
Responsible Mining Towards The Sustainable and Mineral Resource Development: Education Perspective

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Abstract

Responsible mining will initiate the sustainable and responsible mining and mineral resources development in which it is a principle that integrates the economic, social and ecological consideration to enhance the life of current and future generation will have adequate resources and opportunities. This outcome can be achieved if the mining sector adopt and apply the industry's good practices, knowledge and resources on the sustainable development at all stages of mining including during exploration until the mine closing. This sustainable and responsible mining needs ethical and skilled professionals entering the work force in the mining industry so that the concept can be taken seriously. Thus, these professionals need to be qualified and being trained as early as in their degree education and can be continued to further at higher level of degree. Universities with collaboration of industries can compromise this through knowledge sharing in terms fundamental (concept), research and trainings.

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1. INTRODUCTION

1.1 Responsible mining

Responsible mining by mining companies can be enlightened as an encouragement to reform mining activity and marketing strategy to promote their operations as environmentally or socially sound and this responsible mining will lead to the sustainable development (SD). In 2008, Toyce defined responsible mining as: "Respecting the environment by meeting and exceeding national and international norms, and seeking innovative and proactive approaches to environmental protection. It requires that a company uphold the rights and perspectives of people and communities affected by its operations and invest in long-term community development through national and local government and/or community development organizations". The company also can collaboratively with local communities and investing in the long-term well-being of the country. Responsible mining also requires companies to leave the environment and communities in which they operate healthier than they were originally found (Tedstrom, 2008).

1.2 Sustainable development (SD)

The SD can be explained by the relationship of economic, social and ecological (environment) aspects, and the aim of developing and maintaining continuing objectives during the instant development activities by maintaining the integrity of the ecological systems at the same time improving the quality of human life (McDivitt, 2002). Sustainability is about obtaining a good balance of those three aspects which can also be denoted as 3P i.e profit, people and plant. It is a business of creating value with crucial elements for sustained long term growth. The value creation must benefit and be fairly shared among all across the value chain of the business. The sharing of benefit can be measured in terms at its impact on economic, social,

environment and cultural components of the business (Anuar 2017).

The sustainable development goals (DSG) has set 17 SDG for the period of 2015-2030 which consists five aspects denoted as 5P i.e people, plant, property, peace and partnership (5P) as listed in Table 1. The development of the SDG related to mining and mineral resources by aligning the implementation of the National Mineral Policy through several mechanisms such as good practices & guidelines for the industry (Azizi, 2017).

Table 1. The sustainable development goals (DSG)

DSG 1-6	DSG 7-12	DSG 13-17
1. No poverty	7. Affordable & clean energy	13. Partnerships for the goals
2. Zero hunger	8. Reduced inequality	14. Life below water
4. Quality education	9. Climate action	15. Industry, innovation & infrastructure
3. Good health & well beings	10. Sustainable development, decent work & economic growth	16. Peace, justice & strong institutions
4. Quality education	11. Sustainable cities & communities	17. Life on land
5. Gender equality	12. Responsible consumption & production	
6. Clean water & sanitation		

2. EDUCATION PERSPECTIVE

Education can be taken as a foundation of responsible mining in which representing one sector of the society to educate people on the importance of effectively managing our resources as well as protecting the environment for our own sake and for the sake of the future generations, give students and stakeholders a solid understanding of mining and mineral resources, their importance to society, and the environmental impacts of their exploitation and also can produce an educated, ethical, skilled and motivated work force. Thus, the university be as role for the knowledge and technology infrastructure, technology and innovation, human resources development via engagement in cross disciplinary capability through learning and research with universities and industries. Universiti Malaysia Pahang as an example currently developing postgraduate programme targeting an enrollment from professional in related field of industry as to fulfill this needs (Hassan,2017). A good collaboration between industry and university is very important in designing the systematic and comprehensive curriculum together with research activities (Jamil, 2017; Hassan,2017).

3. CONCLUSIONS

Responsible and sustainable in mining and mineral resources development can be concluded as meeting the needs of current generation without compromising the needs of future generation to meet those needs (United Nation,1987). It is related to consideration of harmonising the financial (profit), social (people) and environmental (ecology) issue to warrant the accomplishment of the company as well as the sustainable of live hoods of the communities. The engagement of community, companies, public and education sectors will be able for better deliver the sustainable growth and returns.

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