Strategic reclamation policy of post-mining area based in the environment in North Kolaka district

Budi Hartono¹, A M Imran², and M Rijal Idrus³

¹Graduate School, Department of Management Environment, Hasanuddin University, Makassar, Indonesia
²Department of Management Environment, Graduate Studies Program, Hasanuddin University, Makassar, Indonesia
³Faculty of Marine Science and Fisheries, Hasanuddin University, Makassar, Indonesia

Email: budihartono776@gmail.com

Abstract. This paper aims to investigate the absence of reclamation activities and its objectives regarding the appropriate policies of friendly environmental post-mining area that happened in mineral companies, North Kolaka District. The Stakeholder analysis applies Analytical Hierarchy Process (AHP) method along with Expert Choice software, version 11, to obtain the weight of pairwise comparison matrix. Based on the elements of structural hierarchy, the results of weighting and priorities can be constructed to get the strategic policy of mine secondary reclamation. The determined priority values for each element are obtained from the calculation of responses given by stakeholders who are considered to have a stake in the management, so that the level of contribution can be distinguished. The strategic reclamation of secondary nickel mines has obtained a sustainable and friendly environmental management policy whereas the reclamation area strategy includes economic benefits for the local people. As for the natural resources toward non-renewable mining, the ecological condition happens to be the initial concern of stakeholders.

1. Introduction

One of the significant impacts on the environment comes from the mining sector as seen in the area of Southeast Sulawesi Province, especially in North Kolaka where the district is well-supplied with mineral resources of the Nickel commodity. Dozens of Izin Usaha Pertambangan-Operasional Produksi (IUP-OP) issued by the North Kolaka government were given to entrepreneurs. In 2009, the exploitation of mineral resources was carried out on a large scale due to the opening of excavation mineral export that had no awareness toward the environmental impact. After completing the excavation, none of the mining companies in North Kolaka done reclamation activities on the land that was opened and preferred to leave it unsettled. Thus, the company has two side effects of mining that oppose to each other, namely as a source of welfare and potential environmental risk.

Efforts to repair the previous mining area in North Kolaka are needed because the area itself becomes unproductive and potentially causes pollution. In order to prevent these undesirable states, reclamation occurs to be solution.

However, the success of reclaiming the post-mining area is largely determined by the seriousness
of the government. Regional government, in North Kolaka is fully responsible to observe the current and upcoming problems if the post-mining area is not reclaimed as mandated in UU 32, year 2019, concerning environmental protection and management. Therefore, the accomplishment of mining reclamation highly depends on the government policy system, management awareness, company’s power and community involvement. In addition, the company’s power means the ability to correspond with the area that can rely on many aspect, including mineral extractions, local conditions, environmental aspects, economic viabilities, and funds. These aspects are the planning factors that must be added into a workable and coherent reclamation concept. The implementation of reclamation concept must require a strict and regulatory system from the government who are also the stakeholder, so the goal of improving the sustainable and friendly environmental post-mining area can be achieved as well as to improve the socio-economic conditions of local community.

2. Method
The study of this paper was fulfilled in post-nickel mining area of North Kolaka. The period is done for 2 (two) months, starting from June 2019 to August 2019. This research is descriptive correlational in which to describe precisely the facts and telationship between the phenomena studied by Nasir (2015). The sampling was done by surveying method, a particular technique that aims to collect responses about the absence of reclamation activities and the causes where the mining companies in North Kolaka have no action to get the right policy for reclaiming the post-mining area. The number of respondents can be seen in the following table:

Table 1. Taking Respondents

| No | Respondents                          | Amount of Respondents |
|----|--------------------------------------|-----------------------|
| 1  | Local Government and Province        | 20                    |
| 2  | Mining Companies                     | 15                    |
| 3  | Universities                         | 5                     |
| 4  | Non-Governmental Organization        | 10                    |
| 5  | Local Community at the area          | 150                   |
|    | **Total**                            | **200**               |

Analytical Hierarchy Process (AHP) method combined with Expert Choice software, version 11, is conducted as the tools to process the analysis of Stakeholders’ responses and collect the weight of pairwise comparison matrix. In order to obtain the leads for the reclamation policy, the results of weighting and priorities can be found in communicating the strategic policy that is able to reclaim post-mining area. The determined priority values for each element is obtained from the calculation of opinions given by stakeholders who are considered to be involved in the management, so that the level of contribution can be distinguished. These stakeholders include local government, companies, universities/research institutions, non-governmental organizations (NGOs), and local community.

3. Discussion

3.1. Mining Reclamation Practice in North Kolaka
Mining companies in North Kolaka are known to be the middle class among the lower scale business. There are a number of companies that have exploited nickel minerals, yet they do not reclaim the area accordingly to mining regulations. As the results, the researchers have found that the main obstacles in conducting the reclamation activities were:
1. Mining techniques does not match the rules of good mining practice. Most companies clear the area in spite of some accurate data.
2. Lack of understanding by the owner of the company can result to a serious consequence.
3. Sanctions are not mandatory that the government pay less attention to reclamation activities done by the mining companies.
4. The company does not include post-mining reclamation planning.
5. Reclamation fund is regulated by the government as companies’ policy upon the process with minimum cost compared to the reclamation activity.
6. The government does not immediately appoint a third party to implement the reclamation after the land is opened from the reclamation guarantee fund.
7. Lack of supervision from related agencies of mining activities.
8. Miners do not proceed to a friendly environmental mining.

3.2. Directions to Strategic Reclamation Policy of Post-Mining Area

The results of weighting the roles of each stakeholder and aspects or parameters are shown in the following table:

| No | Stakeholders                                      | Weights | Priorities |
|----|---------------------------------------------------|---------|------------|
| 1  | Local Government                                  | 0.293   | 1          |
| 2  | Companies                                         | 0.238   | 2          |
| 3  | Universities/Research Institutions                | 0.184   | 3          |
| 4  | Local Community                                   | 0.164   | 4          |
| 5  | Non-Governmental Organizations                    | 0.121   | 5          |

| No | Stakeholders                                      | Weights | Priorities |
|----|---------------------------------------------------|---------|------------|
| 1  | Ecology                                           | 0.406   | 1          |
| 2  | Economy                                           | 0.269   | 2          |
| 3  | Social                                            | 0.172   | 3          |
| 4  | Organization                                     | 0.155   | 4          |

Based on the results of AHP, several directed alternative policy on weighting the strategic reclamation of post-mining area can be seen in Table 4.

| No | Stakeholders                                                                 | Weights | Priorities |
|----|-----------------------------------------------------------------------------|---------|------------|
| 1  | Sustainable and friendly environmental post-mining area management           | 0.292   | 1          |
| 2  | Reclaiming post-mining area that has economic benefits for the local community | 0.322   | 2          |
| 3  | Community involvement in determining post-mining area management            | 0.235   | 3          |
| 4  | Post-mining area reclamation must focus on the agenda of local government in terms of sustainable management and friendly environment that provide economic benefits for the local community | 0.151   | 4          |

The results of the analysis can be seen in Table 3, that post-mining area management is sustainable and friendly environmental as the first priority in reclamation program gets a weight of 0.292. Reclaiming post-mining area that owns economic benefits for the local community gets a weight of
0.322 as a second priority, while community involvement in determining post-mining area management becomes the third priority with a weight of 0.235 and the last priority is reclamation of post-mining land must pay attention to the agenda of local government in terms of sustainable management and environment as well as providing economic benefits to the community results in 0.151

**Figure 1.** Hierarchical Structure Formulation (AHP) Results on Strategic Reclamation Policy of Post-Mining Area in North Kolaka
4. Conclusion
Based on the previous discussion, the results of this paper lead to the main causes of mining companies that failed to conduct reclamation activities of policy related, namely incapacitated of good mining practices proceeded by the company, made it difficult to manage and lacked of supervision from the relevant agencies in which talking about energy and mineral resource department and coal.

The direction of strategic reclamation policy for post-mining nickel area obtained a sustainable and friendly environmental management. Strategic reclamation policy is, therefore, the first priority for the improvement toward the post-mining area and the second priority happens to involve the economic benefits for the local communities. As for the non-renewable nature of mining resources, the reclamation with plants is able to improve ecological conditions as well as become the initiative concern for the stakeholders.

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