim, Sumatera Selatan, Indonesia

	Ya	Tidak
- Saya, Prof. A. Munawar, Ph.D., setuju secara sukarela untuk berpartisipasi dalam penelitian.	√	☐
- Saya memahami bahwa meskipun saya setuju untuk berpartisipasi sekarang, saya dapat menarik diri kapan saja atau menolak menjawab pertanyaan apa pun tanpa konsekuensi apa pun.	√	☐
- Saya menerima bahwa saya memiliki hak untuk menolak/mengizinkan data dari wawancara saya digunakan, dan setelah digunakan konten akan dihapus.	√	☐
- Saya telah dijelaskan tujuan dan sifat studi tersebut kepada saya dan saya memiliki kesempatan untuk mengajukan pertanyaan tentang studi tersebut.	√	☐
- Saya setuju wawancara saya direkam dengan audio-video.	√	☐
- Saya memahami bahwa semua informasi yang saya berikan untuk penelitian ini akan dirahasiakan.	√	☐
- Saya memahami bahwa dalam laporan apa pun tentang hasil penelitian ini, identitas saya akan tetap anonim jika diinginkan. Ini akan dilakukan dengan tidak secara eksplisit menyebutkan nama saya dan menyembunyikan detail wawancara saya yang dapat mengungkapkan identitas saya atau identitas orang yang saya bicarakan.	√	☐
- Saya memahami bahwa saya berhak mengakses informasi yang saya berikan setelah wawancara.	√	☐
- Saya memahami bahwa saya bebas untuk menghubungi siapa pun yang terlibat dalam penelitian untuk mendapatkan klarifikasi dan informasi lebih lanjut.	√	☐

Nama-nama orang yang terlibat dalam penelitian ini yang menjamin penggunaan persetujuan yang disepakati dan jawaban yang diberikan selama wawancara disebutkan di bawah ini.

Peneliti:

Franky Armando Hutagalung

Pembimbing Penelitian:
1. Dr. Laura Franco Garcia
2. Prof. Dr. J.T.A. Bressers
3. Dr. Tb. Benito A. Kurnani, Ir., Dip., EST.

Partisipan:

Prof. A. Munawar, Ph.D.
Tanggal: 10 Juni 2021

APPENDIX IX: SUMMARY OF INTERVIEWS' TRANSCRIPT

1. **Name of Interviewee : Meidiana and Arbiwahono**
   Organization : Muara Enim Environmental Agency (Municipal Level)
   Date of Interview : May, 24th 2021

A. Levels and scales

The administrative levels involved in the implementation of AMD management are the federal level, the provincial level, and the regional level. Muara Enim Regency government plays a role in choosing the location of AMD management and issuing liquid waste disposal permits, as well as monitoring and evaluating companies located in Muara Enim Regency. The Provincial Government of South Sumatra monitors and evaluates companies located in the province's inter-regencies. The external level is also involved in certain conditions, such as water quality inspection as a comparison conducted by other work units and academic studies. The level of engagement is determined not by the size of the company, but by the complexity of AMD management. Since each administrative level is only participating at certain stage, not all administrative levels are involved. Decisions are made based on the authority that is held.

All policy implementation processes are managed by a government bureaucratic structure that adopts a top-down approach, the possibility to engage other relevant levels is rather limited. The company's adherence to the provisions on the permit provided by the government, such as mandatory flow meter, mandatory record of debit, and daily pH, is monitored on a regular basis. The municipal level's effect is only optimal when all circumstances are normal; nevertheless, if a problem arises, the municipal level will discuss with the level above it or with other external levels such as academic expert and NGOs.

B. Actors and networks

When environmental documents are addressed, the community is involved because it is required to include the community in public consultation and include the community on the AMDAL assessment commission. If the AMD installation site is immediately adjacent to the community, the community might be actively involved as well. Political actors in the district, such as board members, are occasionally involved if there are community concerns about AMD and perform joint inspections of the company in order to identify the correct solution to the problem that happened. If the company can meet these requirements, they do not need to involve NGOs or other groups. If a technical study is required that the company cannot complete due to restricted company resources, such as calculating the design of KPL or conducting technical studies to ensure that AMD discharged into the environment meets quality

standards. NGOs or consultants may be involved in the technical study. AMD management does not necessitate a large number of actors.

Interactions between stakeholders can occur directly when the government conducts inspections, monitoring, and examination, through offline via mail, or online via email and phone. Interactions can also occur through reports, such as those submitted by the company to the government as part of the company's role in AMD management. The most common conflicts are conflicts of interest between companies or between companies and communities, such as the conflict generated by the sliding of a settling pond close to the river flow. Participation of new actors is still feasible if it is relevant, and sharing social norms is still possible because every actor requires roles from other actors, therefore sharing social norms is still possible. Because Indonesia's governance structure limits these options, a change in leadership is not conceivable, particularly at the government level. Because of the company's mining activities, the figure of a leader from each level remains significant in the municipal government system. If there are AMD problems that have an influence on the community, the leaders of each level usually inspect the place. The results of this assessment will be sent to the company in the form of a letter of recommendation, so that the company can promptly remedy the problems and report whether or not it has been finished.

C. Problem perspectives and goal ambitions

There is no viewpoint on a specific problem that is underrepresented in AMD management policy. It is apparent that the company's primary purpose is to maximize profits. However, the company continues to pay close attention to AMD management in order to ensure the mine's sustainability, such as the priority for the Enim river. The river is not only a site to discharge AMD, but it is also a source of water for the community, therefore maintaining the river's quality is still a top priority for the corporation. “There is no room for compromise when it comes to the environment.”

Kepmen 113/2003 contains four AMD parameters and the river water policy contains 14 water parameters. Because mining activities are high-risk, strict policies must be implemented. To avoid landslides, a mature evaluation of the catchment area and settling pond capacity in tolerating AMD flow is required. Furthermore, it is required to comprehensively investigate the river's ability to accommodate AMD discharges pouring into the river, so that there is no runoff in the river when it receives the load of AMD. The Regent of Muara Enim has also issued a decision letter addressing the company's obligation to plant trees around the mining site's border as well as on the Enim river's border, so that the tree's roots can avoid erosion and landslides.

D. Strategies and instruments

In RPJMD, general environmental management is regulated, and AMD management is incorporated into it. Permits and administrative punishments are two

policy instruments that are frequently used in Muara Enim Regency. Fines instruments do not yet have a controlling policy. So far, there has been no conflict in policy enforcement; enterprises that have received administrative sanctions from the government have never objected to the implementation of such measures. There is an opportunity to use various instruments, such as fines, as long as the institutional structure is adequate and there are work units or institutions that can perform tasks to enforce the instrument, such as the imposition of fines, there must be institutions that can apply fines and calculate the amount of the fine. This incentive instrument is difficult to implement due to the government's restricted budget. It is still possible to use a disincentive. Prior to 2007, Muara Enim's government imposed a levy on industries that discharge wastewater, including AMD, in order for the municipality to gain revenue. This system was supposed to go further in river rehabilitation and restoration. Nonetheless, in order for this instrument to be properly implemented, the government must provide supporting facilities and infrastructures, and the cost of those facilities and infrastructures is rather costly, so that the levy policy is eventually repealed.

From the standpoint of municipal authorities, there are several policies that are very general and do not specifically regulate and take into account some factors that should be considered, such as soil conditions in mining sites, hydrological conditions, topography of the mining area, whether it is close to a river, a sea, or adjacent to a mountain. These variables will affect the quality of AMD produced as well as the design of AMD management systems; for example, if the settling pond is built on sandy soil, how will the settling pond be designed? What should be considered in the construction of AMD management installations if the soil has a high porosity? As a result, those considerations are intended to prevent the avalanche and settling pond leakage. Furthermore, taking these aspects into account aims to make the suspended residual particles contained in AMD easier to settle, because if the suspended residual is difficult to settle, the policy's quality standard for suspended residuals will be difficult to meet.

E. Responsibilities and resources

The organizational structure clearly defines the division of responsibilities, and each field has its own role and responsibility in supervising AMD management in the company, for example, monitoring work units are responsible for monitoring, and control work units are responsible for controlling. Concerning the availability of existing resources in the company, the municipal government does not conduct a more detailed analysis. The government is satisfied as long as the company can achieve quality standards using existing resources. If there is no overlap in responsibilities, the existence of responsibility can encourage organizational coherence. Currently, there is no overlapping responsibility across levels or at the same level, such as the monitoring undertaken by the provincial and municipal governments. The government's resource distribution is inconsistent, thus it cannot

support the existence of organizational cohesiveness, because each actor is primarily focused on their separate responsibilities, therefore collaboration to support cohesion is unusual. There has never been a conflict over existing responsibilities.

Due to limited resources, both in the government and in the company, responsibility cannot be pooled or integrated in effective accountability processes and structures. Companies are required to submit reports to the government in order to be held accountable. Accountability for this report is sufficient. The municipality's human resources are still inadequate. Actually, capabilities can be enhanced by training, but for technically capabilities, special credentials are required in order to reach AMD management objectives. In terms of financial resources, sufficient or insufficient is a relative term. The current budget is insufficient in comparison to existing responsibilities, but the supervisory function continues to function with the amount of budget available. Without a budget, the agency may also conduct monitoring and control of the enterprise. Monitoring should be carried out since it is the government's responsibility to do so. When it comes to financial resources, the most essential thing is to use them wisely in accordance with the activities that have been planned. From the company's standpoint, the equipment is adequate; the only thing that the companies frequently complain about is the lack of land to construct settling ponds and AMD's channel. AMD's continuous and automated management technologies, as well as real-time and online AMD quality measurement tools, are required to achieve the desired changes and improvements, so that all levels of government may monitor AMD's quality online.

2. Name of Interviewee : E.P. Bakri
Organization : Ministry of Environmental and Forestry (Federal Level)
Date of Interview : May, 24th 2021

A. Levels and scales

The federal, provincial, and municipal levels are all involved in the implementation of AMD. Municipal governments have the right to give AMD discharge permits to companies that generate AMD. The municipal level has the authority to monitor and evaluate the application of AMD management in the municipally located company. The provincial level has the same power for companies located between two or more municipalities, and the federal level supervises companies located between two or more provinces. The cooperation between levels, including monitoring and evaluation, is performed in a hierarchical or top-down approach. Working together presents several challenges, the majority of which occur at distinct levels. Unifying the opinions of two separate levels frequently takes a long time. For example, in Muara Enim, there was a disagreement between the federal and municipal levels, which resulted in the constraints of providing licenses to the companies for two years.

In terms of flexibility, AMD management policy implementation remains related to the hierarchy, where each level frequently interacts with the same level, for example, top management at one level will frequently communicate with top management at another level. The ability to scale the level up and down is quite difficult because each level has a role, and the function is poured in binding regulations, so that each level must follow the rules and become inflexible. Based on their respective roles, each level tends to improve governance efficacy. The lower level will always report to the higher level on the jobs and responsibilities that they do. If the lower levels disregard its roles, the highest level will send a reminder.

B. Actors and networks

The company or private sector is the important actor in the implementation of AMD management policy in Muara Enim. The companies are required to handle their own AMD. To achieve the government's quality standards, each company has specific programs and rules for AMD management according on its resources. In AMD management, any company is required to develop Standard Operating Procedures. The entire process of AMD management does not engage all relevant actors. Communities and NGOs are only participating in the planning phase, which mandates community engagement and public participation before the companies begin their operations. The government and the company both have mutual trust. The companies are allowed to choose which AMD management methods are suited for their operations. Companies that produce AMD should undertake AMD self-tests to confirm that the AMD parameters they generate from mining activities conform with the regulation.

The opportunity to engage new actors is significant; some actors will very certainly have a significant influence in AMD management, for example, the involvement of NGOs as a liaison between communities, companies, and governments. The potential to share social norms is particularly significant, because teamwork is prevalent in many aspects of government and society. However, the prospects for leadership change, particularly among government actors, are limited because Indonesia's bureaucratic structure restricts the leadership change. Government actors are also the actors who put the most pressure on AMD management policy since this government's inputs and suggestions to the company must be immediately followed up on by the company, particularly inputs and suggestions that if not followed up on by the company have the potential to result in legal consequences. This government's influence can have an impact on changes in behavior in the company, decision making in the company, and the impact of a change in management on the organization.

C. Problem perspectives and goal ambitions

AMD management is divided into several stages, beginning with planning and progressing through construction, monitoring, and evaluation. AMD management planning is part of the corridor of Environmental Impact Assessment (AMDAL) activities, which is a key aspect of activity planning. The companies plan how to handle AMD during their planning activities. Where will it be discharged? What is the initial condition of the water body if it is released into it? What are the consequences for the water bodies? The evaluation of rocks and soils surrounding the mining site is the first step in AMD management strategy. One aspect of AMD management planning that should be considered is how to limit the flow of AMD in the surface water flow system to make it easier to manage and mitigate the AMD that goes into the underground water system flow. Because AMD will be tough to manage if it gets into the underground water system. As a result, AMD's management planning must be comprehensively planned. AMD management is carried out in order to decrease the environmental and social stresses produced by the presence of AMD. The conflict between profit and the environment becomes a factor influencing AMD management's success. The companies that are successful in AMD management will receive a credit point in their PROPER evaluation. Companies who are environmentally responsible and dare to invest in the environment, including AMD management, will receive a higher PROPER rating score.

The method of establishing AMD management policy at Muara Enim's private coal mining companies is not flexible enough. Existing policies, in the company's perspective, are strict and do not take into consideration various elements in the enterprise, for example the size of the companies. Some quality criteria are difficult to meet, particularly in companies located in metal-rich areas. Unless the government makes policy changes, the possibilities of reassessing the objectives are relatively low.

D. Strategies and instruments

Administrative permits and punishments are currently being used as policy instruments for AMD management. These policy instruments have not made a big contribution since they are seen too light for businesses. Since the instrument's enforcement in Indonesia has not been optimum, the current system cannot allow policy instruments to develop synergy. The government is incapable to use some tools against companies, such as revocation of a company permit or the imposition of fines.

Another method that coal's mining businesses can employ is a circular economy approach that uses fly ash and bottom ash from coal plants as AMD neutralizers. The government's enforcement of the instrument has not been optimal because the government is still focused on shifting mining companies' behaviour in AMD management from end-of-pipe to cleaner production oriented.

E. Responsibilities and resources

Those with decision-making authority in AMD management policy are the leaders of each level, based on the function performed. In terms of finance, manpower, and time, the resources owned by the government and enterprises at this moment are insufficient in comparison to the weight of responsibilities. The strategy from the companies' side to the lack of human resources is to integrate senior and junior workers during monitoring and supervision, therefore senior personnel are expected to be able to transfer knowledge to junior staff and improve junior staff's competence. Furthermore, the government provides regular training to company staff so that the corporation may undertake its own quality standard monitoring.

Responsibility can be integrated into the process and framework of effective accountability through stages if these duties can collaborate and share resources. According to the results of the interviews, the most significant resource that must be addressed is the availability of adequate equipment and technology. The government does not force companies to have cutting-edge technology. The most critical issue is that the company can meet the government's AMD quality criteria. The companies that use cutting-edge technology will receive a credit point in the PROPER assessment.

3. Name of Interviewee : A. Fuadi
Organization : Ministry of Environment and Forestry (Federal Level)
Date of Interview : May, 29th 2021

A. Levels and scales

The administrative levels that are involved in the implementation AMD management policy are federal level, province level, and local or municipalities level. The Ministry of Environment and Forestry, as a representative of federal level, develops rules and guidelines for AMD management. One of them is the standard quality of AMD before it is discharged into water bodies. The province and municipal governments are responsible for carrying out supervision, monitoring, and assessment, as well as establishing programs to oversee the enterprises. Some administrative levels do not feel engaged so far since the federal level still dominate in enforcement of the policy.

It is possible to involve extra other levels when at some point they become relevant. The level is international level who can give advice the solution for manage AMD. Interaction between administrative levels occurs in both formal and informal contexts. In a formal sense, interaction across the same administrative levels is more interesting than interaction across the different administrative levels. It is influenced by the hierarchy approach used in Indonesia's governmental structure. In a formal sense, interaction between different levels is constrained by bureaucratic norms. Interaction between different administrative levels is feasible informally, but not for critical matters. All administrative levels press for management improvement and there is no certain level act as a champion. The federal level, as a policymaker, has the power and capacity to do so.

B. Actors and networks

The Ministry of Health and the local Agency of Health are two significant actors who are not involved in AMD management. The Ministry of Health and the local Agency of Health should be engaged in AMD control because AMD pollution has a significant impact on societal health. An auditor should also be involved because the management of AMD is considered a high-risk operation, necessitating an environmental audit. The auditor is an independent person that can assess the company's regulatory compliance. Furthermore, some actors are only active in the certain phase of AMD implementation. NGO, society, and academia are only involved in the planning phase because companies are required to announce to the public regarding the plan of AMD management activities and the location of AMD management, so that people who live near the location are aware that an AMD treatment installation will be built near their home. NGO, society, and academics are not involved in the implementation, monitoring, and evaluation phases.

Mutual trust is relatively poor, particularly between the government and the private sector. It is difficult for the government to trust the corporations because they

only measure the three metrics on the quality requirement in the policy once a month. Companies only measure pH on a daily basis. Because the report on AMD management activities is provided to the government every three months, it is difficult for the government to re-check the report's accountability. If the report is sent at least once a week, the government can do a re-check to ensure the condition stated in the report. It is impossible to change leadership because change leadership in Indonesia government must be based on regulation. Involving new actors and share social capital are still possible.

The Ministry of Environment and Forestry, also known as KLHK as a representation of the federal government, exerts the most pressure on AMD management policy implementation, because KLHK has a department, which called Directorate General of Law Enforcement tasked with enforcing the policy. This directorate performs some procedures in order to identify organizations that break the policies. If a breach is discovered, the government will impose sanctions ranging from light to severe, and the corporation will be given a time limit to repair the faults or accomplish the tasks assigned by the government.

C. Problem perspectives and goal ambitions

There are certain problem viewpoints that are underrepresented in the current AMD management policy. They are in charge of rehabilitation and preservation. Those perspectives are important in the implementation of AMD management policy because the installation of AMD management is fragile and needs to be rehabilitated to avoid problems, such as the collapse of a settling pond in Muara Enim, which polluted the river and rendered the people unable to use the river's water. Companies face a problem when it comes to profit goal and the sustainability goals, because the cost of AMD management is quite high but not beneficial for the company. On the one hand, the goal will be to safeguard the environment from harm. Companies, on the other hand, will earn greatly profit from their operations. As a result, there is a contradiction between the goals that will be attained.

The policies are not too strict and rigid. The problem is some of the policies are out of date and are not relevant with the current condition. One of AMD's management policies, for example, the policy on AMD quality standards released in 2003, is no longer applicable in the present environment. This means that for the past 18 years, the policy has not been revised or updated to reflect the current situation. A policy should ideally be modified or amended every five years. Actually, the federal government was planning on replacing some old policies with a new policy, adding some limits based on the current situation, but the plan has yet to be achieved because some enterprises have refused to consent to the changes because it will be more difficult to comply.

The goal is challenging to fulfil because the companies believe that the quality standards specified by the policy cannot be applied uniformly among the companies since several factors influence the variation in AMD quality. The considerations

include the mining area's location, geographical circumstances, soil conditions, and so on. Companies located in remote areas with high metal and sulphide soil will produce poor quality AMD, making it hard to attain AMD quality standards.

D. Strategies and instruments

Permits, sanctions, and fines are policy instruments used in AMD control. Permits and sanctions have already been discussed before. If the government discovers a violation of the AMD quality requirement, a fine is imposed. The fine is calculated based on the unit cost of the pollutants by multiplying the excess percentage of the amount of pollutant load above the quality standard limit, the AMD discharge flow, and the pollution periods. Experts calculate the fine, which is then determined by the court.

The existing system still makes it difficult for policy instruments to collaborate and produce synergy (internally and externally). Fortunately, the federal government is currently proposing to implement the AMD quality standard online monitoring program. It's known as SPARING. SPARING is an online system that companies should utilize as a tool to measure the value of four parameters (pH, suspended residual, iron, and manganese) in real time, allowing the government at all levels to monitor the quality of the AMD generated by the industries. The fine will be determined directly in this system.

Since some of the instruments can be enforced concurrently, there is a chance to combine them. For example, if a company violates the law, the government may apply both a sanction and a fine. However, this possibility is difficult to pursue because it may result in disagreements between the government and the companies.

It is difficult to adequately enforce the instruments since there is a lot of intervention and pressure about the application of the instrument. Currently, step-by-step ways to instrument enforcement are still applied. For example, if a company violates the policies, the company will be punished with light sanctions for the first time. If the fines are ineffective, the government will impose severe sanctions.

E. Responsibilities and resources

The policy explicitly assigns decision-making authority, but it is contingent on a number of variables. If a problem with AMD management is relatively simple to handle, municipality and provincial governments can fix the problem and make decisions without engaging the federal government. Nonetheless, if the problem is tough to fix and requires more levels of involvement, the federal government should be involved in decision-making. Thus yet, no major problems have occurred in Muara Enim regency, so municipalities and the provincial government have made some decisions about AMD management in Muara Enim. In terms of resources, there are insufficient resources to facilitate the proper implementation of AMD management. In comparison to the number of mining companies that should be monitored by the

government, the amount of human and financial resources available, particularly in provincial and local governments, is insufficient.

Conflict can be arisen as a result of the responsibilities, since sometimes the person involved in a program do not agree on how the responsibilities are assigned. In general, the resource is allocated based on the intricacy of the responsibility. When compared to provincial and local governments, the federal government is normally granted a larger budget and more employees. The competence can be fostered by assigned responsibilities when senior and junior staffs work together to undertake supervision, monitoring, and controlling for the firms, competence can be built through given roles. When junior staff members perform their duties alongside senior staff members, they can learn more.

Responsibility can only be combined or integrated into successful accountability processes and structures if the enforcement of the policies is effective. The government typically finds it difficult to allocate resources (money, legal rights, equipment, and personnel) to monitor and assess the AMD management policy's implementation. The current resources are insufficient to affect the required adjustment and development. The government's strategy has been to determine the priority, for example, by undertaking oversight, monitoring, and controlling in big companies that generate a large amount of AMD. At the very least, by doing so, the government may avert the worst-case scenario if there is a problem with AMD in those companies.

4. Name of Interviewee : B. Yusnan
Organization : South Sumatera Environmental Agency (Provincial Level)
Date of Interview : June, 2th 2021

A. Levels and scales

The federal level is involved in establishing quality standards. The province government is also authorized to set criteria, but they must be stricter than the federal government's quality criteria. Furthermore, the provincial government performs monitoring and evaluation to ensure that the permits given are being obeyed by the companies. The municipal government also monitors and evaluates companies that have received environmental permits from the municipality**.** Nonetheless, in specific instances, the provincial government is allowed to monitor and evaluate the companies whose environmental permits are issued by the municipal government, such as during the Company's Performance Assessment Program (PROPER). Not all of the administrative levels feel involved. External levels, such as NGOs, are rarely involved in AMD management unless there are public concerns about AMD pollution. Academics are solely involved to do research; they are not involved to provide relevant feedback to companies or governments. Consultants are occasionally involved in planning, such as designing settling pond installations.

The international level is relevant to be engaged in AMD management in Indonesia as a source of information and experience. There is no possibility to upscale or downscale the level because each level already has its own roles and responsibilities. Furthermore, the Indonesian bureaucratic structure mandates that a level can only interact formally with certain level. Informal engagement is only possible when concerns do not necessitate an official decision. The decision is made based on their respective authorities; for example, if the company's environmental permit is issued by the provincial government, the province government takes a decision. If there are difficulties relating to AMD and the provincial government is unable to address the issue, it may seek assistance from the federal government.

B. Actors and networks

It is preferable to involve the Health Department in this AMD issue. As far as I know, the Health Department is not currently involved. The Health Department can test the AMD produced by the companies. The test is carried out to ensure that the AMD produced by the company is safe for people's health. In addition, the community is not always participating in AMD management. The community is only involved if there is an incidence of AMD pollution affecting them. Other political actors, such as board members of representatives, are sometimes involved if a member of their constituency files a complaint with them. When there is a complaint, the board members usually take part in performing inspections of the company.

The level of trust among the actors is still low. The government will have a high level of trust in the company if the company follows procedures. For example, if

the company performs measurements or checks the quality of AMD parameters (pH, suspended residues, Fe, and Mn) in a certified laboratory, the provincial government trusts the results of such measurements. Communication among actors is also limited; regular meetings are held just twice a year at most. There still found any conflicts in the interaction process. The most common conflict arise is between the company and the community, which accuses the company of polluting the environment. When this type of conflict arises, the government normally acts as a mediator.

The possibilities to include new actors is there, but the government system in Indonesia is limited by the restrictions that do not allow for the or the change of leadership. Sharing social norms is still feasible because every player requires roles from other players, therefore sharing social norms is still possible. In Indonesia's environmental governance structure, federal government actors continue to be the most prominent and exert the most pressure on AMD management policies.

C. Problem perspectives and goal ambitions

AMD management orientation remains prevalent in the “end of pipe” approach, with most organizations today focusing solely on how to handle AMD in order to achieve quality standards. Ideally, AMD management should focus more on the entire process, including the production operation process. One of the orientations that the company should consider when performing production operations to produce little AMD, or even do not produce AMD if they can (cleaner production).

In companies, there is still a contradiction between economic and sustainability goals. If a corporation intends to conduct mining operations, it must be prepared for all implications, including the readiness to give a budget for environmental management in their operations. The government believes that AMD management policies are not extremely rigorous, and that procedures are fairly clear. The AMD management objectives are likewise fairly clear, and there is no possibility to evaluate the goals. The issue is that certain policies are not synchronized with one another. AMD management goals are highly demanding for companies because some companies believe quality standards to be difficult to achieve and highly tough.

D. Strategies and instruments

Policy instruments, particularly financial instruments such as incentives and disincentives, are regulated, but their application is scarce at this moment. Sanction in the form of administrative sanction is a regularly employed to the companies. Nonetheless, based on the information acquired, companies with a minimum PROPER result blue may be eligible for a bank loan. Social instruments such as discourse and discussion have been used in the past, but they are now fairly rare.

The current structure does not allow policy instruments to collaborate in order to generate synergies (internal and external). When an instrument is implemented, a conflict usually arises. For example, when sanctions are imposed on companies,

sometimes the companies do not agree with the sanctions. To address this, the government, which imposes sanctions, conducts re-verification to confirm the truth.

There are options for using various instruments, such as fines. Essentially, the imposition of fines is required in order for the company's policy compliance to improve. No instrument is overlap with other instruments. The enforcement of instruments is carried out by officials who have the authority to enforce the instrument; for example, after granting permit to the company, the government supervises the company's implementation of the permits.

E. Responsibilities and resources

The organizational structure clearly defines responsibilities, and each field has its own role and responsibility in managing AMD management in the company. The Minister, the Governor, and the Regent are the person in charge of making decisions at the federal level, provincial level, and municipal level respectively. The difficulty today is that only a few of those responsibilities are facilitated with sufficient resources to facilitate the proper implementation of AMD management and to achieve the intended results. Since accountability necessitates collaboration and coordination with various work units within one institution, for example, when undertaking supervision, the provincial level frequently employs individuals from other departments to assist them. Meanwhile, adding government workers is a difficult and time-consuming process that must be approved by leaders. Responsibility promotes personnel or work units to have the skill and competence to carry out responsibilities in order to be more effective. To improve competency, the process of transferring knowledge from senior to junior is also attempted.

Due to limited resources, both in the government and in the company, responsibility cannot be pooled or integrated in efficient accountability processes and structures. Furthermore, some companies are not accountable because not all reports presented by the company determine the true situations. When the government confirms and rechecks the situation on the site, it is discovered that the condition described in the report differs from the actual situation.

When compared to current workloads, the government's budget is insufficient to execute optimal supervision functions. The government's human resources are also insufficient; for example, according to the human resources department's estimate of personnel needs, the provincial government should have at least 8 certified environmental supervisory officers, but the province government currently has only two.

5. Name of Interviewee : A. Rais
Organization : PT. MME (Company/Private Sector)
Date of Interview : June, 6th 2021

A. Levels and scales

The levels involved in AMD management are as follows:

a. the federal government level, represented by the Ministry of Environment and Forestry, which has a role in developing and settling regulations as well as conducting inspections of companies to monitor AMD management in the company.

b. Because the company is located in the district and does not border other districts, the municipality government has the responsibility to issue permits.

The company feels that the good cooperation only occurs between the companies and the government. The company is rarely involved other levels, such as external levels in AMD management. Cooperation between the company and the government is enough since the government always assists in providing solutions to challenges encountered by the companies. Interaction between levels is often hierarchical, with usually certain actors of one level are allowed to interact with certain actors in the other levels, for example in the company, at least the Head of Mining Engineering (KTT) or HSE superintendent can frequently interacting with the government. Engineers, staff, and operators, are not entitled to interact directly with the government unless accompanied by the Head of Mining Engineering (KTT) or HSE superintendent. At the past, there was a unit or department in my company that worked as a liaison between the company and other levels involved, but the unit or department was disbanded as a cost-cutting measure.

Governance is being improved at all levels of government. Although the government level is the most influential in AMD management in the company, no level (central, provincial, or district) acts as a priority in governance because each level has its own functions and duties. At the corporate level, the distribution power in private sector is unbalance since the workers in the environmental department are largely from the local community, with insufficient ability and competency.

B. Actors and networks

Some actors, such as NGOs and academia, are not engaged in AMD management implementation in the company. The company does not interact frequently with the community either. However, some of the companies hire some qualified members of the local community as employees. Because local communities are normally more concerned with the environment, the recruitment of some local communities into personnel who manage AMD is projected to make AMD management more effective. In addition, the company does not hire consultants since it is not necessary and can be done with the internal employee. If there is a dispute between the public and the company, other external actor such as the police and board members of house representative may be involved in AMD contamination. The

Ministry of Health and the Health Office at the provincial and district levels are not involved in AMD management. The Public Works Office is also not involved in AMD's construction and processing plant because the corporation has construction engineers and can complete this step on its own.

The company has sufficient trust with the government since my company frequently seeks guidance and assistance from the government on AMD management concerns. This relationship still exists until now, and sometimes we have meeting to discuss about environmental management including AMD management. The meeting is not routine and take place only when there is a case involving AMD or when the government performs supervisory tasks in the company. The company has lack trust to NGO because some NGOs tend to be provocative, spread incorrect information in the mass media, and do not provide solutions for improvement. The company will involve NGOs only if there is a complaint from the community or person living near the mining operations.

If the conditions remain normal, the involvement of new actors and the replacement of leadership is not needed; however, there is still the possibility of doing so if conditions arise in the future that force the company to involve new actors, such as involving internal environmental audits or environmental consultants. When it comes to sharing social norms, the opportunities are there, since working as a group to achieve specific goals can be advantageous to the company.

The federal government is the most powerful actor in AMD management because, in addition to having responsibility for AMD policy making, it can also undertake control and monitoring. The provinces and districts can only perform supervision and control. If policy breaches are discovered during the implementation of controls and monitoring, the government will make recommendations to the company. Top management will evaluate government recommendations in advance to determine the urgency of the recommendation. If the recommendation is urgent, the organization will follow up right away.

C. Problem perspectives and goal ambitions

The rehabilitation phase of AMD management installation is underrepresented in AMD management implementation, despite the fact that this rehabilitation procedure is required to ensure that there is no leakage, collapse, or landslide in the AMD management system. This repair process is only carried out if an external inspection is conducted.

Due to the constraints of the company's equipment, the rehabilitation procedure is not carried out progressively.

In the mining industry, there are usually two competing goals: profitability and environmental sustainability. In this situation, the company's top management must commit to allocating budget not only for operations and production, but also for the environment.

Environmental work units can also find tough to ask for fund to the top management, but if there are pressures from supervisors and governments, that the budget is needed to avoid the AMD problems, the funds are finally granted by top management.

The present policies are overly severe, restrictive, and difficult to follow because they do not take into consideration the company's resources. Policies requiring the use of specific technologies will burden medium and small companies with limited resources. The company expects that AMD-related policies will be considerably simple to implement. The goal is challenging to attain since the company sometimes receives a lot of interference and pressure from other parties on policy enforcement. Essentially, the goal of AMD management is to reduce the environmental damage caused by AMD. However, in order to attain this goal, the corporation is sometimes burdened with expectations and pressures, leaving the company confused as to what to do.

D. Strategies and instruments

Permit, administrative sanction, and disincentive are the most commonly used instruments in AMD management. Permits and administrative sanctions are well-known to the company, since the company has sometimes obtained them from the government in order to improve the company's performance. In terms of disincentive, it is applied in the form of economic compensation for land degradation caused by AMD pollution. However, the disincentive in the form of a fine, the company has never known whether or not the fine was enforced in Muara Enim. Aside from that, there is a well-known instrument in the Indonesian mining industry known as reclamation guarantee. When a mining site or mining location is closed, the company must carry out reclamation. Because AMD control is a component of the reclamation stage for the reclamation of the mining site closure, the reclamation guarantee can also be used for AMD control if mining activities have ceased (post-mining). Besides financial instruments, the government frequently implements social instruments such as environmental campaigns, seminars on new policies, dialogues, capacity building, and awareness, in which companies are usually involved.

The current system allows policy instruments to collaborate to create synergies both internally and externally. For example, when there is an enforcement of disincentive instruments, such as compensation from the company to the community whose agriculture land has been damaged by AMD pollution, the company will involve other parties such as the Agriculture Department to verify and review the compensation. Conflicts may emerge during the enforcement of these instruments if society disagrees with the amount of compensation granted by the company. Other conflicts arose of disagreements between the province government and the municipality government related to problems found when conducting supervisions at the company.

If all instruments have been adequately enforced and there is already a legal basis for the incorporation of such instruments, there is a chance to combine and

integrate existing instruments. Instruments can also run in parallel and be enforced at the same time, however this is dependent on the actors with the authority to enforce the instrument.

The procedure for enforcing AMD management instruments sometimes is unclear. For example, if a company wishes to make an adjustment or change in the management of AMD that is somewhat different from what is specified in the permit, the procedure is quite difficult for the company. Furthermore, the other issue regarding to the instrument enforcement is the parameters specified in one policy are not synchronized with the parameters required in other policies, hence the company is sometimes blamed for those unsynchronized policies.

E. Responsibilities and resources

The authority for making decisions in the corporation is on the top management level, but the technical concern, is still on the environmental work unit. The allocation of responsibility to the company is fairly obvious, and it is stated on each work unit's job description. Actually, the presence of responsibility can promote organizational cohesion; nevertheless, each company's environmental unit's capabilities and condition vary one to another. There are companies that have a solid environmental team, but there are other companies that do not have a solid environmental team. Collaboration with other units within the organization, such as the environment unit and the operation and production unit, is also essential. Each unit's leaders will form a group called Quality Safety Environment (QSE). Furthermore, duty can lead to competence since the more frequently the responsibility is carried out, the more competence will develop. When it comes to AMD management decisions, top management in the company takes great consideration, especially if the decision requires companies to spend money on it. Regarding to integrate the responsibilities, because each responsibility has its own set of consequences, duties cannot be compounded or integrated. KPIs (Key Performance Indicators) are used in the company to measure performance in carrying out responsibilities. All responsibilities must be fulfilled because refusal to do it, will have an impact on the company's operations.

Financial resource adequacy is relative because it is determined by the company's capital, however in general, the budget allocated in my company is sufficient. In terms of human resources, it cannot be denied that there are still insufficient, particularly for employees who are local residents, because their competency is still lacking, therefore it takes a special strategy to solve this issue, such as providing them with more frequent training. My company's technology and equipment resources are also enough, so the company can handle AMD and meet the required quality standards with existing technology and equipment.

6. Name of Interviewee : F. P. Sopah
Organization : Walhi (Environmental NGO)
Date of Interview : June, 7th 2021

A. Levels and scales

The federal government, provincial government, and municipal government are all involved in the implementation of AMD management policies. Any external levels, such as academia and NGOs as community representatives, are also included, but only in the planning phase of AMD management, which is part of the Environmental Impact Assessment (AMDAL), because academics and NGOs are typically included as AMDAL assessment commission members. AMDAL is a proof of commitment from the company to safeguard the environment, not just an administrative necessity or a formality. After AMDAL is approved and environmental permits are obtained, AMD management is fully managed by the companies during the implementation stage, with no involvement from NGOs or academia. If there are revisions in AMD management implementation that differ from the plans outlined in the AMDAL document, NGOs may be re-involved to provide advice and input to the companies.

The company's AMDAL is used as the foundation for NGOs to conduct investigations in cases of AMD pollution that has an impact on the community. Nowadays, NGOs are primarily interested in community service and are rarely involved with AMD management in the company. NGO involvement is only if there are complaints from the public regarding pollution that occurs on their farmland or into the river where AMD dumps. Through this assistance, NGOs can help people report pollution to the government. International should be involved in order to get some broader insights from other countries who has the same problem with AMD management.

In the preceding year, NGOs aided the government in conducting investigations into cases of company disobedience of the policy. Since the AMD problem is already a worldwide concern, it is preferable that not only the national level, but also the international level, be involved. NGOs have a role in undertaking government policy analysis. The supervisory function performed by NGOs currently has little influence on changes in the company's behaviour in reducing pollution of AMD. If policy enforcement is poor, there will be little change in company behaviour, and the functions and roles of other stakeholders will be inadequate. Therefore, the companies must strictly adhere to the policies.

B. Actors and networks

There are certain relevant actors who are not involved in the AMD policy execution. One of them is the native headman of the community. They don't know much about the governance structure because they aren't part of it, but they do know the culture of the people who live near the mining site and the state of the area. If

there is an issue, they can at least assist the companies and the government. Experienced and certified consultants should also be involved in the company, since they have a lot of experience to assist the companies with AMD technology and approach.

The level of public trust in NGOs remains reasonably high, and the community continues to have high expectations of NGOs since, according to the community, NGOs are the closest to the community and serve as a bridge between society and the government. Unfortunately, many people nowadays misuse the study of NGOs as a tool of bargaining with companies. Companies, municipal governments, provincial governments, and federal governments rarely interact with NGOs. Furthermore, NGOs are not involved in the rehabilitation and building stages of AMD management facilities; nonetheless, NGOs typically do studies on rehabilitation and construction and their possible impact on the community.

NGOs limit the involvement of other actors, such as consultants, professors, and others, in carrying out their responsibilities. The federal government level continues to play an important role in AMD management. The allocation of power in AMD management is unbalanced since the most power remains at the federal level because the federal government is still the most powerful in the policy area. Although the municipal government is the permission issuer and also has the right to revoke the permission, the municipal government has not had the fortitude to do so up to this point.

C. Problem perspectives and goal ambitions

Currently, AMD management is primarily concerned with how to reduce or treat the amounts of contaminants in AMD in order to achieve quality standards. Ideally, AMD management should also address how to create AMD that is pollutant-free and has a low level of deviation from the quality standard. This can benefit the company's cost efficiency. For example, the company generates AMD with a pH of 4 from its mining operations, and the most of the company's attention is on how to process AMD with a pH of 4 to become a pH of 6. By doing the right mining activities and some innovations in its operation, the company may actually create AMD with a pH of 5 or even 6, thus the company does not need to spend a lot of money to process AMD to achieve a pH of 6.

The company's problem between environmental and economic aims is a well-known issue in AMD management. In response to this dilemma, NGOs always advise companies to be more than just profit-oriented; environmental conditions must also be restored. True, the expense of environmental recovery is relatively high, but in AMDAL, the companies already had a commitment to protect the environment before they began their activities.

AMD management policies and present quality standards are too permissive and tend to weaken the company. There is no need to re-evaluate the aim because it is fairly clear; the issue is that the approach to attain the goals is sometimes tough for the

company. Currently, ecological disasters such as floods are common in Muara Enim Regency. Flooding has never occurred in this location during the rainy season in the past. It occurs as a result of a change in the landscape caused by the onset of mining activity. The community used to use the Lematang River, which is the estuary of the Enim River, as a source of drinking water, but with the presence of coal mining, the water from the river can no longer be consumed. The policy on the river recovery procedures that have been polluted by AMD is the most pressing policy to develop now.

D. Strategies and instruments

Companies' behaviour in controlling AMD pollution can be changed using current policy instruments such as permits, sanctions, and compensation. The issue at the moment is that the instrument's execution has not been optimal. The government lacks the courage to make decisions that are appropriate for the company's defiance, for example, if there is a violation of the company's provisions on the permit that has been issued, the government lacks the courage to immediately revoke the permit, so the policy instrument applied to that company is only administrative sanctions.

The current system allows instruments to collaborate and create synergies. The issue is with the instrument's execution, which has not been running properly. Regarding existing and applicable rules, there are still policy points that are no longer relevant to contemporary conditions, such as policies relating to quality standards, which have remained constant for the past 18 years. Furthermore, the strategy does not take into account the accumulation of contaminants that are discharged into bodies of water.

There is an option to use various instruments, such as fines. Fines are thought to be more effective in making a company aware of its environmental responsibilities. The local and provincial governments actually have data and study results on the present river water quality. They have data on how contaminated the river is right now, but because the instrument is not enforced optimally and the municipal and provincial governments do not have adequate power, the data and outcomes are ignored.

There is a government official with the authority to enforce the policy, but the existing policy enforcement officials have not performed their tasks to the best of their abilities. Policy enforcement should be done with care and consideration since improper policy enforcement might have societal implications. For example, if a company violates AMD policies and the company is closed, there will be layoffs and maybe unemployment.

E. Responsibilities and resources

Some companies, in my perspective, do not have appropriate resources in AMD management. The technology utilized by AMD management is also insufficient, because there are still many companies that pursue profit. In terms of

human resources, both the number and the quality are still insufficient. Human resource issues, on the other hand, can be resolved if the company allocates a budget for the addition of staff and trains them to be able to manage AMD efficiently.

The authority cannot assist organizational cohesion and consistent since the resource allocated are insufficient. For example, if the federal government has a bigger responsibility for AMD management, then the federal government's allocation of resources should be greater than the province and city governments. To meet AMD's policy objectives, the federal government's funding allotment must be increased. The existence of responsibilities can lead to competence because it encourages actors with specific responsibilities to expand their ability.

Responsibility cannot be integrated and combined since it creates the possibility of conflict, and each actor already has a role. The company is the actor with the most responsibility for ensuring that AMD management is executing its function appropriately. The problem presently is that the company's accountability is essentially a formality that exists only on paper and in the form of administrative reports. When responsibilities are not carried out optimally, the chance to develop conflicts arises.

Since each actor involved does not have an in-line commitment, the allocated resources are insufficient to implement AMD management's policy, achieve the required adjustments and improvements, and the allocation of resources is also imbalanced. Because the current available resources are underutilized, no additional resources are required to achieve the intended modifications.

7. Name of Interviewee : A. Sentanu
Organization : South Sumatera Energy & Mineral Resources Agency
Date of Interview : June, 8th 2021

A. Levels and scales

Aside from being the major environmental policymaker, the federal government has the jurisdiction to issue environmental licenses to companies located in two or more provinces. The province government has the right to issue environmental permits to companies with operations in two or more districts, whereas the municipal government issues environmental permits to companies with operations in those districts and issues AMD discharge permits. The provincial government's authority is still in the function of coordination, monitoring, and assessment in AMD management. If there are complaints about AMD pollution, the mine inspector performs an inspection at the relevant company. If there are public complaints, the NGO is the external level that has been involved. Interactions among levels are currently working normally, and the environment agency usually encourages discussions if there are difficulties relating to AMD. Coordination and communication with other levels are going well as well. For situations that can still be handled by the municipal or provincial governments, so that decisions are made by the municipal or provincial governments. Regular meetings are only held once a year, at the end of the year, where the company presents to the government the performance of AMD management and the company's planned activities for the following year.

Due to Indonesia's government's top-down bureaucratic structure, the possibility to involve other relevant levels is rather limited. When there is an AMD problem, the province level initially collaborates with actors at the provincial level, then with the level above it. It is not required to include another level if the problem may be solved on the same level. The distribution of power remains generally unbalanced, with province and municipal governments having less influence than the federal government. Federal level did not fulfil its responsibilities and let the municipal and provincial governments fix the problem and make decisions if a problem with AMD management is relatively simple to handle.

B. Actors and networks

Not all actors are involved in all stages of AMD management; rather, they are involved in only a part of them. People sometimes object because they are excluded from various stages of AMD management. People sometimes feel underrepresented or that their expectations are not reached. The Health Agency has also not been involved, whereas AMD that is flowed into the water requires oversight from the Health Agency to ensure that the quality of AMD that is flowed is safe for public health, because some of the waters in Muara Enim are used as a source of water for daily activities. The provincial government's trust in AMD management companies is rather low since the company verifies AMD parameters on its own and the provincial

government can only verify when the provincial government conducts field inspections. There are no major disputes among actors, but there is disagreement and argument among government actors, which is usually handled by clarification. Conflicts regarding pollution and land are common occurrences between companies. The government is frequently a mediator in this issue, and if the conflict proceeds to court, the government becomes a witness.

Involvement of new actors is still possible if it is relevant, such as the presence of a special commission that serves as a communication liaison among actors, but there are no rules requiring the formation of such a commission. Because the government has the capacity to implement policies, the actor who exerts the most pressure is still the government. The government's recommendations can influence the company's behavior in order to improve its environmental conditions. Political actors such as council members wield significant power as well, as some impacted communities protest to council members, who serve as people's representatives in parliament.

C. Problem perspectives and goal ambitions

There is no viewpoint on a specific topic that is underrepresented in AMD management policy. Companies that propose to perform mining activities must reassess their commitments in order to reconcile economic and environmental aims. The foundation for the company's actions is the planning document. Regardless of the repercussions of having to pay a high price for it, there is already a consequence for the company. The present AMD policy is neither too strict nor too loose, and the policies follow each other. The policy's parameters are adequate, and no parameters need to be added, modified, or adjusted.

It is true that certain companies have difficulty fulfilling the policy's quality standards because the soil in the province of South Sumatra is primarily acidic. However, returning to the company's promise, the company must take care of the environment, so that even though the company must provide a large amount of funds to manage AMD in order to meet quality standards, it must be done by the company.

D. Strategies and instruments

Administrative sanctions are tools that the provincial government frequently use. Workshops, public conversations, and AMD management training are infrequently used as social instruments. From the perspective of the provincial government, the company's adherence to the government's suggestions is sufficient, because the company is also concerned of consequences that will be imposed if it does not follow the government's recommendations. There has never been a conflict as a result of instrument enforcement. The government levied sanctions on the company, but there was never a rejection. There are no policies that contradict or overlap. So far, the instrument's enforcement has been adequate.

There are several instruments, such as fines, that can be used. If there are companies that do not meet the quality standards, sanctions must be applied so that the company may be more disciplined in controlling AMD. The establishment of an environmental tax has apparently not implemented in Muara Enim. Because AMD management is now relatively ordinary, conducting research for innovation is the best way for AMD management to be optimally implemented. If new inventions are discovered, they should be widely disseminated and applied. The quandary arises when strong enforcement of instruments results in additional societal consequences. For example, if corporations violate policies that result in the company's license being withdrawn and the company closing, then there will be unemployment in the society. The goal of policy enforcement is to protect the public from the effects of AMD while also protecting the company from larger harm in the occurrence of environmental damage.

E. Responsibilities and resources

When compared to the obligations held, the resources provided are insufficient. Responsibilities have been allocated in a balanced manner, for example, there are work units that develop and implement policies. However only a few of those responsibilities are facilitated with sufficient resources to facilitate the proper implementation of AMD management. In the case of restricted budgets, responsibility is frequently assigned using a priority scale. In light of limited human resources, the approach is to enlist the assistance of individuals from other work units in carrying out obligations. The existence of responsibility increases competence since appropriate capacity is required in order for the implementation of responsibilities to function properly. This suitable capability is what motivates each executor of responsibility to improve his or her own self-capacity.

Corporate responsibility in AMD management has been poor, thus the government must work hard to improve corporate accountability. This accountability includes not just the time it takes to provide reports, but also the frequency with which AMD quality and other requirements are verified. The size of the company also has an impact on this company's accountability. When opposed to small companies, big companies are usually more accountable. Typically, a budget is given for planned and scheduled monitoring and monitoring operations. However, there is frequently no budget for unforeseen activities. In terms of the company's resources, the size of the company is also a factor that influences whether or not the resources owned by the company are sufficient. Large corporations typically have sufficient resources in terms of budget, employees, and equipment.

8. Name of Interviewee : Prof. A. Munawar, PhD.
Organization : UPN University (Expert in Acid Mine Drainage)
Date of Interview : June, 10th 2021

A. Levels and scales

The federal government, provincial governments, and municipal governments are all involved in the implementation of AMD management policies. Companies, NGOs, academics, and communities are among the external levels engaged. Collaboration between federal, provincial, and municipal authorities is not yet at its peak, owing to the fact that not all regions in Indonesia face the same AMD challenges. Cooperation among levels is also still insufficient, owing to a lack of media for such collaboration.

It is possible to engage on an international level to learn from other countries whose AMD management has evolved, such as Russia, Venezuela, and Australia. As an academic or researcher, I frequently communicate with academics and researchers at the University of Queensland in Australia. I was also a participant at the International Symposium for Mine Closure, which was one of the AMD discussion topics. I met several Indonesian attendees at the International Symposium, including companies and government representatives, but when we returned to our home country, we never even communicated. Furthermore, because I lack the power that the government has, the results of discussions and experience gathered from international academics and researchers cannot be presented ideally. The distribution of power between the federal, provincial, and local governments is still unbalanced.

B. Actors and networks

It is intended that NGOs will not only respond to problems that have happened, but will also participate in preventing or minimizing AMD problems from occurring in the first place. The crucial element is that NGOs stay objective and independent when dealing with an AMD issue. From an academia perspective, trust in companies remains low since academia does not observe directly how AMD management is handled in the company and academia is rarely included by the company in the implementation of AMD management. Most companies only comply with the policy if the supervisor inspects them. As an academic, I am not convinced of the corporation's commitment or how effectively the company has managed the AMD by using the measures outlined in the policy.

Involving new actors and share social capital are still possible. However, change leadership is still difficult to apply due to the restriction in the structure of the regulation in Indonesia. The federal government's role exerts the strongest pressure on AMD management. As an academic and researcher, I rarely engaged by the federal government and rarely gets involved in AMD discussions. Because I had a friend who worked for the federal government, the communication was limited and intimate. Formal communication and interaction, on the other hand, are extremely rare. The

federal government remains to have significant power, as it has become common in Indonesia's political structure for the federal government to be the most effective in enforcing policies. Companies are typically more submissive to the federal government than to the provincial and municipal governments.

C. Problem perspectives and goal ambitions

In comparison to other countries, discussions and concerns about AMD are relatively new in Indonesia. Other countries have long been concerned about the AMD issue. In the year 2000, I began researching the AMD. I've interacted with a lot of companies, and I've noticed that the most of them don't know how to effectively manage AMD. The essential thing I learnt is that because each company has a distinct mine location, the characteristics of AMD generated are also diverse, thus there is no single AMD management strategy that can solve all AMD problems. However, based on the condition of the AMD, the geology condition, or the characteristics of the AMD, we should combine several types of AMD management techniques. Some experts are still working to find efficient AMD control methods. Economic goals, such as profit, and environmental goals, such as environmental sustainability, must coexist and be balanced. The point is that while companies may want huge profits, they must equally consider environmental concerns.

Government policies on AMD are good and already represent the government's effort to reducing the impact of AMD. The current issue, however, is the implementation or enforcement of these policies. Policies related AMD should be tightened since, as we know, the impact of AMD is long-term, so the organization can be more cautious in the management of AMD, beginning with the planning phase. The objectives of AMD management are challenging enough for companies to adhere to the policies. The existence of government awards to companies in the form of Company Performance Assessment (PROPER) appears to be ineffective, since it does not capture the actual conditions and does not make a major contribution to the company. To make PROPER more beneficial to companies, the PROPER assessment system is critical and should accurately reflect the companies' current situations.

D. Strategies and instruments

Policy instruments such as fines, sanctions, and others must be implemented because the policy will be rendered useless if the instrument is not used. The current system does not encourage the enforcement of existing instruments to collaborate, but such instruments must be deployed gradually so that environmental goals do not lag behind economic ones (profit). The opportunity to combine instruments is highly limited since the Indonesian government system is overly bureaucratic, making everything linked to the implementation of policy instruments difficult to perform, therefore using current instruments is not yet fully effective. Policy enforcement is still dispersed, and unsynchronized policies can be detected. The policy misalignment

will be a possible source of conflict in the future. To avert a potential dispute, strict management and oversight are required.

E. Responsibilities and resources

The head of each organization is the most responsible person for making decisions in AMD management policies. The responsibilities are clearly assigned but the resources provided is insufficient, especially in the government. To improve the effectiveness of AMD management oversight, government supervisors should ideally have specified skills and certificates. Financial resources vary according to the size of the company. Technical resources are also highly dependent on the company's financial capabilities. If we learn about the resource allocation of global mining companies, we will see that the resource allocation in those companies is really well planned to achieve the desired goals, such as in companies that have advanced in environmental management, they have adequate human resources in terms of quantity and quality. Their workers in the environment department have educational backgrounds ranging from the Bachelor's to the Doctorate level (PhD). This demonstrates that the company is serious about managing the environment.

Corporate responsibility is determined not just by administration and reports, but also by the company's actual situations. The issue is that there is a discrepancy between the actual condition and the condition stated in the report. Furthermore, the company's report to the government only conveys the AMD situation after treatment. The majority of companies do not record pre-treatment parameters. AMD management in the company is ideally integrated and should involve not just the environment department but also the planning, operations, and production departments, but what is happening today is still "business as usual."

The resources allocated to implement AMD management policy and achieve the desired changes and improvements are insufficient. Transparency in AMD management is still required; any minor problem should be reported and resolved immediately so that there are no major issues in the future. Aside from that, AMD management should be projected for a long period of time, so that troubles do not arise in the future when the company is closed or no longer running.