Settlement’s feasibility parameters in the village outer mining area

I R Sushanti$^{1,2}$*, L Jauhari$^2$ and I A Abednego$^3$

$^1$Architecture Department, Institut Teknologi Sepuluh November, Surabaya, Indonesia
$^2$Urban and Regional Planning Department, Engineering Faculty, Universitas Muhammadiyah Mataram, Indonesia
$^3$Architecture Department, Institut Teknologi Sepuluh November, Surabaya, Indonesia

*Email: imarahmawati77@gmail.com

Abstract. Indonesia has a lot of mines that are spread throughout the country. Mining activities could affect the social, culture, economic, and environment sector. Settlements around the mine are directly and indirectly related to mining activities. This study aims to determine feasibility parameter of settlements in the village outer mining area based on sustainability aspect. The research method is descriptive qualitative by using literature review and some case studies of settlement around the mines. The results showed that the parameters for determining settlement feasibility in the village outer mining area are: 1) level of settlement quality, 2) mining activities, 3) mining policies, and 4) continuity. Hopefully, this study could be a reference in evaluating the feasibility of settlements in other area around the mine.

1. Introduction

Indonesia is a country that has a large potential for mineral resources. Various mining materials are available to meet domestic and foreign needs, and it even generated much foreign exchange for Indonesia. Some potential mineral resources in Indonesia include oil and gas, coal, bauxite, iron, gold, tin, copper, nickel, asphalt, manganese, sulfur, marble, and iodine. These resources are extracted and used to improve social welfare and increase the economy by the management of mineral resources through the mining industry. Mining is one of the primary industries that provide raw material for almost any other industry.

Mining activity has done great contribution to many aspects of life throughout the world. Coal mines, oil and gas supply sources of energy, while the mineral mines such as bauxite, manganese, and nickel provide raw materials for various industrial purposes. Rock mining materials, such as andesite, sand, and limestone, also contribute significantly to building materials. In line with the statement, Ahyani [1] states that the mining industry can absorb considerable employment and is one of the sectors that contribute substantially to improving local revenue (PAD) for the District or Municipal, Provincial, and State.

The existence of mining areas in Indonesia has impacted both positive and negative on the surrounding environment. Mining activities include stages of exploration, exploitation, processing, refining, and transportation of mineral or mining materials in contact with nature or environment, which cause enormous and significant environmental impact, especially those relating to water quality.
[1]. Settlements region, according to Law Number 1 the Year 2011 on housing and settlement region, is part of the environment outside the protected area, either urban or rural, which serves as a living environment or residential environment and the activities that support life and livelihood. A settlement by Kuswartojo [3] is defined as a combination of housing and human who live in and occupy it. The settlements can be interpreted also blend between human and society, natural and artificial elements. In addition, Doxiadis [4] explains that the settlement elements are nature, shelter, network, man, and society; while the settlement itself is part of a residential neighborhood consisting of more than one housing units that have the infrastructure, facilities, public utilities, as well as having other functions to support activities in urban or rural areas. The composition of the elements make up diverse neighborhoods, as well as activities that are accommodated by these settlements are also diverse. In addition to accommodating residential settlement activities, they also accommodate life and livelihood support, one of which is mining. The distribution area of the mining industry itself does not close the possibility of changes in the various facets of life. From the physical aspect, the various stages of mining activities changes the natural conditions such as land-use conversion from forest area into mining area [5], while on the social-culture aspect, the presence of mining areas changes the values, attitudes, and behavior of local community that are influenced by the migrant who seeking job at the mine [6]. On the other hand, mining becomes one of the leading sectors of the state that plays an important role in increasing state revenues and supporting national development.

The development of mining areas that have an impact on the environmental conditions of the settlements areas is considered very important to note. Therefore, this study aims to determine parameters of settlement’s feasibility around the mining area in Indonesia. Hopefully, this study could be a reference in evaluating the feasibility of settlements in other areas around the mine.

2. Method
The method used in this study is descriptive qualitative by using a literature review approach and some case studies of settlement around the mines. Qualitative research is a research procedure that produces descriptive data in the form of speech or writing and the observable behavior of people (subjects) itself. In this study, literature review and case studies are conducted to formulate parameters of the feasibility of settlements on several stages of mining activities in the circle mining area. In the study collected documents related literature are studied intensively to formulate appropriate and corresponding results.

3. Result and Discussion
There are several case studies that have been conducted and analyzed in determining the settlement’s feasibility parameter in the village outer mining area. Siska [6] on the impact of the coal industry in Jembayam village, Kutai Kertanegara stated that mining activity has positive impacts on 1) the pattern of population growth, 2) patterns of migration and 3) the pattern of economic development; while in socio-economic aspect, mining activity has positive impact on 1) the increase in community revenues, and 2) changes in employment, but less positive impact on 1) employment as the coal industry does not absorb sufficient labor from the local community and 2) the development of the economic structure because it does not reduce the number of unemployed community members. The presence of the coal industry in the Jembayan village initially raised pros and cons, which continues up to now, but it is undeniable that region. The presence of the coal industry, apart from providing proven development, also providing work opportunities and yielding improvements in socio-economic conditions.

Ahyani [1] in the study of the influence of gold mining activities to the condition of soil damage on artisanal mining in Bombana, Southeast Sulawesi province indicates that the level of soil damage at the gold mine site is heavy and the level of physical environmental impacts such as soil degradation is also terrible. The area-losses the nutrients needed by plants to grow, surface water discharge reduces, and high vehicle traffic makes it easy to damage roads, to cause air pollution, and to bring socio-economic impacts.
Everyone has a standard of living, even a very low-class society, and low-income people. Although though the income is below the average wage, low-income households that have been permanently protected can maintain average households at low standards but can be accepted locally, compared to immigrant who does not have money and shelter [7].

Aastuti [8] in her study of illegal gold miners in the village of Pangkal Jaya, Nanggung Sub District, Bogor Regency, stated that activities undertaken by the illegal gold miners are very influential to other aspects such as level of income, level of expenditure, family education, change of the type of housing or shelter. In this study, a comparison between the level of well-being before the respondent worked as illegal gold miners with the level of prosperity after the respondent worked as illegal gold miners. The results showed that there was a change in the living conditions of rural communities Pangkal Jaya toward considered adequate or suitable after working as an illegal gold miner. It can be seen from a variety of indicators, such as changes in the type of flooring, type of wall, building area of residence, and others. Based on observations in the field, high illegal gold miners activity can improve household welfare, which is indicated by the improvement of rising income, better house building, better health, better education level, and higher expenditure.

The quality level of the settlement around the quarry, Waru Sub District, Sukoharjo Regency, indicate that some components of the settlements still have a low quality even though the overall is classified as moderate to high [10]. The components that have a low quality are green open space and economic level. The components that have a high quality are the level of education and social groups, while the components that have high quality are the density and layout of the building, drainage network, and social interactions. There are variable levels of health assessed using the Incident Rate (IR) level. There are some components that affect settlement’s quality, such as existence of green open space, economic level, education level, social groups, building density, building layout, drainage networks, social interaction, and the health level.

Several efforts to maintain the preservation and sustainability of settlements environment in the mining area must be the primary concern of various parties, in terms of social, economic, environmental, and policy. Ahyani [1] stated that the efforts to avoid environmental impact are by utilizing land conservation technology and law enforcement through clear, transparent, and accountable law as well as the involvement of the community in an active role. According to Siska [6], human resources need to be increased in the form of educational assistance, empowerment training for local communities so they can compete with migrant community members. Authorities responsible for the programs that the company has provided to the community through the company's CSR (Corporate Social Responsibility) program or direct assistance to the community must be transparent, including the company itself. There was also a need for the development and improvement of infrastructure in all areas of medical assistance, as well as in religious and other social assistance. The political settlements literature does not give an optimistic picture for development policy; it offers a potentially rich seam to engage the politics of CSR in the extractive sector; there were useful contributions the approach [11]. In fact, according to Yuliana HS [12] in the research shows that the human factor is a significant influence on environmental damage, so that the need for the formulation of policies that regulate tin mining and to supervise artisanal mining activity.

Nurul In, et al. [9] stated that the mining activities are carried out, and the community is expected to carry out mining activities in an orderly manner, and to the village government, district and county are expected to coordinate well in order bring order mining activities. Some study about land use conversion’s conflict in mining area indicates that the number of settlement in the forest around mining area increases rapidly during mining activities. [13][14][15][16]. Hidayat [5] in his study also states that regional factors, mining, and the slopes are very influential in changing all classes cover/land use in East Luwu Regency. Mine sites are widely influential in changing forest areas into open land and from forest land into smaller plots in East Luwu Regency. Only two mining companies out of the thirteen mining companies, only two companies are consistent to spatial plan of the East Luwu regency while eleven are inconsistent. Therefore it becomes essential to make some efforts in the
establishment of national strategic importance, which should be complemented with supporting clear, accurate, and precise maps, both in terms of area and the geographical position.

In the process of implementation, the community should have an important part in the implementation of the activities, particularly in the formulation of the involvement of the Environmental Impact Assessment in the area with consideration that the company's commitment to the environment and welfare of the people directly affected can be held as promised [17]. Therefore, as a sustainable effort, all parties involved in mining activities, as well as the people who live in settlements areas on mining village outer areas, must consider several issues related to the management of housing environment, either when the exploration, production, and post-mining operations. Several studies revealed that there are four main issues that can be formulated as parameters for the feasibility of residential areas in the mining village outer area, namely: 1) the level of environmental quality, 2) mining activities, 3) mining policies and 4) sustainable efforts [2][18]. Those four parameters are described as follows:

1. The level of environmental quality that includes both physically and psychologically parameters such as health level, economic level, education level, building density, facilities, infrastructure, social interaction and social groups[2].
2. Mining activities promote corporate social responsibility program that contributes to some aspects include community income, employment changes, labor absorption, and economy structure [18].
3. Mining policy that can be interpreted as a political, management, financial, or administrative mechanism to achieve an explicit goal should affect the legality, stakeholder commitment, stakeholder coordination, and community participation [19].
4. Sustainable efforts should cover three dimensions of sustainable development, namely environment, social, and economy [20].

Four parameters were formulated to determine the environmental feasibility of settlements in the outer mining area by the aspect of sustainability that can be classified as seen in table 1:

| No. | Aspects of Sustainability | Feasibility Parameters of Settlements | Level of Settlement Feasibility |
|-----|----------------------------|--------------------------------------|--------------------------------|
| 1   | Environment                | The level of environmental quality   | Health level                  |
|     |                            |                                      | Economic level                |
|     |                            |                                      | Education level               |
|     |                            |                                      | Building density              |
|     |                            |                                      | Building layout               |
|     |                            |                                      | Facilities                   |
|     |                            |                                      | Infrastructure               |
|     |                            |                                      | Social interactions           |
|     |                            |                                      | Social groups                |
| 2   | Social and Economy         | Mining activities                    | Income communities           |
|     |                            |                                      | Employment changes           |
|     |                            |                                      | Labor absorption             |
|     |                            |                                      | Economy structure            |
| 3   | Policy                     | Mining Policy                        | Legality                     |
|     |                            |                                      | Stakeholders commitment      |
|     |                            |                                      | Stakeholders coordination    |
|     |                            |                                      | Participation communities    |
| 4   | Sustainability             | Sustainable efforts                  | Planning                     |
|     |                            |                                      | Utilization                  |
|     |                            |                                      | Development                  |
|     |                            |                                      | Control                      |
4. Conclusion

Some parameters play an essential role in determining the feasibility of the region of the settlement in the village's outer mining area. Those parameters are health level, economic level, education level, density buildings, building layout, facilities, infrastructure, social interaction, and social groups. Mining activities taking into account some of the mining stages that deliver positive values to the community and the surrounding environment, namely: community income, changes in employment, labor absorption, and economic structure. Mining policies are aspects related to policies that can have a positive effect, both vertically and horizontally, by paying attention to legality, stakeholders' commitment, stakeholder coordination, and community participation. Sustainable efforts as continuous efforts of all the parties involved in mining activities, as well as people who live in residential areas on the area of the circumference of mining, must continuously consider several issues related to the management of housing environment, during the exploration, production operations and post-mining are: planning, utilization, development, and control. Some issues still need to be settled associated with the settlement feasibility in the village outer mining area; those issues are active participation of relevant stakeholders, robust and precise regulation, and Sustainable development goals vision.

References

[1] M. Ahyani, Pengaruh Kegiatan Penambangan Emas Terhadap Kondisi Kerusakan Tanah Pada Wilayah Pertambangan Rakyat di Bombana Provinsi Sulawesi Tenggara, Semarang: Universitas Diponegoro, 2011.
[2] Gol, Undang-Undang Tentang Perumahan Dan Kawasan Permukiman, Jakarta: Government of Indonesia, 2011.
[3] T. Kuswartojo, Perumahan dan permukiman di Indonesia upaya membuat perkembangan kehidupan yang berkelanjutan, Bandung: ITB, 2005.
[4] C. A. Doxiadis, Ekistics An Introduction to the Science of Human Settlements, London: Hutchinson, 1969.
[5] W. Hidayat, E. Rustiadi and H. Kartodihardjo, "Dampak Pertambangan Terhadap Perubahan Penggunaan Lahan dan Kesesuaian Peruntukan Ruang (Studi Kasus Kabupaten Luwu Timur, Provinsi Sulawesi Selatan)," Jurnal Perencanaan Wilayah dan Kota, vol. XXVI, no. 2, pp. 130-134, 2015.
[6] Siska, Dampak Industri Batubara Terhadap Sosial Ekonomi Masyarakat Disekitar Desa Jembayan Kecamatan Loa Kulu Kabupaten Kutai Kartanegara, vol. 1, Samarinda: Universitas Mulawarman, 2013.
[7] J. C. Turner, A New View of The Housing Deficit, San Juan: Social Science Research Centre, University of Puerto Rico, 1966.
[8] W. F. Astuti, Dampak Aktivitas Pertambangan Emas Tanpa Izin terhadap Rumah Tangga Gurandil, Bogor: Institut Pertanian Bogor, 2015.
[9] N. In, I. P. Sriartha and P. A. Citra, "Dampak Aktivitas Penambangan Pasir Batu Terhadap Keberlanjutan Sumber Daya Pertanian Di Desa Lenek Daya dan Desa Lenek Kali Bambang Kecamatan Aikmel," Media Komunikasi Geografi, vol. XVII, no. 1, pp. 38-48, 2016.
[10] L. A. Setiawan, W. Astuti and E. F. Rini, "Tingkat Kualitas Permukiman (Studi Kasus: Permukiman Sekitar Tambang Galian C Kecamatan Weru, Kabupaten Sukoharjo)," Pembangunan Wilayah dan Perencanaan Partisipatif, vol. XII, no. 1, pp. 1-11, 2017.
[11] T. Frederiksen, "Political settlements, the mining industry and corporate social responsibility in developing countries," The Extractive Industries and Society, vol. VI, no. 1, pp. 162-170, 2019.
[12] H. S. Yuliana, "Analysis of Impact Unconventional Tin Mining to Flood (Studies in Pangkal
Pinang City The Province of Bangka Belitung 2016), "Mnajemen Bencana, vol. III, no. 1, pp. 57-73, 2017.

[13] V. Baustic, M. Baumann, A. Shortland, S. Walker and T. Kuemmerle, "Conservation and conflict in the Democratic Republic of Congo: The impacts of warfare, mining, and protected areas on deforestation," Biological Conservation, vol. CXCI, pp. 266-273, 2015.

[14] V. Goverski, E. Kasischke, J. Dempewolf, T. Loboda and F. Grossmann, "Analysis of the Impacts of armed conflict on the Eastern Afromontane forest region onthe South Sudan — Uganda border using multitemporal Landsat imagery," Remote Sensing of Environment, vol. CXVIII, pp. 10-20, 2012.

[15] D. Donovan, W. D. Jong and K.-i. Abe, Tropical Forest and Extreme Conflict, Basel: Springer, 2007.

[16] H. Achour, A. Toujani and T. Rzigui, "Forest Cover in Tunisia Before and After the 2011 Tunisian Revolution: a Spatial Analysis Approach," Journal of Geovisualization and Spatial Analysis, vol. II, no. 10, 2018.

[17] A. H. R, Analisa Peran Stakeholder Terhadap Manajemen Lingkungan pada Proyek Pertambangan Bauksit, Jakarta: Universitas Indonesia, 2010.

[18] GoI, Undang-undang tentang Pertambangan Mineral dan Batubara, Jakarta: Government of Indonesia, 2009.

[19] K. Blakemore and L. Warwick-Booth, Social Policy an Introduction, New York: Open University Press, 2013.

[20] UN, "The Millennium Development Goals Report," United Nations, New York, 2015.