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Social impact assessment in the mining sector: Review and comparison of indicators frameworks

Lucia Mancini^{a,*}, Serenella Sala^b

^a European Commission, Joint Research Centre, Directorate D: Sustainable resources, Land Resources Unit, Via E. Fermi 2749, Ispra VA Italy

^b European Commission, Joint Research Centre, Directorate D: Sustainable resources, Bioeconomy Unit, Via E. Fermi 2749, Ispra VA Italy

A B S T R A C T

Mining provides inputs for other industrial sectors that are vital for sustaining population wellbeing and the functioning of global economies. At the same time, it can generate social and environmental impacts, which could compromise public acceptance of the sector. Given this twofold role in human society, the improvement of the sustainability performance is a very important objective both for industry and for the European policy, willing to boost a sustainable supply of raw materials.

In various contexts, social impacts of mining are assessed with different sets of indicators and targets. In this study we perform a review of the associated literature, identify a list of typical social impacts occurring in the sector, and explore their geographical distribution. The list of identified impacts is compared against the indicators used for assessing and promoting sustainability in different contexts and at different scales: (i) the United Nations Sustainable Development Goals (SDG), (ii) the Global Reporting Initiative (GRI), (iii) the EU policy making through the analysis of the Better Regulation policy and three impact assessment reports, and (iv) the databases used in Social Life Cycle Assessment (SLCA).

Land use-related impacts and environmental impacts affecting human health and human rights appear to be the most concerning social aspects in the mining sector. Benefits from income and employment are, instead, the main positive impacts identified in the screened literature.

The paper compares the different indicator sets used in the above-mentioned frameworks with the list of impacts emerged from the literature review. Working conditions and human rights are well-covered aspects in the indicator lists. Main differences concern demographic changes and migration due to the presence of a mine and land use-related impacts, which are described in literature and partially covered in other schemes. A challenge for sustainability assessment is the evaluation of the mining sector's contribution to society, beyond the mere economic value added, and in general the assessment of positive impacts.

1. Introduction

Strategically important for the competitiveness of the industrial sector and essential for populations' wellbeing and economic development, mineral resources are at the basis of modern societies. Many of the Sustainable Development Goals (SDGs) set by the United Nations for 2030 (UN General Assembly, 2015) could not be reached without the contribution of minerals and metals, which are fuelling the manufacturing sector and creating jobs and value added along the supply chains of material goods. At the same time, the production of mineral raw materials can generate negative environmental and social impacts, constraining the achievement of other sustainable development goals (e.g., climate action, good health, clean water).

The fact that resources use can lead to both benefits and impacts for

human societies is also reflected in the scholarly debate on the “resource curse” hypothesis. The “resource curse” is based on the observation that countries rich in natural resources tend to grow more slowly than resource-poor countries (Mikesell, 1997; Anderson, 1998; Sachs and Warner, 2001; Cai and Newth, 2013). The resource curse hypothesis has been widely analysed and empirically tested both in developing and developed countries, with diverging conclusions arising from the literature. Some authors agree on the role of institutions and governance in determining the different outcomes (e.g., van der Ploeg, 2011; Mehlum et al., 2006). Moreover, the importance of analysing regional (within-country) effects of resource booms, in order to avoid unobserved country heterogeneity, is outlined in Fleming et al. (2015) and van der Ploeg (2011).

Resource scarcity concerns driven by increasing world population

* Corresponding author.

E-mail address: lucia.mancini@ec.europa.eu (L. Mancini).

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and security of supply considerations are additional aspects that have amplified the policy relevance of raw materials in the last decades (Dewulf et al., 2016; Graedel and Reck, 2016).

The European Union adopted a Raw Materials (RM) policy and strategy in 2008. It aims at: (i) ensuring a fair and sustainable supply of non-energy, non-agricultural raw materials from global markets; (ii) boosting a sustainable domestic supply; (iii) improving resource efficiency and supply of secondary raw materials through recycling (EC - European Commission, 2008). In order to support the EU policy on RM, the European Commission has developed the Raw Materials Information System (RMIS), which is a European reference web-based knowledge platform for non-energy, non-agricultural materials from primary and secondary sources. The RMIS includes information on trade, social and environmental considerations (EC - European Commission, 2017).

As described in the Raw Materials Scoreboard (EC - European Commission, 2016), which presents an overview of considerations related to raw materials in EU, public acceptance of the extractive sector is very low in Europe and the general public has little trust that the extractive industry can behave responsibly. The lack of so-called “Social Licence to Operate” (SLO) can be a potential bottleneck in the process of enhancing domestic production in EU. Among other factors, mitigation of environmental and social impacts of the sector contribute to create and maintain social acceptability (Moffat and Zhang, 2014). Moreover, human rights risk, conflicts, and political instability can affect the raw materials security of supply (Blengini et al., 2017).

From a trade perspective, the import of minerals from conflict affected-areas is an issue of concern for policy and downstream operators trying to sustain legitimate trade. The Kimberley process,¹ initiated in 2000, has established a voluntary international certification scheme for diamonds. The Dodd-Frank Wall Street Reform and Consumer Protection Act² has tackled the challenge of conflict-free sourcing of Tin, Tungsten, Tantalum, and Gold in US. The European Union Regulation on conflict minerals was published in May 2017 and will become effective from 2021 (EU, 2017).

The provision and use of raw materials is a central topic also for scholars in the research field of sustainability assessment. While the discipline is foremost advanced in the assessment of negative impacts, the consideration of the positive impacts is a more recent field of investigation (Di Cesare et al., 2018). The Social Life Cycle Assessment (SLCA) methodology assesses the social and sociological aspects of products, their actual and potential positive and negative impacts along the life cycle. It makes use of both site-specific and generic data on countries and sectors provided by dedicated databases.

Improving the social sustainability of the sector is a relevant objective also for industries in the raw materials production, especially in view of gaining trust and acceptability (Euromines, 2016; ICMM, 2005). This is reflected in the growing role of Corporate Social Responsibility (CSR) and information disclosure practices, like the Global Reporting Initiative (GRI) (Global Reporting Initiative, 2013a). Companies in the resource sector are involved in many initiatives,³ e.g., the Conflict-Free Sourcing Initiative, or the Organization Environmental Footprint, which includes, among others, also considerations of human health impacts (EC - European Commission, 2013). The “Responsible Mining Index” (RMF, 2017) is currently under development for the purpose of measuring mining company performances in terms of social, environmental and governance practices, including their efforts to contribute to the SDGs (RMF, 2017).

So far, despite its relevance, the evaluation of social sustainability performance has been conducted adopting a variety of approaches and indicators (Azapagic, 2004). Data collection performed at company

level for sustainability reporting is rarely used in other contexts, while it could represent a rich source of information for research, policy makers, and supply chain analysis (e.g., Northey et al., 2013). However, the harmonization of indicators for the social assessment of the mining sector could ease the information exchange among different stakeholders.

The aim of this paper is to review and analyse indicators used in different contexts for assessing the social impacts of the mining sector. It aims at exploring the most relevant social aspects in the sector, their geographical distribution, to what extent top-down approaches used in policy contexts (at global and country level) are able to capture and measure social considerations at the local level of a community (bottom-up perspective).

For this we, firstly, examined the scientific and grey literature to obtain a reference list of social impacts characterizing the mining sector. Secondly, we compare this list with the following schemes for the social sustainability assessment:

- Sustainable Development Goals (SDG), which is the main global reference for sustainable development policies.
- Global Reporting Initiative (GRI), one of most widely used framework for company sustainability reporting.
- EU Better Regulation policy (EC - European Commission, 2015), taking into account impact assessment guidelines and practices as applied in three impact assessment reports related to the extractive sector. While other countries and regions face similar resource security challenges as the EU, we consider that the assessment of social impacts is particularly crucial in the European context, where the RM policy strategy aims at improving both security of supply, sustainability of the sector, and consequently its public acceptance.
- Social Life Cycle Assessment (SLCA) databases, a methodology for the evaluation of social impacts along supply chains.

The second section of the paper describes the methodology used in the literature review. The third section shows the results of the review, the impacts categories clustering and the geographical distribution analysis. The fourth section compares the review results with the indicators used in the above-mentioned frameworks. The final section illustrates concluding considerations on the completeness of the examined documents and presents challenges for social sustainability assessments in different contexts.

2. Methodology: literature review of social impacts in mining

The first part of this section focuses on the literature review, describing the features of the selected sample of studies. Furthermore, it illustrates the different frameworks used for the comparison with the review results.

2.1. Literature review

The literature review performed in this study aimed at having a representative sample of studies from the literature, describing the most frequent social impacts occurring in the mining sectors. Therefore, the search was conducted through both commonly used web research engines and academic interdisciplinary databases including Scopus and Google Scholar. The key words used in the search were “social impacts mining” in the timeframe 2000–2017. We complemented this with thematic searches, in which other keywords were added to the original anchor title: *econom**, *employment*, *environment**, *health*, *safety*, *human rights*, *land use*, *demograph**, and *migration*. From the results, we selected the most cited studies. The aim was not to comprehensively cover the literature in the field, but to obtain a list of most common social impacts characterizing the sector.

We selected 50 studies following these criteria:

¹ <https://www.kimberleyprocess.com/en>.

² Section 1502 and 1504, <https://www.sec.gov/about/laws/wallstreetreform-cpa.pdf>.

³ E.g.: Initiative for Responsible Mining Assurance (IRMA); Aluminium Stewardship Initiative (ASI).

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