

The Managerial Aspects of Integrating the Sustainable Development Principles into Practices of Mining Companies

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Abstract. In order to successfully achieve sustainable development objectives, modern enterprises have to establish a framework and implement appropriate managerial tools for the effective integration of sustainability into business operations. The paper aims to clarify the concept of sustainable development in the mine management context, highlight the main principles of sustainable mining and devise appropriate tools and mechanisms from a managerial viewpoint to implement the strategic sustainability priorities into business practice. Based on a literature review of research on sustainable mine management issues, the main dimensions of the sustainability concept are highlighted and the specific goals corresponding to each of the priority focus areas are identified in the paper. As a result of the study, the key organizational aspects and firm-level mechanisms that should be primarily taken into account from a management decision-making viewpoint to embed the strategic sustainability principles into business practices and corporate activities of mining operators are pointed out. From a practical perspective, the findings can be used by mining operators for defining strategic sustainability priorities and setting related corporate objectives, as well as devising guidelines for the effective implementation of the integrated sustainable mine management system.

1 Introduction

There is no doubt that in the modern business environment it is crucial for organizations to change their entrepreneurial mindset, current management practices as well as established business models in order to keep pace with the economic trends and social needs. As the

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business conditions change, it is becoming clear that companies should move away from the traditional management approach in which the primary focus is on maximizing profits, regardless of the cost to others. Extractive industries such as mining, logging, the extraction of minerals, oil or natural gas are nowadays confronted with serious challenges of sustainable development, in particular, with regard to environmental and social issues. Thus, there emerges an objective need for mining companies to implement and integrate the principles of sustainability into all aspects of their operational activities.

This research focuses on defining a theoretical basis for a deeper understanding of the specific characteristics of sustainable development in the mining sector and is intended to identify its significant dimensions as well as priority focus areas and corresponding objectives with regard to mining operators. Based on a conceptual review of the literature related to the sustainable mine management issues, key organizational aspects and firm-level mechanisms which should be primarily taken into account from a company's viewpoint to embed effectively and efficiently the strategic sustainability priorities and principles into the corporate activities of mining operators are pointed out in the paper.

2 Materials and Methods

In general, the sustainability concept in the mining sector represents the idea of how industry companies can contribute to sustainable development. Based on the overview of existing approaches and definitions, sustainable development can be presented as an integrative concept that embraces a range of interconnected aspects, namely, the economic dimension which focuses on the economic needs of society and economic development, the social dimension that refers to social and cultural needs, and the environmental dimension with regard to the management of natural resource base, and the maintenance of the ecosystem integrity [1]. In the context of the mining industry, sustainable development is aimed at striking a balance between achieving the benefits of the mining projects and in the same time the improving of the economic, social, and environmental sustainability, with a specific emphasis on the optimization of positive impacts. Sustainability as a complex and multidimensional concept presumes that it is necessary to operate taking into account the interconnections between economic, sociocultural and environmental aspects, as well as the need for the fair distribution of benefits and opportunities. In this vein, sustainable development can be presented through an integrated approach that is aimed at building a prosperous community by addressing economic, environmental, and social issues and avoiding in the same time the ecosystem degradation and overconsumption of the key natural resources [2]. With this regard, the challenges of the modern turbulent business environment and the evolution of the sustainable development at the firm level have heightened the need for devising and implementing balanced approaches to the management of mining operators, in order to ensure an effective integration of the economic, social and ecological norms, principles, values and priorities into corporate activities.

This paper presents a theoretical framework for investigating the main determinants of sustainable development in the mining sector and strives to provide a basis for defining the core organizational factors and focus areas at the firm level which are from a decision-making perspective of critical importance for effectively managing the process of embedding the sustainability values and principles into the business operations of mining companies. The paper is structured as follows: first, a descriptive overview of the theoretical aspects of sustainable development in the mining sector is provided. Then, based on a review of the existing sustainable mine management literature and thematic research, the specific characteristics of sustainable mining are considered from a management viewpoint. As a result of the study, through the integrated approach to sustainability, the

main organizational factors and intra-firm mechanisms are summarized that are of particular importance for integrating long-term strategic priorities related to sustainable development into business practices of mining companies.

3 Results and Discussion

In recent decades the concept of sustainable development has become a significant economic factor. Accordingly, one of the overarching goals for the mining operators is today to find ways and devise effective implementation mechanisms by which the mining industry can address the sustainability-related challenges and contribute to sustainable development. Given the global relevance of the issue, the study of the most important barriers and possible opportunities for achieving sustainable goals in the mining industry has gained importance within the academic community during recent years. However, although it is an essential issue for mining enterprises to develop sustainability strategies, appropriate methods, organizational factors, and managerial mechanisms of integrating sustainability into business practice are still not sufficiently researched.

As the overview of the underlying theoretical concepts has shown, the sustainable development concept originates from the resource management and is applied particularly with regard to environmental protection issues and maintaining natural ecosystems. But sustainability as a broad and multifaceted concept cannot be considered exclusively from an environmental perspective [3]. A multidimensional approach to understanding sustainability in the mining sector assumes that three key focus areas should be highlighted: environmental dimension, economic dimension, and sociocultural dimension.

Sustainable mining can be characterized as one wherein the proceeds generated from the mining projects are on a continuous basis reinvested in the sustainable undertakings and in community support, including projects which are aimed at maximization of environmental, economic and social benefits, e.g. development of the health-care services, improving access to education, cultural promotion etc. Thus, from a management perspective, the practical implementation of the sustainable development paradigm is reflected in relevant business decisions designed not only to enhance the efficiency of the company's operations and multiply its assets, but also contribute to the well-being of society [4]. In order to fulfill their obligations relevant to the attainment of sustainable development, it is necessary for mining companies to be involved in strengthening the multi-stakeholder interactions, including public and private sector actors that enable to incorporate knowledge and values from different sources and to develop integrated strategies [5]. Accordingly, following the conceptualization proposed by A. Jabłoński (2013), at the company level sustainability decision-making is associated with such processes as improved communication, integration, cooperation and partnership with customers, suppliers and a wide range of stakeholders, quality, agility, as well as innovation activity and teamwork [4; 6].

In the light of the multi-stakeholder approach, the sustainability concept in the context of the mining industry can be considered as a result of dynamic interaction among key actors, such as mining companies, government, local communities and authorities, non-governmental and civil society organizations, as well as industrial unions and environmental organizations. The evidence shows, that there is a link between a company's financial performance and its social and environmental initiatives: business activities, which are carried out in accordance with the principles of open cooperation, mutual benefits, and common interests allow for sustainable development in social and environmental aspects as well as economic growth of the company [1; 7]. However, it needs to be pointed out that given the complexity of the task of harmonizing the contradictory interests and priorities of the above-mentioned stakeholders, there is an

important issue for modern companies to accommodate divergent views and find a compromise to ensure stakeholders' needs and requirements can be achieved [8]. The balancing of contradictory interests and values is therefore a necessary prerequisite for providing constructive interactions and maintaining integrative ways of working with diverse stakeholder groups. In this vein, it is important to develop new forms of cooperation, collaboration, and coexistence among the relevant stakeholders, with tolerance to ambiguity, complexity, and uncertainty of such interrelationships [5].

Given the common sustainable development challenges, it is evident that current managerial practices in the mining sector need to be revised to contribute to the community development, maintain natural ecosystems' functionality and be compliant with the sustainable development objectives. According to the approach proposed by *J.A. Botin (2009)*, the sustainable management of mining operators can be described and explained by the integrated model that encompasses foundational elements, such as a business culture, in which sustainability is recognized as a priority (including corporate vision, mission, and corresponding goals), strong leadership and motivation (in particular, regarding the human resources management), and an appropriate organizational structure which seeks to ensure long-term economic gains through sustainability [1].

With reference to the existing literature related to the sustainability concept in the mining sector, the main focus areas that are identified as being particularly relevant for managing mining towards sustainable development, specific objectives corresponding to each of the priority dimensions as well as potential benefits and the intended outcomes of the implementation of sustainability programs from a company's viewpoint, were summarized and presented in Figure 1, which is developed by the authors adapting [1-6; 10-16].

As indicated in Figure 1, the environmental dimension of sustainability can be defined as physical sustainability, alludes to the importance of maintaining the natural environment. The economic aspect of sustainability emphasizes the need to ensure long-term economic development and provide high living standards as well as equality with regard to sharing financial benefits. The third major dimension of sustainability is a sociocultural aspect that encompasses social welfare, human well-being, and social responsibility to provide a more balanced distribution of wealth, an appropriate infrastructure, cultural development, and other related factors.

Evidence shows, that modern mining operators undertake a wide range of activities and programs that are conducive to the achievement of sustainable management objectives for each focus area. These activities can be broadly grouped into the following categories: the protection and maintenance of the natural environment, providing for the workers' needs in health care in safety, development of the local communities, and stakeholder engagement [1; 9]. With regard to the mining sector the concept of sustainable management envisages that the operational activity of the company should be carried out in accordance with principles that presume an implementation of economic as well as social development programs in an effective manner, pursuing corporate social and environmental responsibility initiatives, compensating the local communities the spillover costs, and fair distribution of the benefits and surpluses from mining operations.

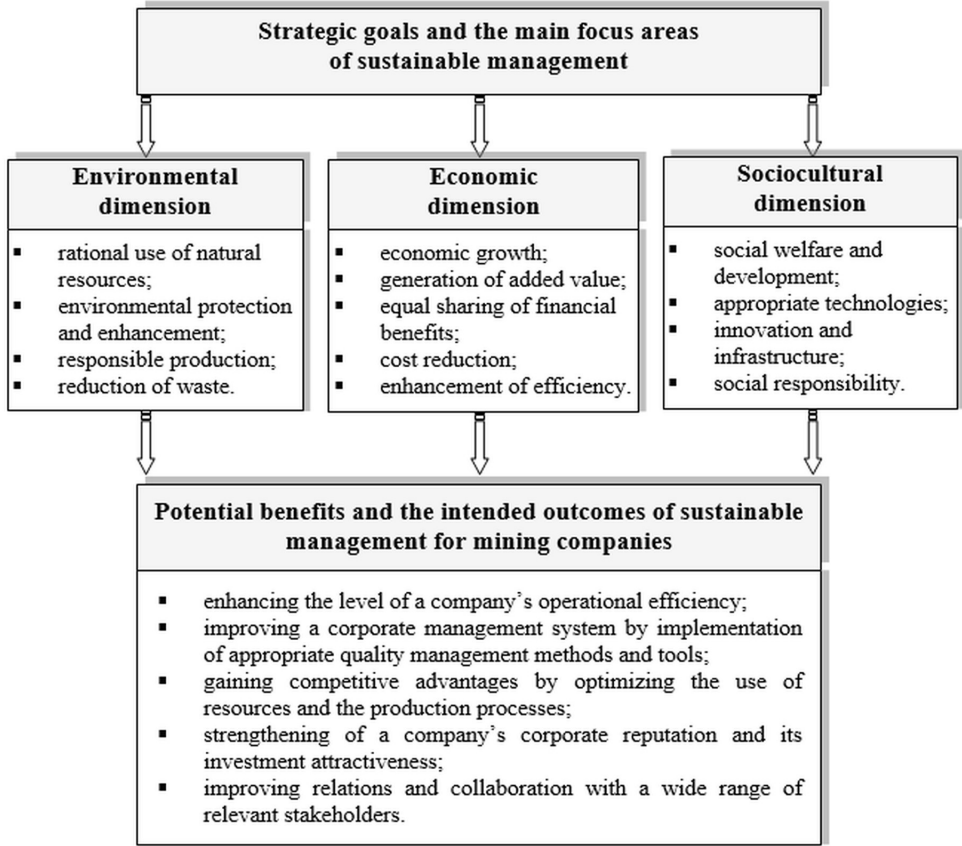


Fig. 1. Strategic goals and the potential benefits of implementing sustainability programs for the mining companies.

From an organizational viewpoint, it is important to integrate a concept of sustainable development into a company's corporate strategy and reconcile the main principles of sustainability with the operational activities and the current management system at all levels of the organization. Among the factors that promote the integration of sustainability values and principles into the organization, a special reference should be made to the corporate commitment to sustainable development and a well-developed sustainability-oriented organizational culture. In addition it requires adequate information management tools and techniques as well as specific intra-firm integration mechanisms that should be developed to reflect the organizational particularities and the specific nature of the mining industry, such as an organizational sustainability framework, appropriate policies and standards, managerial procedures and operations, as well as an integrated sustainability management system. To achieve the main sustainable development objectives, the values and principles of sustainability should be also accepted and implemented across all the levels of an organizational structure of a company. Corporate activities that aim at developing a common sustainability awareness, for example through various training programs and workshops can be also pointed out as an important step towards integrating sustainability values into the organization's strategy and business processes and deeper understanding of the social, environmental and economic context within which it operates. To summarize, successful implementation of the sustainability principles in the mining companies is influenced by multiple managerial and organizational factors, among which

the following should be highlighted: a corporate culture, a management and leadership style, a current business strategy of a company, a type of organizational structure along with appropriate managerial tools and techniques that are contributing to sustainable-oriented activities.

According to *J.A. Botin (2009)*, the integration of the sustainable development principles into business practices of organizations that operate in the mining sector requires specific integration mechanisms, such as standards and systems, positions, roles and committees, public reporting, and independent assurance [1]. In this view, we share the opinion that integrating sustainability into the operational activities of a company should be considered as a managerial rather than as an engineering task and implemented at all functional levels of an organization. From a management perspective, to embed the sustainability principles into the corporate strategy and strengthen organizational performance purposeful actions need to be appropriately planned, coherently and specifically implemented and continuously monitored. Following the approach proposed by *N. Oertwig et al. (2017)*, the appropriate planning of operational actions of a company and the availability of evaluations for the systematic monitoring are identified as essential factors for a successful implementation of the sustainability strategy at the organizational level [10]. The adequate measurement tools, control mechanisms and communication with regards to the aspect of sustainable development require the interaction between various actors, evaluation methods and operational data in order to integrate sustainability into a comprehensive strategy of a company [10; 11].

In preparing a framework for business sustainability particular attention should be also paid to the development of engagement strategies for each of the key stakeholder groups as well as identification of main risks, uncertainties, technological, economic, environmental and other relevant conditions which could affect the implementation of a company's sustainable management system. With respect to mining activities, sustainable development presumes that mining companies interact with local communities and regional governments and take into account their interests in order to cover environmental as well as social aspects when it comes to making commercial decisions and developing technical issues [1]. Overall, the dynamics of the economic environment, the business model specificities, decision-making style as well as management attitude and behavior need to be recognized and taken into consideration to establish a comprehensive framework of sustainability integration within the organization. In this context, the achievement of a multi-stakeholder consensus around the principles and criteria of sustainable mining which requires extensive consultations and discussions with various actors could be challenging for the mine managers given the difficulty of reconciling divergent interests.

With regard to the implementation of new business models in the mining sector, attention should be drawn especially to the innovation which is considered to play an essential role in achieving sustainability by meeting the increasing social demand for the innovative products and services, without losing out on efficiency [11; 12]. In the case of mining sustainable development impose the need to promote business models that ensure financially viable and environmentally sound projects, which take into account the aspects of corporate social responsibility, bring lasting benefits not only to the investors, but also to the community, as well as contribute to economic development at the local and regional levels [13]. These key characteristics of sustainable mining should be taken into account by the companies that have as their objectives the effective poverty reduction and economic prosperity in the region. It needs to be emphasized that mining in the context of sustainable development concept can be also considered as a mechanism for economic growth and social development since it creates new wealth in terms of government income and employment opportunities.

4 Conclusions

Based on the findings of the study, it is possible to outline the main aspects which are of particular importance from a company's viewpoint for ensuring successful integration of the strategic sustainability priorities and principles into business practice and managing mining operators towards sustainable development:

- the effective implementation of sustainability aspects in the business practice requires appropriate changes in corporate strategy that are interconnected in an organization at all levels of decision-making;
- in order to achieve the sustainability objectives, corresponding to the environmental, economic and social dimensions, specific intra-firm mechanisms such as an organizational sustainability framework, appropriate policies and standards, roles and committees, managerial procedures and operations, as well as an integrated sustainability management system should be developed and applied;
- adopting a multi-stakeholder approach to sustainability it needs to be emphasized that it is critical for the companies to develop organizational skills and capabilities that facilitate interaction among various actors and ensure effective working relationship in collaborative networks.

To conclude, sustainable management in the context of the mining sector should be considered as a complex and multifaceted concept which strives to maintain a fine balance between the technical, financial, social and environmental aspects of mining activities. Appropriate managerial solutions for mining enterprises' sustainability development, the monitoring and evaluation of the integration process, and a pragmatic implementation strategy are necessary to provide the optimized decision-making and put established theoretical frameworks of sustainability into business practices.

References

1. J.A. Botin, *Sustainable Management of Mining Operations* (Colorado, US: Society for Mining, Metallurgy, and Exploration, 2009)
2. A. Ibiyemi, Y.M. Adnan, M.N. Daud, *International Journal of Environment and Sustainable Development*, **14** (2), 170 (2015)
3. M.A. Rosen, *Glocalism. Journal of Culture, Politics and Innovation*, **3**, 1 (2018)
4. S. Lorenc, O. Sorokina, *Mining Science*, **22** (2), 67 (2015)
5. J.-A. Everingham, *Greener Management International*, (57), 91 (2012)
6. A. Jabłoński, *Models of Sustainable Business* (Publishing house Difin, Warsaw, 2013)
7. M. Grieg-Gran, *Financial Incentives for Improved Sustainability Performance: The Business Case and the Sustainability Dividend* (MMSD Project, London, 2001)
8. A. Lulewicz-Sas, *Corporate Social Responsibility versus Social Irresponsibility. Theory Approach* (Agencja Wydawnicza EkoPress, Białystok, 2013)
9. N. Yakovleva, *Corporate Social Responsibility in the Mining Industries* (Ashgate, Hampshire, 2005)
10. N. Oertwig, *Integration of Sustainability into the Corporate Strategy* (Springer International Publishing AG, Cham, 2017)
11. K. Maas, S. Schaltegger, N. Crutzen, *Journal of Cleaner Production*, (136), 237 (2016)

12. R. Pfriem, R. Antes, K. Fichter, M. Müller, N. Paech, S. Seuring, B. Siebenhüner, *Innovationen für eine nachhaltige Entwicklung* (GWV Fachverlage GmbH, Wiesbaden, 2006)
13. M.I. Agienko, E.P. Bondareva, G.V. Chistyakova, O.V. Zhironkina, O.I. Kalinina, IOP Conference Series: Earth and Environmental Science, **50:1**, 012022 (2017)
14. A. Gürtürk. *Integrated Reporting and Sustainability-Related Assurance: Effects, Current Practice and Future Directions* (Kassel University Press GmbH, Kassel, 2017)
15. C. Marolla. *Information and Communication Technology for Sustainable Development* (Taylor & Francis Group, Boca Raton, 2018)
16. M. Koho, S. Torvinen, A. Torres, *Objectives, Enablers and Challenges of Sustainable Development and Sustainable Manufacturing: Views and Opinions of Spanish Companies* (IEEE International, Chicago, 2011)