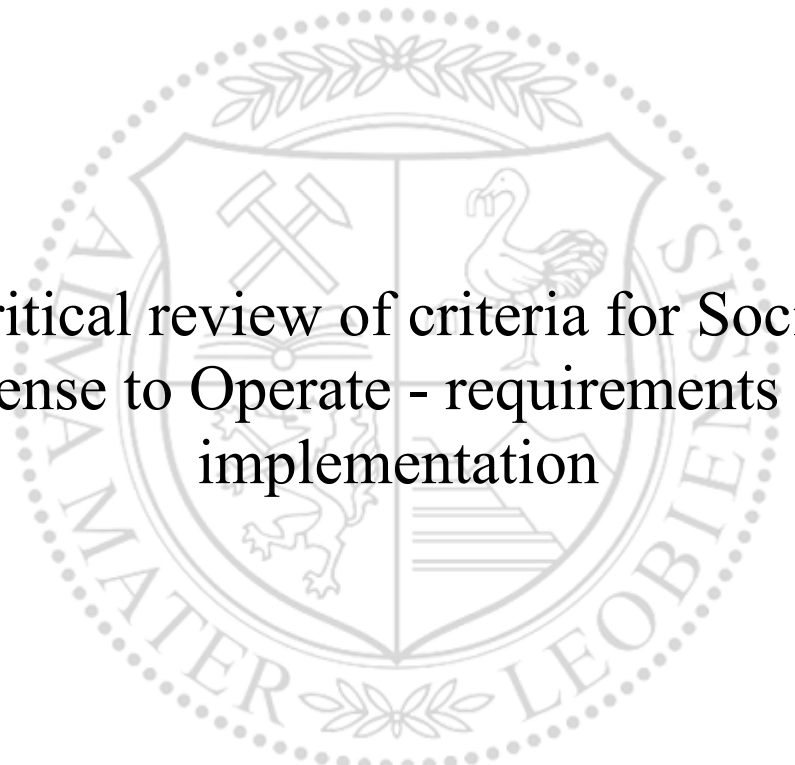




Chair of Mining Engineering and Mineral Economics

Master's Thesis



Critical review of criteria for Social
License to Operate - requirements and
implementation

Daria Egoshina

June 2024



AFFIDAVIT

I declare on oath that I wrote this thesis independently, did not use any sources and aids other than those specified, have fully and truthfully reported the use of generative methods and models of artificial intelligence, and did not otherwise use any other unauthorized aids.

I declare that I have read, understood and complied with the "Good Scientific Practice" of the Montanuniversität Leoben.

Furthermore, I declare that the electronic and printed versions of the submitted thesis are identical in form and content.

Date 07.06.2024

Signature Author
Daria Egoshina

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List of abbreviations

CS – Corporate Sustainability
CSR – Corporate Social Responsibility
DGEG – Portuguese Mining Authority
EIA – Environmental Impact Assessment
EITI – Extractive Industries Transparency Initiative
EU – European Union
ESG – Environmental, Social, and Governance
HOQ – House of Quality Analysis
ICMM – International Council on Mining and Metals
NGOs – Non-Governmental Organization
PRI – Principles for Responsible Investment
RMMS – Responsible Mining Management System
SDGs – Sustainable Development Goals
SEA – Strategic Environmental Assessments
SIC – Site of Community Importance
SIIF – Social Investment Impact Framework
SLO – Social License to Operate
SPA – Special Protection Area
TSM – Towards Sustainable Mining

Abstract

Social performance is becoming increasingly in demand due to the growing emphasis in industry on sustainable practices and the willingness of mining companies to adhere to the concept and principles of the social license to operate (SLO). The difficulty in meeting the SLO criteria arises from a widespread lack of clarity about their specific components. This uncertainty creates challenges for mining companies seeking to comply with these criteria, as there is a lack of a clear and commonly accepted definition and understanding of the elements that compose the SLO. The primary objective of this research is to conduct a comprehensive analysis of the SLO, exploring its conceptualization, key stakeholders, and theoretical frameworks. The study aims to delve into critical examining of SLO criteria and investigating the intricate relationship between the SLO and sustainable development goals (SDGs) through examining case studies of mining companies. The research methodology was applied based on the literature on the subject, scientific articles and reviewing annual sustainability reports issued by mining companies. The study presents the results of the comparative case study of three mining companies in the Iberian Pyrite Belt, using method of House of Quality Analysis (HOQ). By analyzing case studies of companies' SLO performance in their reports, the research detected similarities and variations in meeting the SLO standards. The results of the analysis have provided valuable insights into which activities yield best results in the SLO attainment, which SLO criteria maximize the likelihood of success in maintaining the SLO, highlighting industry-specific best practices.

1 Introduction

1.1 Motivation/ Background of the work

The mining industry plays a pivotal role in the development of the global economy, providing essential raw materials for various industries. Over the years, the mining industry has witnessed a shift in societal expectations to emphasize responsible and sustainable practices. Thus, the current vector of development for mining companies around the world is a strategy of sustainable development in the context of the main objectives of production activities in interaction with a local community. However, the industry is facing increasing attention regarding its social and environmental impact: before starting operations, mining companies are challenged to convince and prove to governments, the public and local communities that their projects will not harm the ecosystem or the society. This has led to the emergence of the concept of social license to operate (SLO). In essence, an SLO represents the acceptance and approval of a company by a local community and other key stakeholders, which is essential to ensure the sustainability of mining operations. The concept of the SLO is site-specific. The SLO may be a recommended practice in soft-law countries, or it may be established at the regulatory level, where the SLO must be obtained and validated prior to project implementation, which is usually the case in hard-law countries.

The more familiar and studied concept of corporate social responsibility (CSR) is related to SLO, though is not the same. While the SLO can be part of the CSR, in the context of sustainable development goals and social responsibility, the concepts are different, and this difference is important to understand.

The historical evolution of the SLO reflects changes in stakeholder relations, environmental awareness, and the industry's role in achieving broader sustainability goals. Understanding these historical contexts is critical to understanding the current challenges and opportunities associated with the concept of SLO. As the significance of sustainable business practices gains acknowledgment, Environmental, Social, and Governance (ESG) requirements have emerged as pivotal benchmarks for assessing a company's responsible practices. The SLO certainly influences this evaluation and affects the risk of an investment in a project for a company. The inquiry lies in understanding the interrelation between these aspects and the extent to which the SLO impacts them.

In the pursuit of aligning with sustainable practices and preserving a positive corporate reputation, not every company adheres to a fair play: some employ deceptive strategies, such as greenwashing. Greenwashing is the practice of presenting an environmentally responsible image or claim to conceal a less environmentally friendly reality. Mining companies might engage in greenwashing by creating an impression that their operations are more sustainable and socially responsible than they are.

Concluding, there are several main problems raised, to which this thesis aims to address:

First is the uncertainty and lack of clarity in a concept of the SLO, including:

- An ambiguity in understanding when, in which shape or form, the SLO is considered granted, and to what extent the SLO is fundamental.
- A lack of clarity on how the mining industry perceives and responds to the SLO.

- A discrepancy between theoretical frameworks mentioning stakeholder engagement and its practical implementation.
- A lack of understanding of components of SLO criteria.

1.2 Main Goal(s) and tasks

Considering the identified issues within the scope of the thesis, the primary objective of this research is to conduct a comprehensive analysis of SLO and present critical review of SLO criteria. Outlined tasks, aimed to address those problems and contribute to a more comprehensive and nuanced understanding of SLO in the mining industry, are as follows:

- Clarify and conceptualize the SLO by exploring whether it is a process, a set of actions, or a formal agreement.
- Conduct a comprehensive analysis of case studies based on their issued sustainability reports.
- Propose fair SLO criteria to assess the SLO performance of mining companies under study.
- Evaluate the effectiveness of company initiatives in an obtainment of SLO.
- Describe the relationship and correlation between the SLO and specific SDGs.

The structure of this thesis is presented as follows: chapter 2 conducts a thorough literature review, exploring the conceptualization and evolution of the SLO, key stakeholders, theoretical frameworks. The chapter also delves into detailed exploration of the criteria used for assessing the SLO and delineates of the SLO criteria. Chapter 3 outlines the research methodology, detailing the approach, data collection methods, and analysis techniques. Chapter 4 provides an assumption of alignment between principles of the SLO and the SDGs. Chapter 5 provides the analysis of case studies demonstrating the analysis of sustainability reports of mining companies and their social performance. Additionally, it provides the results of house of quality analysis. Chapter 6 presents discussion of the results, seeking to find the common patterns in the SLO performance of the companies, as well as their differences. The thesis concludes with a summary of key findings, contributions to the field and implications.

2 Literature review

2.1 The concept of social license to operate

The mining industry has traditionally been one of the most important industries for the economic development of the countries in which it is practiced and for a growth of local communities located around mining operations (NARREI & ATAEE-POUR, 2021). The activities of mining companies can cause conflicting opinions among local communities in the extraction area: some recognize possible positive effects such as increased employment, regional development, and higher incomes, while the others find more reasons to be apprehensive (KOMNITSAS, 2020). However, mining operations are more often associated with negative impact on local communities and the environment (ASIF & CHEN, 2016; PEREZ & SANCHEZ, 2009). In this regard, society, especially in mining areas, is very wary of mining projects, which leads to the emergence of social risks for mining companies (REY-MARTÍ ET AL., 2023A). To minimize them, mining companies around the world are trying to act in accordance with the principles of corporate social responsibility.

The CSR is a management concept within which companies incorporate social and environmental considerations into their business operations and interactions with stakeholders. By recognizing the value of all stakeholders, the CSR aims to strategically position the company as sustainable and responsible, guided by the principles of transparency and an open dialogue. It means that it fosters the sustainable behavior by actively involving diverse stakeholders in the decision-making process (LIM & GREENWOOD, 2017).

The solution to the problem of forming the population's perception of mining companies' activities as socially acceptable, can be achieved through the transition principles of CSR (KOMNITSAS, 2020).

The sustainable development is the integration of activities in the following three key areas, which should contribute to meeting the needs of the society, not just individuals or legal entities (KOMNITSAS, 2020):

- Technical and economic activities that ensure economic growth.
- Environmental activities that ensure the rational use of natural resources and environmental protection.
- Social activities that take care of employees and contribute to the development of society in the field of environmental protection.

However, following the CSR principles is not enough to reduce social risks for one's projects (MOFFAT & ZHANG, 2014). Only obtaining a so-called social license to operate can be a real guarantee of this (HALL ET AL., 2015; OWEN & KEMP, 2013; PRNO & SCOTT SLOCOMBE, 2012).

The SLO emerged as a concept in the late 1990s as a response to increasing social risks in the mining industry (THOMSON & BOUTILIER, 2011; OWEN & KEMP, 2013; LESSER ET AL., 2021; HILSON & MURCK, 2000; KOMNITSAS, 2020). A social license is understood as an informal permission on the part of the society as an abstract, not always formalized and/or having legal formalization in contrast to the state but interested in its own comfort and sustainable development of the participant. It is an ongoing process of gaining an acceptance of local community members and other stakeholders, and most importantly, maintaining it (LESSER ET

AL., 2021; MOFFAT & ZHANG, 2014; (PRNO & SCOTT SLOCOMBE, 2012; THOMSON & BOUTILIER, 2011). It implies that the social license is not a formal agreement or a document, but the effective or current credibility, reliability and endorsement of company and its projects.

An acceptance in the context of the SLO may be a necessity driven by political interests, especially in democratic jurisdictions. In the presence of a dissatisfied society, the process of transferring permits and operating licenses becomes more complicated. Without supporting society, the government risks losing its authority and losing political supporters. At the global level, different scenarios exist due to the cultural influences and differences in legislation. The concept of social licensing is indeed predisposed to comply with the legal rules of countries operating under common law principles. While communities and civil society tend to view the social licensing in terms of a dynamic and ongoing relationship between a company and its stakeholders, regulators and companies view this license as a formal permission associated with specific tasks and events in which the regulator plays a central grantor role.

Thus, an adherence to the CSR principles with publication of necessary reports - is not only a public declaration of diligent compliance with formalized standards and procedures during the company's activities, but also a demonstration of the company's involvement in the problems of sustainable development of society and its territory of residence (LIM & GREENWOOD, 2017). At this point, it is very important to understand that the CSR and the SLO are different concepts, although often perceived the same and, indeed, intersect with each other. Both are applied in companies to adhere to responsible practices and also to enhance the company's image among their stakeholders. In this context, the SLO can be perceived as a goal of the CSR strategy through which company might gain legitimacy (BLOWFIELD & MURRAY, 2019).

The social license acts as the "path" for a company to follow, to secure approval from public communities. Meanwhile, the CSR strategies are serving as models to prevent and minimize environmental impact and enhance social well-being. Main characteristics of these two concepts are presented in Fig. 2.1. Fig. 2.1 is an original creation based on information sourced from the following literature (BLOWFIELD & MURRAY, 2019; CESAR, 2021; N. COOK ET AL., 2015; EDWARDS ET AL., 2019; TUULENTIE ET AL., 2019).

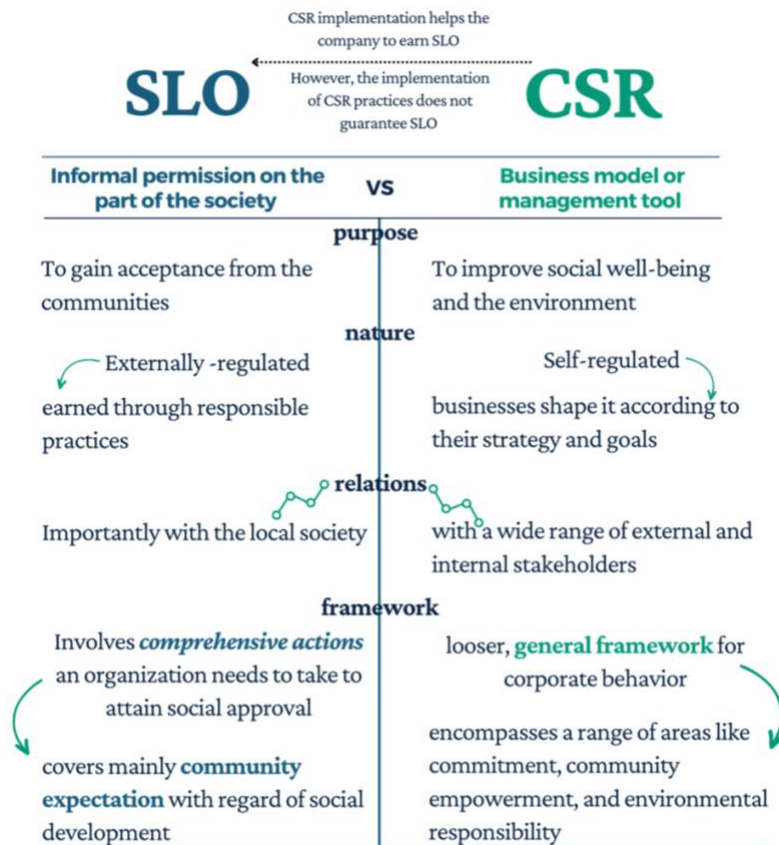


Fig. 2.1: The main characteristics of the SLO concept and the CSR concept (original source)

Despite the recognition of the importance of obtaining the SLO by the world's largest mining companies due to the reduction of social risks for them (PRNO & SCOTT SLOCOMBE, 2012), this concept remains largely metaphorical. The SLO represents an ongoing negotiation process and serves as a supplement to regulatory licenses; described as “intangible” (ESTEVES ET AL., 2012; FRANKS & COHEN, 2012) and “difficult if not impossible to measure” (PARSONS R. & LACEY J., 2012). Later, other terms preferably used by mining companies have emerged: a term “social license to operate” can be substituted with “social acceptance” or “social performance”. A term “stakeholder” can mean “concerned public”, “interested public”, “host communities”, or “affected communities” (TOST ET AL., 2021). Omitting or substituting the term “license” allows for a broader focus on overall social impact and performance, thus, gives a mining company an opportunity to establish tasks and goals by their choice and report results according to them.

The aspect of the SLO is being tangible or intangible was argued by NELSEN, 2006. The author stated that the SLO can be considered as tangible, because the opposed and dissatisfied community is capable of interrupting, or delaying, or stopping the mining operation. He, though, agreed that the SLO has intangible nature due to the impossibility to formalize this license in the same manner as the statutory licenses and authorizations are granted to companies by governments.

In contrast, this idea was criticized by some experts, like SHEPHEARD & MARTIN, 2008, who argued for more legally defensible approach. In their view, granting social licenses needs a structured and lawful assessment rather than relying on intangible criteria. The SLO should be determined through a rigorous analysis that follows specific laws and regulations, specifically focusing on documenting the core values and beliefs of stakeholders within a legally mandated social and environmental impact evaluation process.

Nevertheless, commonly recognized, the SLO is not something that can be granted by civil authorities, political bodies, or the legal system (FRANKS & COHEN, 2012; THOMSON & BOUTILIER, 2011), and this fact complicates managerial decision-making in the context of good faith implementation of the CSR principles (OWEN & KEMP, 2013).

Obtaining the SLO for a mining project signifies an approval by most of the involved stakeholders (KOMNITSAS, 2020). However, it's important to recognize that SLO is not a static concept (LESSER ET AL., 2021). It can evolve over time due to several reasons: economic conditions in a region or country, due to changes in the company's activities and policies (KOMNITSAS, 2020). NELSEN, 2006 also highlights that the SLO must be adapted to different social paradigms as cultures evolve. Mostly, the SLO is granted site-specifically, implying that the public or community of stakeholders grants the SLO to particular projects of the company and/or its operations, not to the whole company (THOMSON & BOUTILIER, 2011). Therefore, the next crucial step after obtaining the SLO is its maintenance. This step is both challenging and of utmost importance. It involves the ongoing effort to sustain the local community support, which is vital for the long-term sustainability of the project and acceptance of the mining project.

From the above, the following questions arise: "How can we find out whether a project or a company has obtained a social license to carry out its activities? And what is needed to obtain it? The next chapters will explain it in a more straightforward way.

2.2 Key stakeholders in the SLO

The SLO, as has been discussed earlier, is earned when the mining project and its operations are approved by all the stakeholders, who have a mutual interest in mining project (THOMSON & BOUTILIER, 2011).

A stakeholder is defined as any group, or individuals who are either directly affected or can be affected by the organization's operation or possess the capability to influence it (THOMSON & BOUTILIER, 2011).

Understanding the role of stakeholders, their expectations and rights is crucial for a mining company (MUTTI ET AL., 2012). Identifying main stakeholders in the region or country of study and acknowledging their influence on obtaining acceptance of company's activities will reduce possible conflict situations (AALTONEN ET AL., 2008; PRNO & SCOTT SLOCOMBE, 2012).

Most literature sources, therefore, mention the following key stakeholders:

- Local communities

Several studies state that the most affected stakeholders in mining sector regardless country and/or region, are local communities (ALI-KHAN & MULVIHILL, 2008; PRNO & SCOTT SLOCOMBE, 2012). They are sensitive to changes in the local social landscape, demographic changes, environmental changes and structural transformation of the local social environment (PETROVA & MARINOVA, 2013). Therefore, an understanding of the local culture, the language and the history is of the utmost importance. The needs for educating the local community members about the mining project are also defined as a key factor of attaining SLO (NELSEN, 2006).

- Governments

The government plays an important role since it sets basic and mandatory conditions to have the SLO in place (KOMNITSAS, 2020). Regulatory bodies and government entities within a country also play a crucial role in shaping the scale and characteristics of the mining industry. The study conducted by the International Council on Mining and Metals (ICMM) in 2006, emphasizes the vital role of government capabilities in regulating the mineral industry and the ability of ensuring the effective management of mining benefits for local communities (THOMSON & BOUTILIER, 2011).

Other stakeholders in perspective to the SLO, that are identified from the literature (CHIPANGAMATE ET AL., 2023; LESSER ET AL., 2021; LIM & GREENWOOD, 2017; MUTTI ET AL., 2012; PRNO & SCOTT SLOCOMBE, 2012), are shown in Fig. 2.2.



Fig. 2.2: Key stakeholders in the SLO (original source)

The social aspect of mining was studied in Australia (SOLOMON ET AL., 2008), and brought attention to a crucial aspect of the industry. While the study focuses on a specific country, the authors acknowledge the challenges in generalizing the social context of mining.

In this exploration, both powerful organizations such as NGOs and seemingly less influential voices, like those affected by mining, are recognized as stakeholders. Engaging with these diverse stakeholders becomes a crucial task due to their varying values and perspectives. Attempting to define stakeholder’s expectations and standards in the mining industry proves challenging, given this diversity.

The authors highlight the ICMM Sustainability Framework (ICMM, 2006) and the Minerals Council of Australia's "Enduring Value" (MCA, 2006) as examples. These frameworks serve as the attempts to navigate the complexities of a stakeholder engagement and expectation management in the mining sector. It's emphasized that the companies often prioritize maintaining their corporate reputation, while other stakeholders may prioritize environmental sustainability, or public rights as key values.

A mining company eventually faces the stakeholders that possess the authority or influence over crucial resources essential for the project. These stakeholders typically have the capability to control or regulate access to the key resources, impacting the functioning or, on the contrary, malfunctioning (for example, road closures and protests), success, or sustainability of the project. As a response to this unavoidable dependence on stakeholders, a mining company must choose the strategy that will tackle those stakeholders. This challenging situation, called the resource dependence, is described in paper by THOMSON & BOUTILIER, 2011.

It is also important to mention that stakeholders might not act individually, allowing stakeholders that do not possess legal power and direct control over essential resources (like NGOs, for instance) to interact with the ones that have this power (like governments, banks, suppliers, etc.). Thus, some stakeholders can influence other stakeholders to act according in the direction of their interests through political maneuvering. These types of connection among stakeholders must be identified by the mining company as they can affect the project significantly. Such interactions can lead to the withhold of key resources or, if applicable, a product boycott. The impacts can also be less direct.

They can apply influence by controlling local resource access, and they also have the capability to impact the parent company's access to necessary resources. Since a mining company needs financing, access to deposits at other sites in the future, and willing customers, these less empowered stakeholders can, through the launch of national or international campaigns, restrict the access to equity financing, make the mining company seem less attractive to future employees and/or customers. A negative reputation in community relations may also restrict the company's future access to various sites (THOMSON & BOUTILIER, 2011).

Therefore, the process of mapping stakeholders, conducting comprehensive analyses of their possible networks, analyzing potential impacts on both the mining company and mining project, and ultimately, most important, attaining essential license to operate becomes of paramount importance. The safeguarding of the project's financial feasibility, coupled with the protection of the mining company's operational standing, depends significantly on obtaining the SLO.

2.3 Theoretical frameworks for the SLO

The efforts have been made in the scientific community to identify general components of the SLO. THOMSON & BOUTILIER, 2011 identifies three main components of the SLO, such as legitimacy, credibility, and trust. Community perceptions of the acceptability of a company's mining project becomes a social license to operate. In their work authors explain resource dependence theory and define it as a theoretical framework that helps to understand how mining companies manage external dependencies. It aligns closely with the principles of the SLO, emphasizing the importance of positive relationships, stakeholder engagement, and strategic responses to external dependencies for sustainable and responsible operations. The framework is schematized in Fig. 2.3.

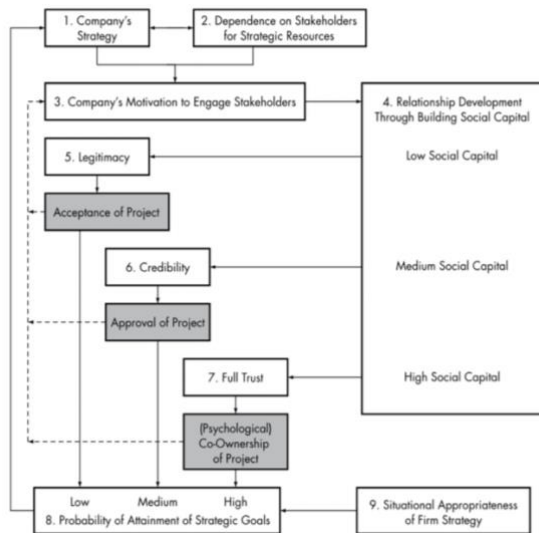


Fig. 2.3: Gaining the SLO (from THOMSON & BOUTILIER, 2011)

After identifying stakeholders, both affected by the mining company and the ones who themselves can affect the company (represented by boxes 1 and 2), the mining company chooses the strategy of engagement with stakeholders. The level of social capital will vary depending on the evolving and positively directed relationships (box 4). It starts on a low level, then it will increase until the local community perceives the project as the legitimate one (box 5). This will allow the project to obtain the first phase, so called “social acceptance”. The accumulation of social capital will mean that the company continues to put more effort into building engaged relationships, which will ultimately allow the company to acquire “credibility” (box 6). By continuing to maintain a high level of engagement, the company can earn approval for the project.

In total, four levels of the social license and the three boundary criteria separating them are identified by the authors (Fig. 2.4).

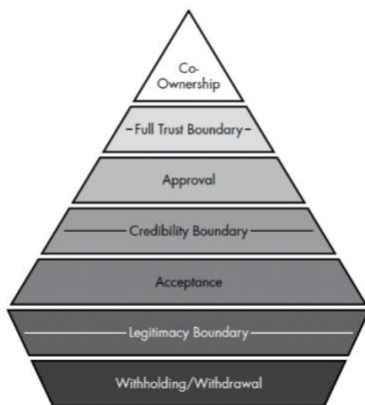


Fig. 2.4: Levels of the social license with boundary criteria between them (from THOMSON & BOUTILIER, 2011).

At the “withholding/withdrawal” phase a mining project is rejected, which can happen in the beginning of introducing the project to stakeholders, or after the project loses its legitimacy. Legitimacy is defined as an acceptance by both the public and relevant elite organizations that a company or project has the right to exist and conduct its activities in a manner it has

chosen. Legitimacy can be perceived in different ways, depending on the dimension, therefore the reasons behind a project being accepted or rejected can be various, and are shown in Tab. 2.1.

Tab. 2.1: Description of different types of legitimacy (DEEGAN, 2019; THOMSON & BOUTILIER, 2011)

Legitimacy	Achieved when:	Lost when:
Moral (Normative): Company's actions align with societal norms, values, and expectations.	The project is seen as socially responsible and ethical, conforms to social, cultural, or political norms of community.	Company doesn't meet stakeholders' expectations (e.g. doesn't adhere to safety standards and/or doesn't minimize environmental impact).
Cognitive: Shared understanding among stakeholders regarding the appropriateness of the company's actions.	The project contributes positively to the community (agreed by all stakeholders); adheres to the industry standards.	The introduction of the project is confusing; the mining company has no legal rights and/or permits for their activities.
Pragmatic: The perceived usefulness and benefits that a company provides to its stakeholders and the broader community	The project is recognized for its economic contributions and job creation.	There are no benefits for local communities; the environmental resources are negatively affected by the project.
Procedural: The fairness and transparency in decision-making processes and interactions with stakeholders	The mining company involves communities in decision-making.	The mining company doesn't address concerns of the local communities openly.

The next criterion shown in Fig. 2.4 is credibility, which is earned through the actual actions undertaken by the mining company. Once legitimacy has been established, the focus shifts to fulfilling the promises made by the company. It becomes paramount to maintain consistency between the company's statements and actions. Transparency in decision-making processes and the fair treatment of all stakeholders are fundamental aspects of building credibility. It is crucial, at this juncture, for the company to consistently address community concerns and present realistic solutions. An avoidance of “uncomfortable” questions, or not admitting the challenging situations in communities might lead to the damage of credibility.

To enhance credibility, the mining company should actively identify and address community priorities promptly. Failure to do so may be perceived as a failure to comprehend and fulfill commitments, posing a risk to the company's reputation and potentially questioning its legitimacy. Another essential step to avoid any possible misunderstandings is to establish formal agreements and contracts that provide a structured framework. Defining rules, roles, and responsibilities further contributes to mitigating the risk of the project losing acceptance. By doing so, the mining company not only safeguards its reputation but also reinforces trust and legitimacy it has worked to attain.

So, with both legitimacy and credibility established, the mining project can secure project approval (shown in Fig. 2.4). This level of the social license signifies the mitigation of sociopolitical risk. To reach the highest level of the proposed pyramid model “Co-ownership level”, a mining company must gain full trust of the local communities. While trust, discussed earlier in terms of reliability, is integral to credibility, the full-trust boundary criterion goes a step further. It implies that communities believe the mining company will consistently act in their best interest and align with their values. At this stage, it is no longer enough to simply resolve issues, the company must demonstrate a genuine commitment to suggesting and creating opportunities that enhance community development and fulfilling their goals.

The decision-making system ensures active community involvement, when feasible and reasonable. Furthermore, communities not only participate in decision-making but also support and trust the company's choices, even if they differ from their opinions, believing that the company will never take actions that could harm the communities. There is an open dialogue between both parties without hiding facts or information. For instance, if there are any obstacles while resolving a problem, this matter will be discussed with community transparently, focusing on collaborative work to pursue shared goals (THOMSON & BOUTILIER, 2011).

The achievement of the co-ownership level signifies the establishment of strong collaborative relationships between the mining company and the community. At this stage, both parties view the mining project as a shared venture. The community begins to align its identity with the mining company and actively advocates for its interests. As can be noticed, within the framework of this model (Fig. 2.4), the SLO concept is more descriptive.

Authors MOFFAT & ZHANG, 2014 in their work, place trust as a core component in obtaining the SLO. They propose model (Fig. 2.5), where trust could be built on engagement with communities (contact quantity and quality), involving them in decision-making processes (procedural fairness) and good management of impacts on the social infrastructure (MOFFAT & ZHANG, 2014). These are four essential components of attaining trust. Mentioned criteria will be thoroughly explained in Chapter 2.5.

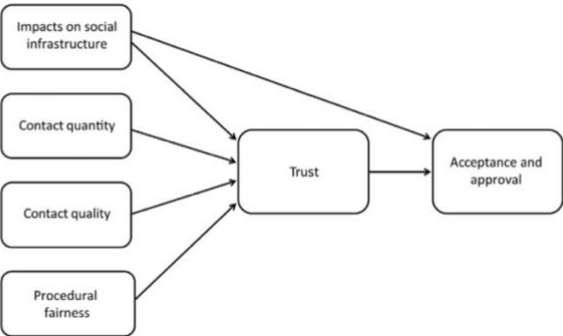


Fig. 2.5: Critical factors strongly affecting the acceptance and approval of mining project (from MOFFAT & ZHANG, 2014).

Later in 2020, (KOMNITSAS, 2020) introduced a methodological approach outlining the primary steps that might be pursued in the process of obtaining the SLO, presented in Fig. 2.6.

It involves initially establishing a clear definition of a goal and the scope of a mining project. This encompasses details such as a project type, data requirements, key risks, an ore extraction method (surface, underground, deep-sea, or landfill), which were not included or mentioned in previous theoretical frameworks.

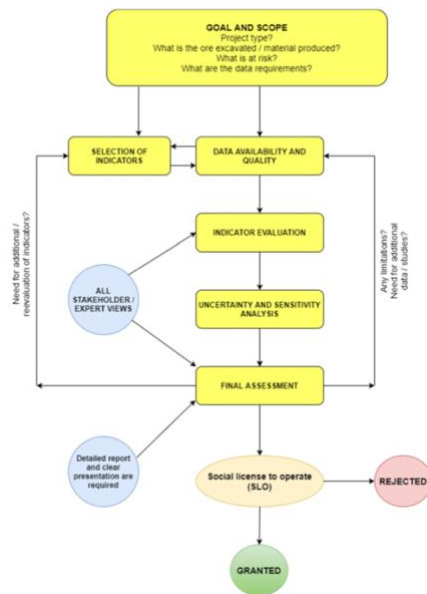


Fig. 2.6: Flowsheet of activities that need to be followed for granting the SLO (from KOMNITSAS, 2020)

2.4 European context of the SLO

The concept of SLO is more researched in Latin America, Africa, Asia (JARTTI ET AL., 2020; KOMNITSAS, 2020; LESSER ET AL., 2021). Therefore, a need to study the SLO in the European context has emerged. When it comes to the SLO in the European Union (EU), it is important to understand that there are diverse worldviews. This is particularly true when trying to figure out the government's role and responsibility (LESSER ET AL., 2021). In Europe, the mining industry has historically faced limitations and challenges in comparison to the rest of the world. First, EU is known for the strictest environmental regulatory framework (JARTTI ET AL., 2020), seeking for avoidance of environmental impacts. It significantly limits mining operations or makes it more costly and complex, especially compared to the other parts of the world with lower operational costs. An opposition from various stakeholders, including local communities, environmental groups, and citizens, is mostly concerned about environmental and social issues related to mining activities (KOMNITSAS, 2020).

However, in recent years, there have been noticeable shifts. Europe is moving towards a resource-efficient circular economy, where the focus is on sustainability and responsible resource management. The mining industry tends to recover metals from secondary resources (SPOOREN ET AL., 2020), which is supported by EU initiatives. Adoption of EU waste legislation with increased recycling targets, including those for packaging waste (80% for ferrous metals and 60% for aluminum) serves as a demonstration of such a commitment (EUROPEAN COMMISSION, 2023). This initiative aligns with the SLO principles, as it indicates responsible resource management and a reduced environmental footprint, which, as believed, can improve community acceptance (KOMNITSAS, 2020).

The European Union's efforts are aimed at research and innovation activities. It is extremely likely that if the EU allows the mining industry to decline, this could lead to a loss of expertise in the field, investment in education, for it not to happen, the Horizon 2020 program was being implemented between 2014 and 2020 (EUROPEAN COMMISSION, 2020). After, there has been launched another program "Horizon Europe", which will run from 2021 to 2027 (EUROPEAN COMMISSION, 2021). These investments help develop advanced and

environmentally friendly mining practices, which promise to improve a public perception of the mining sector and trust in it. In support of this, within program Horizon Europe, there is an ongoing project ‘MINE.THE.GAP’ (MINE.THE.GAP, 2020) which is aimed to change the perception of mining and mineral resources, focusing on modern, environmentally friendly methods. The participants of the program state that there is a limited awareness about the significance of mineral raw materials in our society, and negative perception of mining is often associated with outdated and environmentally unfriendly practices. Indeed, public attitude towards mining in Europe is generally considered to be skeptical, or opposed to mining activities, particularly in environmentally sensitive areas, concerned about inadequate waste management (AZNAR-SÁNCHEZ ET AL., 2018; KOMNITSAS, 2020; LESSER ET AL., 2021).

It has been stated that many known mineral deposits have been depleted or are nearing exhaustion, and new projects are facing lengthy processes to obtain mining permits (KOMNITSAS, 2020), which makes Europe dependent on raw materials (TOST ET AL., 2021). Therefore, there has been an increased attention on exploration and mapping of mineral resources, which indicates a growing interest in harnessing domestic resources (BERTRAND ET AL., 2016; DOMENECH & BAHN-WALKOWIAK, 2019; EUROPEAN COMMISSION, 2023).

MIREU (Mining and Metallurgy Regions EU) is another project within The Horizon 2020 program that discusses the concept of the SLO and proposes the Scalar SLO Model, adapted to the context of European mining (LESSER ET AL., 2021). The model draws an inspiration from Moffat and Zhang's research, specifically incorporating their findings into the community and societal dimensions, and is built upon THOMSON AND BOUTILIER's normative criteria, which serve as indicators of how a community perceives the company's behavior. The distinguishment between factors that are particularly critical for separately: community SLO and societal SLO, are shown in Fig. 2.7. Considering the aspect of relationship between a mining company and the local communities directly impacted by its operations, the key drivers of approval are defined as contact quality, perceived procedural fairness and social benefits. Societal SLO broadens the perspective to encompass a wider range of stakeholders beyond the immediate community, so trust is driven by legal and procedural fairness, confidence in government and distributional fairness.

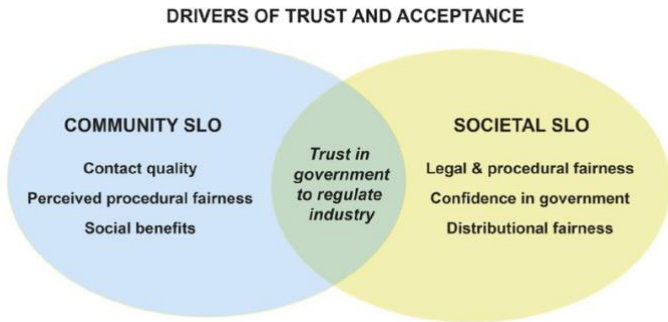


Fig. 2.7: Drivers of trust and acceptance (from LESSER ET AL., 2021).

Interlinked between each other, these key drivers of the approval were merged, and form the upper tier of the model: legal and procedural fairness; engagement; benefit sharing. The top tier works on the cumulative effect, meaning that, to get to the level of benefit sharing, the two previous levels must be already in place. The novelty of the Scalar Model lies in its acknowledgment of the probability of losing the SLO. With the emerging tensions around new mining projects, it is particularly important to understand their root cause. For this

purpose, the model identifies three reasons for potential loss of the SLO and the corresponding levels of withdrawal (Fig. 2.8). Based on the mining industry's experience in Europe, authors have identified three key drivers of the loss of SLO: lack of legitimacy for project/industry, little confidence in government, and clash of fundamental values. The same principle is applicable at the lower tier: a mining company descends into a "clash of fundamental values" only if stakeholders no longer perceive the project/industry as legitimate, and there is a perception of incompetence or corruption in the government.

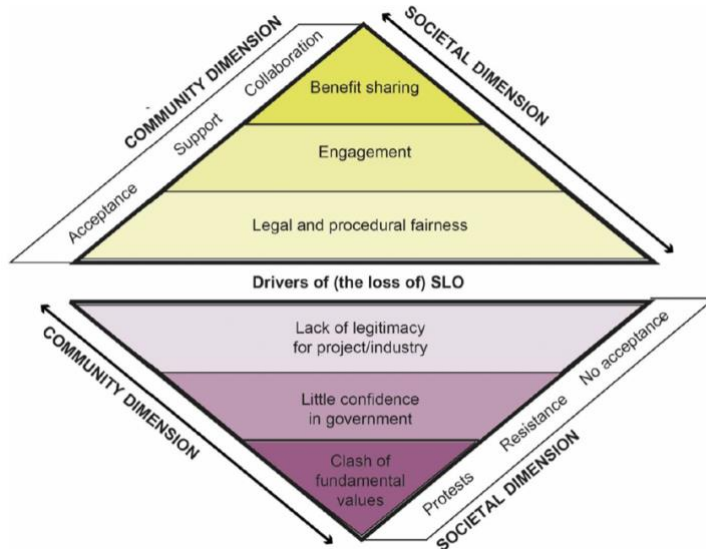


Fig. 2.8: The Scalar SLO Model (from LESSER ET AL., 2021).

In the highest phase of the model, called "collaboration," the community actively participates in project planning, engages in joint decision-making processes, and maintains continuous cooperation with the company. This collaborative approach leads to an improved community well-being, stability, and livelihoods, with agreements in place to support a local procurement and salaries. The community and local government benefit from additional income, and training programs are implemented to equip the local workforce with the necessary skills for mining activities.

2.5 Similarities and differences in the SLO criteria

After analyzing the criteria that are discussed in the literature review, this chapter will identify and discuss the established criteria that are commonly associated with the SLO and will explain their similarities and differences. It must be mentioned that all these criteria will vary in different situations: the presence of one does not exclude the other; some could be more important than the other ones, given specific circumstances; they can be interconnected and overlap each other.

Following factors will be examined:

1. Trust in the mining industry.
2. Equal distribution of mining benefits, or distributional fairness.
3. Contact quantity and quality.
4. Procedural fairness.
5. Confidence in government, or legal fairness

Each factor will be analyzed and evaluated from the following perspectives:

- The global perspective (a general description).
- The legal and regulatory framework (analyzing the influence of legal and regulatory frameworks and considering the influence of mining laws, environmental regulations).
- The stakeholder involvement (assessing the role of stakeholders in shaping and influencing the SLO criteria)
- Industry-specific challenges in mining (the challenges specific to the mining industry regarding the SLO criteria. This might involve issues like land use conflicts, disputes with indigenous communities, or challenges related to environmental impact and reclamation).

1. Trust in the mining industry

- The global perspective.

Trust is known to be a fundamental and central criterion without which the social license to operate cannot exist in the long term everywhere in the world (MOFFAT & ZHANG, 2014; THOMSON & BOUTILIER, 2011; TOST ET AL., 2021). Trust in the mining industry is positively influenced by perceived fairness in procedures, the equal distribution of mining benefits, and the confidence in the governance capacity. Essentially, the more people believe in the fairness of engagement procedures, feel benefits are distributed fairly, and have confidence in their country's governance, the higher their level of trust in the mining industry (JARTTI ET AL., 2020). The stakeholders' perception varies depending on the stage of the project, new information about it, and the company's actions (FRANKS & COHEN, 2012; THOMSON & BOUTILIER, 2011). These findings align with the prior research conducted in Australia, Chile, and China by A. ZHANG ET AL., 2015, and in Australia by MOFFAT ET AL., 2017. Notably, among these factors, a governance capacity emerges as the most influential predictor of trust in the mining industry, a trend consistent with findings from surveys in Australia and Chile.

- The legal and regulatory framework.

The level of trust in the mining industry can be influenced by the legal and regulatory framework in place. A robust and transparent legal framework, along with effective regulatory mechanisms can contribute to building trust (HALL ET AL., 2015; OWEN & KEMP, 2013; PRNO & SCOTT SLOCOMBE, 2012). In well-regulated welfare states, where the government plays a significant role, there is an expectation that the state will enact legislation to protect the environment. For instance, transparent standards and strict policies mandated by European Union membership contribute to a higher level of trust within society. EU member states, bound by comprehensive policies aimed at harmonization and coordination, have established robust mining and environmental legislation. Notably, the Environmental Impact Assessments (EIA) for projects and the Strategic Environmental Assessments (SEA) for plans and programs are components of these legislative frameworks (TOST ET AL., 2021). These high standards contribute to a sense of protection among the public. The evaluation of environmental impacts demonstrates a proactive approach to safeguarding the well-being of both the community and the environment. Trust is fostered by assuring the public that their interests are prioritized, and potential risks are thoroughly assessed and addressed.

- The stakeholder involvement.

An active engagement with stakeholders and considering their perspectives is significant. One of the important aspect companies must embrace, is to treat stakeholders fairly, without

favoritism and make sure that they feel heard and valued. Trust is a product of long-term relationship building. It evolves through sustained efforts to engage and collaborate over time trust (MERCER-MAPSTONE ET AL., 2017; MOFFAT & ZHANG, 2014; MUTTI ET AL., 2012).

- Industry-specific challenges in mining.

The most difficult task for a company is to establish trust, especially in places where historically mining activities were not welcomed due to a caused negative impact (JARTTI ET AL., 2020). Maintaining trust over time is also challenging, given the changing nature of circumstances, leadership, or external factors. A loss of trust can jeopardize the SLO. A distrust in the government and institutions has been observed in Eastern Europe, which causes the SLO debates in Eastern Europe (TOST ET AL., 2021).

2. Equal distribution of mining benefits, or distributional fairness.

- The global perspective.

Social impacts are difficult to evaluate, requiring analyzing complex means (Solomon et al., 2008), including:

- The stakeholders perceive the mining industry differently.
- The mining project: its location and, therefore, regulatory policies in place, the mineral deposit, and the duration of the project.
- A life cycle of the mining project (an exploration, a construction, an operation, and a closure), where social impacts and an approval or a resistance of the stakeholder towards the project varies widely (ESTEVES ET AL., 2012).

The social impacts are generally associated with a generation of the employment, investments in the operating region (KOMNITSAS, 2020), and the education of young population (MEASHAM & FLEMING, 2013). However, numerous negative transformations unfold within the region and its communities due to mining activities. These include shifts in a land utilization, ecological disruptions, an environmental contamination, a disturbance of groundwater flows and various other (AZNAR-SÁNCHEZ ET AL., 2018).

The attraction of a new workforce can affect housing in the region: a possible increase of the rents will influence the affordability and the availability of housing for local people. The demand and prices for the local resources expected to rise, as well as the stress on the local water supply (HILSON, 2002; VANCLAY, 2002). An additional workload might appear on the provision of services in the region: medical (due to potential emerging of diseases), educational, including schools and kindergartens for workers families' (MEASHAM & FLEMING, 2013).

For a full assessment of the mining activities in the operation region, following factors must be also thoroughly researched: a water management, an environmental damage, a productivity and profits, a land use, the demographic changes in the region, the transparency (KOMNITSAS, 2020). The expectations of the communities about impacts of the mining project should match with the real results after the mining company starts its operation, otherwise trust of residents can be lost (MOFFAT & ZHANG, 2014).

- The legal and regulatory framework.

Usually, high expectations are placed on the mining companies. Because of their significant economic influence, people often look to them to provide services typically offered by the government, like an education and a healthcare, especially in places where the government have not adequately addressed those needs (NARREI & ATAEE-POUR, 2021).

When the mining companies hesitate to discuss or address these vital services, it may be seen as a lack of commitment to basic community needs, leading to a breakdown of trust. To manage these expectations better, it's advisable for the mining companies to take the lead in programs that help governments build the capacity to handle these responsibilities. This not only shows a genuine concern for community issues, but also respects the local institutions (AALTONEN ET AL., 2008; PRNO & SCOTT SLOCOMBE, 2012; REY-MARTÍ ET AL., 2023B).

This approach is strategic because it prevents governments from becoming complacent, thinking the company will handle everything. By supporting the government efforts and working together, mining companies not only contribute to a community development but also maintain balanced and mutually beneficial relationship, reinforcing their credibility and the legitimacy in the eyes of the community and stakeholders.

- The stakeholder involvement.

The stakeholders influence a project acceptance through their attitudes towards the consequences of the project. The perceived advantages of mining, such as contributions to overall wealth, infrastructure development, and increased employment, are positively associated with the acceptance of mining. On the other hand, stakeholders' perception of adverse effects shows a negative correlation with acceptance (MOFFAT & ZHANG, 2015). The same Australian study (MOFFAT & ZHANG, 2015) showed that, if the mining benefits outweigh the costs, the public is willing to accept the project. But if the project has severe environmental impacts, a decision will be made to reject the project. Thus, the strength of how stakeholders perceive the impacts of mining, what they establish as acceptable and unacceptable, affects the value of the factor "impacts of mining" in SLO.

- Industry-specific challenges in mining.

Even though impacts can be beneficial, expressed in the form of an employment and an income, business activities and brought an infrastructure to the region, most of the time it is the social and environmental impacts on land, water and livelihoods, that become a major cause of mining conflicts (CANELAS & CARVALHO, 2023A; JARTTI ET AL., 2020).

According to (JARTTI ET AL., 2020), a key determinant of the mining industry's SLO is the perceived equilibrium between its impacts and benefits. When individuals perceive a harmonious balance, trust in the mining sector strengthens, directly influencing the robustness of its SLO. Interestingly, the authors found that the balance of benefits over impacts emerges as stronger predictor of SLO than it is for overall trust in the mining sector (applicable in Finland). The same can be stated about the European context of SLO in general. Community accepts the project when there is a belief that the burden of impacts is outweighed by the project's benefits (LESSER ET AL., 2021).

The assessment of benefits and impacts, and their equilibrium, is not solely contingent on the mining industry's actions, but is also influenced by external factors, including governmental involvement. Consequently, within the model, the balance of benefits over impacts stands out as the most influential direct predictor of the SLO.

The equitable sharing of all mining revenues with affected communities and an allocation for the collective societal good is essential and falls under the concept of distributional fairness (TOST ET AL., 2021).

Apart from contributing to the employment opportunities and the municipal revenue, social benefits arise when a community perceives that a company respects its values and actively contributes to achieving its envisioned future (TOST ET AL., 2021).

3. Contact quantity and quality.

- The global perspective.

The value of engaging with local communities in mining operations can be best understood through the lens of trust. Trust is characterized by confidence in the company and a sense of security in its actions. Establishing an open and honest dialogue between the mining company and the local community is instrumental in creating a strong foundation of trust.

In their findings, MOFFAT & ZHANG, 2014 concluded that the quality of interactions seemed to be more influential rather than their numbers. It emphasizes the significance of maintaining high-quality interactions with community stakeholders over a strategy that prioritizes a high frequency of interactions. This is also confirmed by studies in European context of the SLO (LESSER ET AL., 2021), that community supports the project when feels contact quality is high.

The residents seek to be not just passive observers but active participants in the decision-making processes that affect their lives and surroundings. When companies take the initiative to reach out to the local population, it conveys a genuine commitment to hearing their voices, considering their needs and concerns (TANIS & POSTMES, 2005; YUKI ET AL., 2007), and most importantly, involving them in decision-making processes.

- Stakeholder involvement.

People and groups may engage in cooperation with a company for various reasons, such as politeness, seeking benefits, or fulfilling obligations, especially in the case of the authorities. However, a cooperation driven by these motives does not indicate the presence of a trusting relationship (AALTONEN ET AL., 2008; EDWARDS ET AL., 2019; LIM & GREENWOOD, 2017). Trust involves a deeper and more genuine belief that the company will act in the best interest of the community, extending beyond mere cooperation for practical or obligatory reasons. Community concerns are dynamic and change over the course of the operation's lifespan, therefore, the mining company must maintain close contact with stakeholders even when there is a change in project management or ownership. It is important for the mining company adequately estimate the quality of the relationship with the community in order not to confuse cooperation with trust, which can lead to confusion of acceptance with approval (THOMSON & BOUTILIER, 2011).

- Industry-specific challenges in mining.

THOMSON & BOUTILIER, 2011 discovered several potential issues that can arise from an inadequate contact quality. One common problem is the reluctance to invest fully in relationship building, a strategy often justified by the high failure rate of exploration projects. The explorers delay engaging with stakeholders until a perceived opportune moment, or when there is a belief and a sense that the project certainty will be established. Another potential company's mistake is to restrict communication only to those who are already supportive of the project. By doing so, the company might exclude a segment of stakeholders, leading to a potential project rejection. Additionally, credibility may be compromised if the company fails to fulfill existing commitments, or provides inaccurate or incomplete information. Above all, there is difficulty to implement engagement strategies due to a variety and a diversity of the stakeholders with different views.

4. Procedural fairness.

- The global perspective.

The extent to which residents feel valued, actively participating in forming decisions about operations, is called procedural fairness (BESLEY, 2010; MOFFAT & ZHANG, 2014). It serves as a cornerstone for establishing trust in the authority, and authors ZHANG ET AL., 2018, believe that it is not only a strongest predictor in their model, but is indeed essential prerequisite for obtaining the SLO. When an authority is perceived as demonstrating procedural fairness, people are motivated by that trust to collaborate and cooperate. To positively impact perceptions of procedural fairness, it is suggested by ZHANG ET AL., 2018, that the mining companies provide a detailed information about the mining company's community engagement plan and explaining the government assessment process. Put it differently, when stakeholders are well-informed about the company's community engagement strategies, and how the government assesses mining projects, they are more likely to perceive the decision-making process as fair, transparent, even if decisions are not in their favor. Transparency and clarity in the communication contribute to enhancing procedural fairness, perceived by the community members. In essence, the level of trust is influenced by the extent to which procedural fairness is observed in the decision-making process.

“Procedural fairness is about whether people are treated with dignity and respect during the decision-making process” (JARTTI ET AL., 2020). Interconnected with benefit sharing, it is the concept of fair distribution of benefits from mining.

The criterion appears to be universally applicable, but especially mentioned as an indicator of confidence in the mining industry in focus countries of Australia, China, and Chile (MOFFAT & ZHANG, 2014). It means that the higher the belief in the fair distribution of mining benefits, the greater the trust placed in the mining sector. Consequently, distributive fairness directly influenced the acceptance of mining in Australia and China, though not in Chile.

- The legal and regulatory framework.

The procedural injustices related to a public participation and an information access are assigned to the government (CANELAS & CARVALHO, 2023A). The legal framework might need to address and enforce provisions for adequate public participation, access to the information, and accurate communication throughout the mining project's implementation. This could involve the legislation specifying the rights of the public in decision-making processes, disclosure requirements for the mining companies, and measures to ensure the accurate and transparent information distribution by the news media. The legal framework would play a crucial role in defining standards and holding relevant entities accountable for procedural fairness in the mining approval.

- The stakeholder involvement.

The societal perceptions of equality in the allocation of mining-related benefits affect the maintenance of the SLO. The stakeholders are more satisfied when they receive or believe that they receive fair share of benefits (MOFFAT & ZHANG, 2014). “How people engage is influenced by the perception of what is fair or equitable” (MERCER-MAPSTONE ET AL., 2017).

The citizens also believe in having a voice in environmental and permitting processes, linking legal fairness to the community acceptance (lesser et al., 2021). Exclusion from the decision-making process can lead to conflicts (JARTTI ET AL., 2020). Given that procedural fairness extends beyond community participation to encompass respect and valuing of their

perspective, it is crucial for a mining company to adopt an appropriate strategy for each community to prevent conflicts.

- Industry-specific challenges in mining.

Procedural injustices might include imposing land-use changes by the mining company and seek economic benefits for itself (CANELAS & CARVALHO, 2023A). Unfair treatment can be expressed in different forms, such as deception, manipulation, and a general disregard for local communities' rights. The local municipalities might align themselves with the mining company, potentially misrepresenting local perspectives (CANELAS & CARVALHO, 2023A).

Emerging conflicts have a specific local context. Nordic countries in Europe are mostly concerned about the protection of nature and indigenous rights. The Iberian Peninsula can be characterized by debates on the corporate power over a self-determination and a preservation of the environment and the involvement of NGOs as the peoples' voice (TOST ET AL., 2021).

5. Confidence in government, or legal fairness.

- The global perspective.

Legal fairness, in the context of the SLO, refers to an adherence and an alignment of mining operations with the established laws, regulations, and legal frameworks. It is also about compliance with environmental and social standards, and the fulfillment of legal obligations.

Globally communities seek fair, transparent, and respectful behavior from the mining companies, coupled with an adherence to legal processes, to grant an acceptance to the projects. There must be public trust in environmental, permitting, licensing processes in place. However, compliance with the law is considered a baseline, but it may not solely secure community acceptance. What fosters collaboration and legal fairness is the citizens' participation in revising mining laws and ensuring a consistency with policies. The belief among citizens that they can influence industry regulations adds to the overall support for mining projects (LESSER ET AL., 2021). Therefore, the government accountability to the public, coupled with the adoption of voluntary mining standards, will enhance project support from the community.

To ensure the effective functioning of the mining system, regulatory bodies and permitting authorities must not adopt a passive stance, but instead actively engage in their conventional roles of permitting and licensing. Additionally, they play a crucial role in fostering relationships and partnerships. This involvement extends beyond the mining industry to include active collaborations with the communities, the civil society, companies, and various governmental entities at different levels: ranging from the local and regional to the national and EU levels (TOST ET AL., 2021).

According to the study conducted by MOFFAT & ZHANG, 2014, confidence in governance emerged as a direct and positive predictor of the public acceptance of mining in Australia and Chile.

The confidence in government may be influenced by its handling of a social license in the context of political interests (T. E. COOK & GRONKE, 2005; LIM & GREENWOOD, 2017; SZABLOWSKI & CAMPBELL, 2019). If the government is perceived as prioritizing the SLO to maintain political support and authority, particularly when society stands against mining projects, it may enhance confidence among its supporters. On the contrary, if the government is seen as neglecting the SLO, it could erode the confidence.

- The legal and regulatory framework.

Governments clearly play an important role in regulating the mining industry and determining how mining operations are conducted in their jurisdiction, often through legislation, approval and reporting processes.

The mining governance process is a complex issue (ACUÑA, 2015; OVADIA, 2014; SZABLOWSKI & CAMPBELL, 2019). The controversy is that the government should represent and protect the interests of the mining industry and at the same time monitor and take care of the social and environmental impacts of mining activities. The complexity of the nature of the government's role is that on the one hand it seeks to create a favorable environment for mining investments and new mining projects, and on the other hand, it seeks to implement legislation and to regulate the social and environmental impacts of mining activities. Achieving a balance between promoting mining development and fulfilling commitments to society is difficult but essential (JARTTI ET AL., 2020).

- The stakeholder involvement.

Previously described dualism in the role of the government may raise questions for the public regarding mining governance (JARTTI ET AL., 2020).

The public perceives the laws and regulations overseeing mining activities as the primary formal tools for addressing the social and environmental impacts of mining. If the public holds the belief that the existing governance mechanisms are incapable of ensuring responsible mining, their attitudes will be less favorable (JARTTI ET AL., 2020). Trust in governance mechanisms directly correlates with the level of public willingness to accept mining (MOFFAT & ZHANG, 2014). According to LESSER ET AL., 2021, the projects gain support through the government and industry initiatives, such as the awareness campaigns on raw materials and an active involvement in mining-related networks.

2.6 Summary of the literature review

The literature review has shown a comprehensive overview of the existing knowledge on the SLO. Despite many frameworks, the concepts are being mentioned or even used, achieving a clear understanding of how mining companies can attain the SLO remains elusive.

The SLO appears to be a metaphorical concept, however one is known for sure: the SLO represents an ongoing negotiation process rather than a measurable entity. While attempts have been made to measure the SLO tangibly, the author has concluded that SLO has intangible nature and cannot be measured. There are debates among scientists on whether the SLO should follow rigorous, structured assessments or rely on intangible criteria. The conclusion the author arrived at, is that establishing a universally applicable framework that would possibly fit every mining project is unlikely due to the diverse factors that impact the attainment of the SLO.

The literature review also has shown the ongoing debate surrounding the relationship between the CSR and the SLO. Different perspectives exist, with some suggesting the SLO is embedded in the CSR, while the others argue that the CSR is crucial for achieving the SLO. The author has established the importance of understanding different characteristics of both concepts.

The SLO is a dynamic concept that can evolve over time based on economic conditions, changes in company activities, and societal shifts. It is granted site-specifically, emphasizing

that the stakeholders grant the SLO to the specific projects rather than the entire company. The literature highlights steps toward attaining the SLO, yet practical clarity remains unclear. Terms like "legitimacy" and "credibility" are used, but their practical implications lack precision.

The unresolved issues persist, particularly concerning procedural fairness, trust, and how the industry perceives the SLO. The literature review underscores the complexity of the SLO, emphasizing the need for a nuanced understanding that considers its evolving nature and the complexities of stakeholder dynamics. Attempting to create a rigid list of fixed criteria is impractical in the context of the SLO.

3 Methodology and used methods

3.1 A detailed examination of sustainability reports

This study focuses on examining sustainability reports issued by the mining companies to identify and analyze the activities of the mining company and their outcomes which constitute favorable conditions for gaining the SLO. Additionally, it aims to find out the correlations between the concept of sustainability performance and the SLO attainment: which elements in sustainability reports correlate with the SLO performance? Which elements can be referred to the SLO criteria and contribute to them?

Step 1: A review of sustainability reports.

The studied mining projects will be reviewed and described. The analysis involves a detailed reading of the company's annual sustainability reports.

Defining the SLO criteria for a sustainability report assessment.

The SLO criteria were chosen based on the literature review and include:

1. Trust in the mining industry.
2. Distributional fairness.
3. Legal fairness.
4. Qualitative stakeholder engagement.
5. Procedural fairness.
6. Respect and considering the community values.

The assessment of a sustainability report will focus and consider following aspects, defined by the author:

- **The number of environmental aspects.**

The water management, environmental impacts on land (land use), biodiversity.

- **The number of social aspects.**

The importance of jobs, employment, education of the young population, trainings at the local level, demographic changes in a region.

- **The number of economic aspects.**

Investments in the operating region, infrastructure.

Step 2: The assessment of actual community perceptions.

After the social performance of studied mining companies is analyzed, the research will be carried out. It is aimed to understand if the mining project, in truth, is socially accepted and has achieved a degree of social acceptance to some extent, or if there is any opposition towards it or the mining company. The information about the company, published in newspapers, articles, NGO's comments will be used and thoroughly analyzed.

Step 3: The house of quality analysis.

The SLO is composed of various elements essential for its acquisition. The mining companies in their sustainability reports reflect the actions and outcomes undertaken to achieve favorable conditions for earning the SLO and maintaining it. By analyzing sustainability reports and related documents, the author will identify and compile activities and outcomes, which are aimed at contributing to the specific elements of the SLO. To do so, the house of quality approach will be used. This will allow to evaluate the contribution of each of these activities or/and outcomes to each element of the SLO criteria.

The analysis of activities and outcomes of the mining company and six SLO criteria will be carried out, using the classification method house of quality. Each activity and outcome were scored against each of the elements of the SLO. The scores reflect how much importance is given by each specific activity to each specific SLO criteria. Consequently, for the estimation of the importance, the scale presented in Tab. 3.1, was used:

Tab. 3.1: A proposed scoring system for HOQ (original source)

Score	Meaning
1	Not important at all
3	Little important
5	Important, nothing less and nothing more
7	Pretty important
9	Extremely important

From that a matrix was created. Afterwards, the relative importance of all SLO criteria weighted across all activities of the mining company (normalized score) was realized. The relative importance of each activity and result was then weighted across all SLO elements by multiplying each column of the matrix by its corresponding normalized score.

Step 4: The alignment between the SLO and the SDGs.

Specific SLO criteria are correlated with the individual SDGs, demonstrating the alignment between the SLO and broader sustainability objectives.

The study examines companies' efforts in sustainability as presented in their sustainability reports. Specific focus is given to how these efforts contribute to addressing certain groups or individual SDGs that are related to the SLO.

The hypothesis that companies that have achieved SLO to some extents (or socially accepted) are investing in specific SDGs will be tested.

3.2 Mining projects under the study

The study narrows its scope to mines operating in the Iberian Peninsula, considering similar climate conditions, geographic region and ore extraction types. A brief description of analyzed mining projects is presented in Tab. 3.2.

Tab. 3.2: Mine projects under the study (original source)

Mine project	Commodities	Mine type	Country	Company (operating/owner)
1. Neves-Corvo mine	Copper, zinc, lead and Silver	Underground	Portugal	Somincor/ Lundin Mining Corporation
2. Rio Tinto mine	Copper mine, silver	Open pit	Spain	Atalaya Riotinto Minera/Atalaya Mining Plc.
3. Aguas Teñidas mine	Copper, zinc and lead	Underground	Spain	MATSA/Sandfire Resources

The area is known for being affected by a severe drought and characterized by scarce water resources. The location of the mines spread within the Iberian Peninsula is shown in Fig. 3.1.

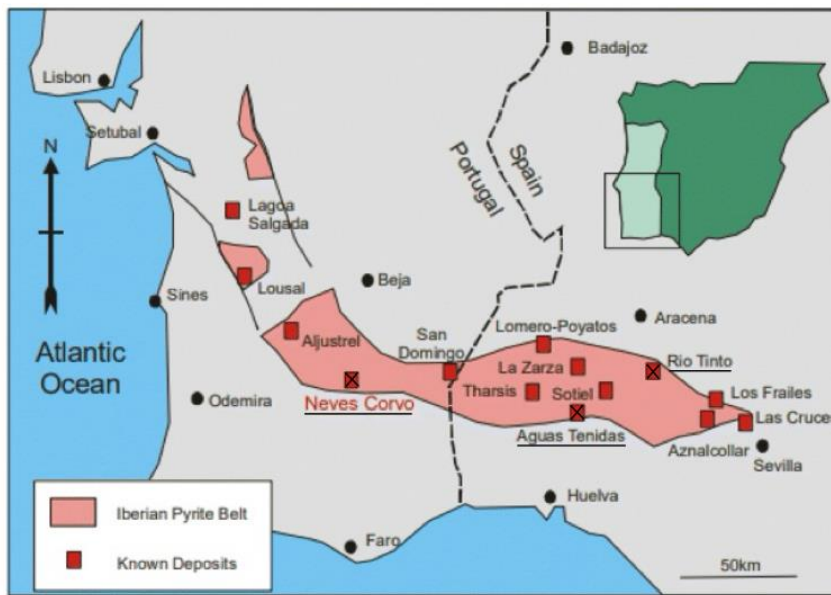


Fig. 3.1: The location of analyzed mining companies within the Iberian Pyrite Belt (from REBOREDO ET AL., 2018)

The result of work of GUADALUPE ET AL. (2022), a virtual conflict map “*mapa de conflictos*” was analyzed, which includes historical map of mining environmental conflicts in Andalusia and Portugal, that dates from the 1970s until 2022 (UNIVERSIDAD DE HUELVA ET AL., N.D.). Important to mention, all three analyzed companies currently are not subjected to a social opposition (UNIVERSIDAD DE HUELVA ET AL., N.D.). There are no detected conflicts in the area of *Baixo Alentejo*, where Neves-Corvo mine, Somincor operates.

Both analyzed companies located in Spain (Riotinto mine, Atalaya Mining and Aguas Teñidas mine, Sandfire MATSA) are in the Andalusia region. This region plays a fundamental role in reducing Europe's dependence on raw materials (GUADALUPE ET AL., 2022). However, the mining industry is known to face social conflicts, two of them related to mining in Europe (*Aznalcollar* and *Mina Las Cruces*) are in Andalusia, close to the Riotinto mine and Aguas Teñidas mine (KIVINEN ET AL., 2020). The problems caused by mining activities in Andalusia in the course of history must be considered. In the 1940s, in *Aznalcollar*, the local population was extremely concerned about the state of the water basins. As a result of precipitation and leaching, there were “spills” in the *Crespinejo* river, making the water unusable. The degradation of mining canals was the cause of the sustained social protest. The *Tinto*, *Odiel* and *Guadiana* rivers were also subjected to the

negative effects of mining discharges, which caused the sustained social protest in early 1877 (GARRIDO ET AL., 2016).

Despite the similarities, companies demonstrate different sustainability report performances. This allows to determine variations in the SLO performance: whether one is doing better, worse or the same in regards of the SLO; and evaluate sustainability report quality. As a result, the best practices could be identified.

The constraints of the selection

This study scope refers to a very specific case analysis, located in the Iberian Pyrite Belt, which means that the results of this study are specific to companies under the study. However, the method presented could be used generically. Future research can expand by analyzing more mining companies and can detect similar or different results. It can also consider comparisons between large and small mining companies, old vs. new mines, and the mining companies with different extraction methods.

4 The relationship between the SLO and the SDGs

Mining and mineral processing have significant environmental impacts ranging from land subsidence, an acid drainage, a sedimentation, air emissions, to tailings deposition and metal contamination in water and sediments. These impacts extend beyond the environment, affecting communities through potential slope failures, tailings dam stability issues, and problems associated with local businesses and available labor to work at the mine. The post mine closure impacts add another layer to these issues (CANELAS & CARVALHO, 2023B; JARTTI ET AL., 2020; THOMSON & BOUTILIER, 2011).

Therefore, the companies seeking to obtain the social license to operate must comply not only with the laws and minimum legal standards of the countries in which they operate, but also with standards developed with the involvement of multiple stakeholder groups, such as international organizations, industry organizations, professional associations, and NGOs (OECD, 2011).

Recognizing the importance of stakeholder engagement is paramount given the global impacts that various mining operations have. This need underscores the core principles of the sustainable mining concept, which emphasizes transparency in communicating with all stakeholders. Under this concept, reporting on the social, environmental and economic aspects of mining operations has become a best practice that benefits not only individual mines but also stakeholders as a whole (BLUNT ET AL., 2020).

Under the principles of sustainable mining, each mine must ensure that the social license to operate, mitigation commitments, economic growth and balanced development are in harmony with ongoing stakeholder input (AZAPAGIC, 2004). This alignment forms a critical link between the SLO and the broader sustainability concept in the mining industry.









As the demand for minerals, metals, and rare-earth elements escalates to facilitate the shift towards low-carbon energies, the mining industry must increase its supply (CHIPANGAMATE ET AL., 2023; VERRIER ET AL., 2022). From a social sustainability perspective, the license to operate, despite geological mineral reserves, emerges as a significant threat - a primary risk to the survival of the mining industry and a key concern for the sector's future (CHIPANGAMATE ET AL., 2023; OLSEN ET AL., 2021). The mining companies are compelled to innovate strategies for sustained production, and the process is complicated by the scrutiny from diverse stakeholders, including the public, civil societies, and shareholders, who have high expectations and want to see a better performance of the mining companies.

In 2015, the UN General Assembly adopted the 2030 Agenda for Sustainable Development (UNITED NATIONS, 2015) as an action plan to be implemented at global and local levels through partnerships to create a better environment for people, planet, prosperity and peace, and to make progress towards realizing human rights. It is based on the 17 SDGs and articulates 169 targets to be achieved by 2030.

The mining companies employ a diverse set of strategies to attain the SLO. In this study the author assumes that the SLO closely aligns with Towards Sustainable Mining (TSM) standard. When the mining company makes an effort and tackles specific SDGs, it contributes to shaping the overall perception of the mining company itself and mining industry in general, therefore, influences the understanding of the SLO.

Tab.4.1 below highlights how each SDG contributes to fostering positive relationships with the communities and stakeholders, ultimately supporting the maintenance of the SLO.

Tab. 4.1: The relationship between the SDGs and the SLO (original source)

The SDG	Targeted SLO criteria	How it affects/ contributes to the SLO
  	Distributional fairness	When the benefits of mining are shared equitably, it creates opportunities for economic empowerment and prosperity for all. Mining provides access to local employment and contributes to an increased economic development. As a result, access to nutritious food in the community, to health care and quality of life for the community members, especially for vulnerable groups, are improved.
	Distributional fairness	The investments in education initiatives such as scholarships, trainings and the school infrastructure ensure an inclusive and equitable quality education and promote lifelong learning opportunities for all.
	Distributional fairness Procedural fairness	The equal opportunities for women in the mining sector contribute to the gender equality, empowering women economically and socially within the community. It positively influences perceptions of a fair treatment and supports the SLO.
	Trust	The SDG may not directly relate to the broader social, economic, and environmental aspects encompassed by the SLO. The impact of energy-related activities may be more limited in terms of addressing broader social issues or promoting community well-being. While the access to energy can enhance livelihoods, it may not directly address social acceptance or mitigate the negative impacts of mining on the local communities.
	Distributional fairness Respect and considering the community values	Offering opportunities for jobs and training can improve the lives of local communities, promoting fair labor practices, and supporting local businesses.
	Trust in the mining industry Distributional fairness Legal fairness	Mining can help drive an economic development and a diversification through the direct and indirect economic benefits, the development of new technologies and by incentivizing the construction of new infrastructure for transport, communications, water, and energy.

	<p>Distributional fairness</p> <p>Legal fairness</p> <p>Procedural fairness</p>	<p>The extent of the correlation with the SLO depends on how mining companies address inequalities and promote social inclusion. Job opportunities, economic development, and community investments can contribute to reducing local inequalities and fostering social cohesion.</p> <p>Fair treatment under the law contributes to legal fairness.</p> <p>The mining companies that engage in transparent and participatory approaches to decision-making, especially regarding a land use, an environmental management, and a community development, can promote procedural fairness and address inequalities in the governance.</p>
	<p>Qualitative stakeholder engagement</p> <p>Legal fairness</p> <p>Respect and considering the community values</p>	<p>Respecting community values, a culture, a heritage, and engaging stakeholders in decision-making processes fosters trust, a collaboration, and a social cohesion, contributing to the creation of sustainable and resilient communities.</p>
	<p>Distributional fairness</p> <p>Legal fairness</p> <p>Qualitative stakeholder engagement</p>	<p>The SDG ensures that the benefits of mining activities are equitably distributed among the stakeholders, including local communities. Adhering to responsible consumption and production principles involves a compliance with environmental regulations, contributing to legal fairness.</p>
	<p>Trust</p>	<p>May not have a strong connection to the SLO as stakeholders are often less persuaded by the ambitious goals or promises stated by the company in their reports. The stakeholders might prioritize immediate socio-economic benefits over longer-term environmental concerns. The complexity and global nature of climate change issues may make it challenging for the stakeholders to directly link actions taken by the specific mining company to the achievement of SDG 13.</p>
	<p>Trust in the mining industry</p> <p>Legal fairness</p>	<p>A strict adherence to the environmental regulations and responsible water management practices aligns with the expectations of the local community, which contributes to the SLO's effectiveness. By demonstrating respect for the environment, community confidence in the mining company is increased.</p>
	<p>Respect and considering the community values</p>	<p>Not only should the company be trustworthy enough to solve water and land issues, but the locals should also have confidence in the company and the government that they will act in the interest of the people.</p>
		<p>Respecting marine ecosystems, supporting marine conservation efforts, and preserving ecosystem biodiversity contributes to the protection of terrestrial habitats and resonates positively with the communities. Respecting land rights, promoting sustainable land use practices equally contributes to the development of the SLO.</p>



Trust in the mining industry

Legal fairness

Procedural fairness

Respect and considering the community values

Mining can contribute to peaceful societies by avoiding and remedying the company-community conflict, respecting human rights and rights of indigenous peoples, and by supporting the representative decision-making of citizens and communities in extractives development.

Building trustful partnerships with the stakeholders, fostering collaborative decision-making processes, and promoting an inclusive stakeholder engagement enhance the social capital.



Legal fairness

Procedural fairness

For instance, when a mining company operates in a country with weak institutions, it could follow legislation of another country with stronger governance and norms. In this case, the adherence to legislation from a country with stronger institutions can contribute to aspects of the SLO, particularly those related to legal fairness and procedural fairness. By following stricter regulations, the mining company can ensure that its operations meet higher standards of environmental protection, labor rights, and community engagement. This can enhance trust with stakeholders, including local communities and regulatory bodies, as it demonstrates a commitment to responsible practices beyond what is required locally.

Aligning the SLO strategy with the SDGs offers a significant advantage due to the specific targets associated with each SDG. These targets could be a foundation for companies to establish their own objectives, measure the progress of their SLO initiatives during impact measurement. It's important to regularly assess an impact and adapt. An effective communication of this approach will resonate with the stakeholders.

5 The case studies of companies' SLO criteria in their reports

5.1 Neves-Corvo mine, Somincor

Neves-Corvo mine is an underground copper and zinc mine, located in the Iberian Pyrite Belt (Fig. 5.1), which is one of the largest volcano massive sulfides provinces in the world, in the *Baixo Alentejo* region (the south of Portugal). One of the largest EU underground mines, Neves-Corvo is the main producer of copper, zinc, and lead in Portugal (SOCIEDADE MINEIRA DE NEVES-CORVO, 2019).

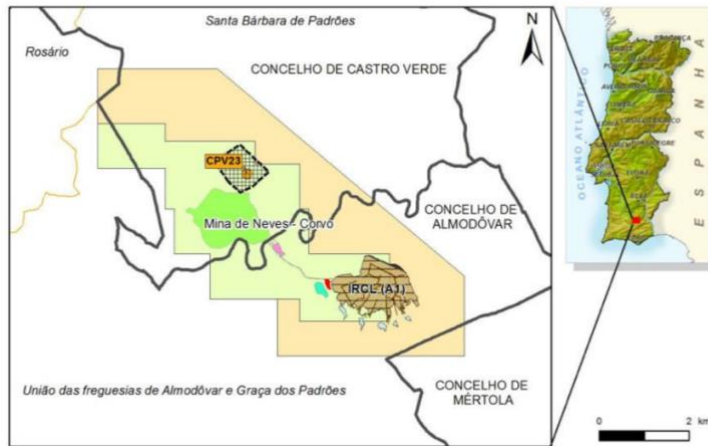


Fig. 5.1: The location of the mine Neves-Corvo (from SOMINCOR S.A., n.d.)

The mine is owned and operated by the Portuguese company Somincor (SOCIEDADE MINEIRA DE NEVES-CORVO S.A.). Neves-Corvo, as Lundin Mining Corporation subsidiary, adheres to an appropriate responsible mining management system (RMMS) that ensures compliance with the SDGs and focuses on the communication and socially responsible business.

Special Protection Area

The deposit was discovered in 1977. In 2008, while the mine was in full operation, the Natura 2000 network appointed the Castro Verde special protection area (SPA) and the site of community importance (SIC) of Guadiana. The Guadiana valley natural park and its tributary the *Oeiras* river overlap with the mining site.

The Castro Verde SPA is Portugal's most representative steppe area, characterized by gently undulating plains, stream valleys, and occasional quartzite outcrops. The SPA predominantly features extensive farming practices, including traditional dry farming of cereals, rotational fallow lands, and pasture for livestock. It also contains holm oak groves, scrub forests, and small olive plantations. It is a UNESCO Biosphere reserve, a Natura 2000 protected area and a key biodiversity area. The protection status of this SPA is primarily due to its rich diversity of steppe birds. This region holds significant conservation value, serving as a crucial corridor for numerous terrestrial and aquatic species (LUNDIN MINING, 2022).

Therefore, when negotiating with a mining company, the local community is likely to be concerned of the potential environmental impact of mining activities on their natural surroundings.

Following the procedure, Neves-Corvo went through the Environmental Impact Assessment (EIA) in 2007 and the Zinc Extension Project in 2017, and received the approval, however, with restrictions due to the presence of the Nature conservation area (LUNDIN MINING, 2022).

Lundin Mining has submitted sustainability reports every year since 2010. Neves-Corvo highlights its awareness of the importance of conservation of the *Oeiras* river and downstream catchment habitat. To protect endangered species and preserve the river health, the company collaborates with Portuguese universities, national conservation organizations, and natural park authorities. It funds a five-year project (2019-2024) aimed at protection and survival of the species in the *Oeiras* river (**A1**) (LUNDIN MINING, 2022). These activities help meet expectations of the communities on the matter of minimizing habitat destruction, protecting endangered species, and preserving water quality in the Guadiana river and its tributaries.

The sustainable management of marine and coastal ecosystems to avoid significant adverse impacts, the contribution to biodiversity conservation, and land-use planning align with SDG 14 and SDG 15 (Tab. 5.1), correspondingly.

Tab. 5.1: The alignment of activity 1 with the SDGs (original source)

Activity A1	SDG
Special Protection Area	SDG 14 Life Below Water
Conservation of the <i>Oeiras</i> river and downstream catchment habitat	SDG 15 Life On Land

As for the water related issues, communities might be concerned that discharges from company's sites could affect users and natural ecosystems, as well as they could be worried about water quality in the Guadiana River and potable water. Lunding Mining Corporation recognizes water as the ultimate shared resource.

In 2022, the company met the needs of the communities by providing a temporary access for agricultural water use (Lundin Mining, 2022). Somincor engaged in collaborative efforts with local municipal authorities to establish dependable water distribution systems within these communities (Fig. 5.2). The company also supplies treated water to some local villages for potable use (**A2**). Somincor constantly co-operates with partners with whom they share a common goal, those who are interested in solving the region's problems. The company actively collaborates with local governments (**A3**). Somincor worked with municipal authorities on the matter of setting up permanent networks to supply these communities. It has established partnership with several universities in Portugal to understand local aquatic habitats from a scientific point of view (**A4**).

Neves-Corvo mine depends on operating water sourced from the third-party *Santa Clara* reservoir, which, notably, is located within a water deficit catchment area. The company acknowledges the associated risk regarding the long-term availability of this resource for operational use and is actively working to reduce its freshwater consumption from it.

The water collected here by Somincor represents only around 7% of the total volume abstracted from the dam (**R1**). There are two pumping stations along the way. The last, and closest to Somincor, stores the water, functioning as an emergency reservoir and supplies to the mining complex. Part of the fresh water from the *Santa Clara* dam is transformed into

drinking water at the respective treatment plants. Somincor provides treated and purified drinking water to several villages (R2).



ACCESS TO CLEAN WATER

56,236 cubic meters of potable water provided to villages
around the mine

Fig. 5.2: The water stewardship initiative in Neves-Corvo (from SOCIEDADE MINEIRA DE NEVES-CORVO, 2019)

The remaining part of *Santa Clara's* water is used for some processes that do not allow the reuse of industrial water. In the last few years Somincor has focused on making it increasingly possible to reuse the industrial water. In recent years, it optimized circuit treatment and separation processes. The tailings from the washing plant are chipped at the chipping plant and the resulting water is used again. The surplus water is stored in the *Cerro da Mina* reservoir, from where it is then transported to the treatment of industrial water for use in processes to replace *Santa Clara* water. The mine water receives the wastewater pumped from the bottom of the mine, which decants in two lagoons and is used again in the mining process. Somincor also treats wastewater with characteristics produced in social areas and by contractors. The sustainability report demonstrates the following results: Neves-Corvo sustained its commitment to zero discharge operations, persistently recycling and reusing 90% of its operational water (R1), to minimize the need for freshwater withdrawals (Lundin Mining, 2022). Proper water management, both in terms of volume and in terms of quality, is of paramount importance to the communities and ecosystems that live here. At the beginning of the mining operation, Somincor used to depend 100% on a fresh water source, today it's only 7%.

Achieving such significant results in a particular problem that means a lot to the stakeholders shows the company's commitment to resource conservation and attempts of getting to the high levels of the water reuse. Maintaining these results will help to gain the trust of the locals. It also demonstrates the company's compliance with legal requirements, which corresponds to the legal fairness criterion in obtaining the SLO.

Furthermore, Neves-Corvo diligently monitors the localized effects on the biodiversity of the *Oeiras* river resulting from the company's authorized discharges into the river over an extended period. To minimize these impacts, scheduled discharges are suspended when there is no flow in the river. The safeguarding and ongoing monitoring of the river holds a particularly high priority for the mine due to its location in the *Guadiana Delta* basin, where both the tributary system and the *Guadiana Valley* natural park possess a protected status. It's noteworthy that no adverse impacts associated with the discharges at the site have been observed on the *Guadiana* river.

These activities show the company's respect and support for the agriculture and farming practices in the region. By reporting their actions related to water, there is a higher probability

of increasing trust in the company. Somincor seems to understand the importance of the area's cultural heritage to the locals. This demonstrates respect and consideration of the values of community and might be a strong predictor of the SLO. Working with the government ensures compliance with legal regulations and fairness in addressing water-related issues according to established laws. Collaboration with universities facilitates engagement and dialog with the local communities and other involved stakeholders. Often, universities conduct participatory research, which involves interviewing and working closely with the local communities. This way, the university can act as a neutral intermediary to build trust and mutual understanding.

As for relation to the SDGs, the alignment is shown in Tab. 5.2.

Tab. 5.2: The alignment of activities 2, 3, 4, results 1, 2 with the SDGs (original source)

Activities and Results	SDG
A2 Providing water for benefit of local communities: water for agricultural use and potable water	SDG 6 Clean Water and Sanitation
A3 Active collaboration with the municipal authorities on water issues	
R1 Zero-discharge operation 90% of reusage and recycling operational water 7% of the total volume of fresh water abstracted from the dam by Somincor	
R2 Potable water provided to villages	
A4 Collaboration with university on aquatic research	SDG 14 Life Below Water

The land management

The coexistence of mining activities in such areas, like Natura 2000, which are crucial for biodiversity conservation, requires careful planning and an adherence to strict environmental regulations. In Somincor, according to the objectives of the Portuguese Forest Sustainability Plan, forest planning and management must be carried out through the *Baixo Alentejo* Regional Forest Management Plan (*PROF do Baixo Alentejo*). For example, Somincor has verified that the operated area does not overlap with forest areas of conditional use (SOMINCOR S.A., N.D.), which is in accordance with the Portuguese basic law on forest policy (Law No. 33/96). However, the tailings dam on the Neves-Corvo property has expanded its location, mostly occupied by natural forest and shrubbery, with three artificial freshwater basins. Somincor was given the approval by the government, and to compensate for the loss of protected oak trees, a reforestation project has been developed, with plans to plant more oak trees in 2023 (LUNDIN MINING, 2022).

In its report, the company uses the term “environmental license” and assures that it has been updated. The company plans to operate the expanded tailings facility only after obtaining the Single Environmental Permit (known as the “TUA”) (**A5**), which incorporates all environmental licensing decisions, and summarizes the conditions applicable to the facilities, activity in question. It illustrates adherence to environmental regulations and minimizing environmental risks. However, there may be opportunities to improve transparency and inclusivity in the permitting process.

Land use and mining compatibility. The assessment of whether minerals and other land uses have been introduced in equal footing.

Land use and mining compatibility is a crucial concept (A6), especially in regions like *Baixo Alentejo*, where mineral resources hold significant value, and mining is an essential economic driver. It's important for several reasons, including its impact on the environment, the local communities, and overall sustainable development.

One of the key principles underlying this compatibility is the "principle of parity". This principle emphasizes that land use decision-makers should recognize the importance of mineral resources and evaluate mining projects on equal footing with the other natural resources. The company made agreements with local farmers so they can maintain the agricultural activity in about 50% of the company's land (LUNDIN MINING, 2022). In Portugal, this principle has gained acceptance over the past 30 years, thanks to collaborative efforts, involving the governmental organizations, mining companies, and environmental decision-makers (Portuguese legislation on rural soil. Law 54/2015 and DL 80/2015 and DR 15/2015).

These principles align with the broader goals of sustainable development (Tab. 5.3). By obtaining permits and ensuring compatibility with land use regulations, the company can mitigate environmental impacts, minimize resource consumption (SDG 12). Both initiatives also support SDG 15: an equitable management of mineral and land resources prevents resource depletion, a habitat destruction, a soil erosion and promotes a biodiversity conservation.

Tab. 5.3: The alignment of activities 5, 6 with the SDGs (original source)

Activities	SDG
A5 Obtaining a unified environmental permit (TUA) to operate the expanded tailings	SDG 12 Responsible Consumption and Production
A6 Land use and mining compatibility	SDG 15 Life on Land

The incident and compliance disclosure

Company reports publicly on incidents that occurred, as well as sanctions and fines. Somincor makes no secret of the fact that it has not met its targets in regard of some aspects. The company also informs about legal matters pending or in the process concerning Neves-Corvo's operations (LUNDIN MINING, 2022). Such an approach, which could be named as the incident and compliance disclosure (A7), contributes to fair and transparent relationship with the stakeholders, which builds trust. Keeping the stakeholders informed and aware of regulatory concerns makes them feel involved and engaged in the company's operations, leading to the perception of company's behavior as fair. Such a transparency could positively affect the engagement.

The community development

The mining company claims to have initiated several programs and elevated its corporate social responsibility efforts, including initiatives aimed at supporting local communities. To accomplish this, the mining company's effective networking with various stakeholders plays a crucial role. A well-being and socio-economic development of communities are the core priorities in Somincor, which are being performed by Social Investment Impact Framework (SIIF) – applied to Neves-Corvo (LUNDIN MINING, 2022). It not only fosters positive

relationships but also fosters a greater acceptance of the mine among the local population, decision-makers, and non-governmental organizations. The company defines the SLO as a holistic approach to stakeholder engagement, community investment, and operational improvement aimed at reducing impacts. Fig. 5.3 represents the key areas of social performance.

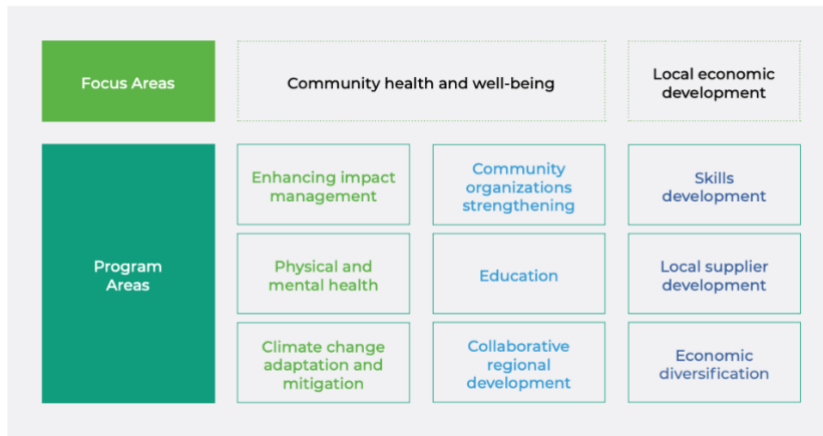


Fig. 5.3: The key areas of social performance in Somincor according to SIIF (from LUNDIN MINING, 2022).

1. The SLO index integration (A8):

The company incorporates the SLO Index as a fundamental factor in making decisions related to stakeholder engagement, community investment, and operational enhancements. This implies that the SLO is seen as a metric or tool used to guide these decision-making processes, it is shown in Fig. 5.4. "...SLO Index – is a perception-based surveying methodology that models what drives community trust in the company and measures how it changes over time" - (LUNDIN MINING, 2022).

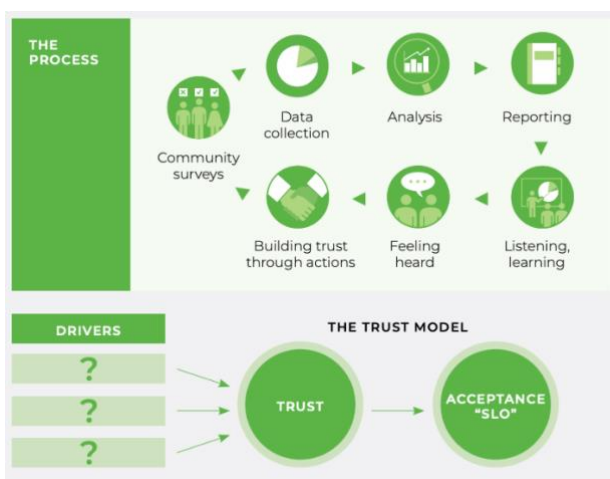


Fig. 5.4: The process of building trust using the SLO Index (from LUNDIN MINING, 2022)

2. A maturity assessment framework (A8):

The company has introduced the maturity assessment framework to evaluate how well the SLO Index has been integrated into its operations. This framework helps sites assess their level of maturity in terms of the SLO, indicating that the SLO involves a process of growth and development within the organization (LUNDIN MINING, 2022).

The main purposes of implementing such an approach are presented in Fig 5.5. As can be seen, this index corresponds and aligns with most of the SLO criteria, effectively contributing to acceptance of a mining company.

Why implement the SLO Index?	
<p>Through the SLO Index we can answer these questions:</p> <ul style="list-style-type: none"> · Does the community accept / trust us? (social license) · Are things getting worse or getting better? · What are the risks for our operation / communities? · Where should we focus our efforts? (location, topic, etc.) · How effective and impactful are our actions? 	<p>Key benefits:</p> <ul style="list-style-type: none"> · Actionable insights · Trends analysis · Effective resource allocation · Monitoring performance · Anticipating risks · Improve internal & external relations

Fig. 5.5: Implementing the SLO Index (from LUNDIN MINING, 2022)

In case of Neves-Corvo, the SLO Index showed that the community in Alentejo region values jobs and investments the most, but still are concerned about water and dust (LUNDIN MINING, 2022).

3. Surveys. The "Local voices matter" initiative (A9)

Conducting surveys at various operations helps the company understand what matters most to its stakeholders, identifying and tracking issues that have an impact on the company's social license. This implies that the SLO involves actively listening to stakeholders' concerns and needs to build or strengthen trust. The "Local voices matter" initiative, jointly undertaken by Somincor in collaboration with "Voconiq local voice" company, featured a specialized survey conducted within local communities in 2021 (LUNDIN MINING, 2022) and is shown in Fig. 5.6. These communities included *Castro Verde*, *Aljustrel*, *Almodôvar*, *Mértola*, and *Ourique*, with the primary aim of gathering local opinions regarding Somincor's operations.

Fig. 5.6: The "Local Voices Matter" program (from Voconiq, 2021)

Notably, as part of this initiative, SOMINCOR made a thoughtful and motivating commitment. For every completed survey, a generous donation of six euros was pledged to support the local fire department of the respondent's municipality. This decision demonstrates a remarkable and socially responsible approach from the perspective of the SLO. In Portugal, where the preservation of forests is highly valued and communities frequently contend with the devastating impact of wildfires, this initiative acknowledges the significance of addressing

the psychological well-being of community members. It sets an exemplary standard for the SLO initiatives among mining companies operating in Portugal, emphasizing the importance of community engagement and support in fostering mutual trust and cooperation.

4. The grievance management (A10)

The company practices a comprehensive review of grievance mechanisms to better understand the concerns of stakeholders and respond to the company's impacts on its communities. Working in pair with the previously described SLO Index tool, the company identifies key issues affecting stakeholders' trust. Most importantly, it can help identify stakeholder groups or topics that require additional attention. Such an approach closely aligns with the principles of the SLO, especially, it tackles the qualitative engagement aspect. By periodically assessing and updating responses to community needs, the company demonstrates the importance of addressing social issues proactively, which enhances trust-based relationships with stakeholders. In 2022, there were only two filed grievances (noise and traffic complaints), which were resolved by conducting multiple operational changes.

5. The investments in community initiatives (A11)

After a detailed reading of the sustainability report, it can be stated that Somincor and Lundin Mining invest in programs focused on education, health, culture, community development and small business economic stimulation entrepreneurship in nearby municipalities (Tab. 5.4). Throughout the 3 years, the company has made 1,161,000\$ of direct community investments (R3).

Tab. 5.4: Lundin Mining direct investments, \$000s (LUNDIN MINING, 2022)

Location	2020	2021	2022
Neves-Corvo	593	295	273
		Total:	1 161

Following social and community engagement initiatives were performed:

The Project I.D.E.A – a private program developed by Somincor and *Algarve University*, Portugal offered high school students from the municipalities of *Aljustrel, Almodôvar, Castro Verde, Mértola* and *Ourique*, which are near the Neves-Corvo mine, the opportunity to pursue entrepreneurship education.

The Lunchbox project smile in motion – a social design with the Alentejo local health unit for delivering lunch boxes to needy students (Fig. 5.7).



MEALS FOR KIDS

Around 15,000 meals provided to +500 children at schools
in the region

Fig. 5.7: The Lunchbox project smile in motion (from LUNDIN MINING, 2022)

The protocol with several group of schools: a social project to support students of needy families with school supplies and food.

The protocol to be concluded with the senior university in *Castro Verde*: a social project, to support seniors in *Castro Verde* municipality.

Partnership with junior achievement Portugal activities: Since 2020 Somincor "... acts as a social investor through the allocation of the financial and human resources necessary for educational programs, being also responsible for an institutional coordination with the public schools, interacting directly with the *Castro Verde* School Group" (NELIA PEDROSA, 2023).

Somincor volunteers "... during five 45-minute sessions address a topic specific to the school year in which they are with the students" (NELIA PEDROSA, 2023).

6. Government-supported regional social responsibility initiatives (A12)

The Portuguese government is committed with the SLO. It endorses the company's initiative by permitting a portion (20%) of the royalties owed by the company to the state to be reinvested in regional initiatives (DGEG/Government policy on royalties). The company can deduct royalties in programs related to regional social responsibility; supporting projects proposed by the local authorities, environmental, geological and mining heritage projects. All the projects (also including investments into engineering optimization processes) must be aligned with requirements of the Portuguese Mining Authority (DGEG) and reported to the DGEG about expenses.

By maintaining a comprehensive database of financial investments made by mining companies in various activities and regions, the Portuguese Mining Authority is not only ensuring transparent practices but also actively contributing to the establishment of a social license to operate.

In certain instances, local communities may harbor doubts regarding how mining companies allocate the funds within their regions. However, with the approval and strict monitoring provided by the government institution like the DGEG, the risk of financial misappropriation of funds not being directed toward their intended purposes diminishes significantly. This, in turn, fosters greater trust within local communities towards the mining company's commitment to their well-being and development.

From all the above-mentioned initiatives the company takes, and the areas the company invests in the most, there is a clear following of sustainability practices. By considering the concerns and preferences of local people, the company is developing inclusive approaches to resource management and infrastructure development. The company provides support to students from needy families with school supplies, food, and entrepreneurship education, which directly contributes to improving access to quality education, creating employment opportunities within the community. There is noticeable improvement of infrastructure and services within communities.

Tab. 5.5: The alignment of activities 7, 8, 9, 10, 11, 12 and result 3 with the SDGs (original source)

Activities and results	SDG
A7 The incident and compliance disclosure	SDG 16: Peace, Justice and Strong Institutions
A8 The SLO index integration	
A9 Conducting surveys	
A10 The grievance management	SDG 8: Decent Work and Economic Growth
A11 The investments in community initiatives	SDG 3: Good Health and Well-being
A12 Government-supported regional social responsibility initiatives	SDG 4: Quality Education
R3 Direct investments in community initiatives	SDG 8: Decent Work and Economic Growth
	SDG 9: Industry, Innovation, and Infrastructure
	SDG 11: Sustainable Cities and Communities

5.1.1. The assessment of an actual social performance and perception of Neves-Corvo mine, Somincor

Since the company came to the region, *Castro Verde* stands out as one of the few towns in *Baixo Alentejo* that has not experienced large decrease in its resident population over the past two decades despite high aging index in the town: for every 100 young people, 222,6 are elderly people, 65 and over (PORDATA. ESTATISTICAS SOBRE DE PORTUGAL E EUROPA, 2022).

Despite being in one of the most economically depressed regions in Portugal (*Baixo Alentejo* is one of the poorest Portuguese regions, showing very low levels of most economic and social development indicators), *Castro Verde* has been able to attract population, improve its social, cultural and physical infrastructure and now shows better development indicators than similar towns in the surrounding area. It is distinctly observed that the improving trend of important areas of community's life is a consequence of the direct employment created by Somincor, the effects of the indirect job creation, such as building and public construction, investments for educational, healthcare, and cultural facilities.

Another fact is the long-term unemployment among women that used to occur in the municipality of *Castro Verde*, has recently been minimized and to some extent has been absorbed by Somincor (INSTITUTO NACIONAL DE ESTATÍSTICA, 2024). There has been an improvement in the percentage of female employees, increasing from 10,2% females employed in 2016 to 13,2% in 2021 (ELLIS RICHARD ET AL., 2023), which makes residents perceive Somincor as a gender-inclusive company. Somincor plays a pivotal role in the development of the city, serving as the town's primary employer. The average monthly earnings of full-time workers receiving a full salary in Portugal in 2021 were less than €1,000. Of the 23 municipalities with average monthly earnings above the national average (€1,247) *Castro Verde* leads the way (€1,941), ahead of the Lisbon metropolitan area (€1,703) (Instituto Nacional de Estatística. Statistics Portugal, 2022).

Based on the Census, the municipality of Castro Verde presented a worrying percentage of illiteracy (being not able to read or write). Since the company is operating in the region, illiterate population has decreased in almost 3,5 times (PORDATA. ESTATISTICAS SOBRE DE PORTUGAL E EUROPA, 2022). The analysis showed that Somincor focuses on education and entrepreneurship for adolescents to avoid future dependency on the mine after closure. Young people, who participated in the recent initiative “Young Entrepreneurship Showcase”, which had funding from Somincor, feel heard and supported. It is another proof that company understands the socio-economic constraints of the region and cares (Bruna Soares, 2019). The main local journal states: “Somincor has already impacted around 1000 students from the Castro Verde School Group, ... the feedback, from every participant has been very positive. ... According to Junior Achievement Portugal, Somincor is the only company in Portugal to cover all students, enrolled by schools, in a municipality” (NELIA PEDROSA, 2023). An independent technical report made by the company Wardell Armstrong states following: “The social perception of the mine is reported to be generally positive. The 2018 social perception study found that 85% of the community approved of the operation and 15% were neutral towards it. This positive trend continued and was reflected in the social license to operate survey in 2021. The study area included the area of influence and 675 people were interviewed. The mine scored 3,4 out of 5 in the category measuring trust and 3,6 out of 5 in the acceptance of the continued operations of the mine” (ELLIS RICHARD ET AL., 2023).

Given the available evidence and the analysis that has been performed by the author, it can be argued that this case study of an active mine in Portugal represents a demonstrative example of having the SLO in place.

5.1.2 The house of quality analysis of Neves-Corvo mine, Somincor

The house of quality analysis was carried out. Using the algebraic calculations, the relative importance of each activity for each SLO criteria and for all SLO criteria taken together was found (see Appendix A for results of scoring). Based on that, activities and results performed by the company were ranked. For better understanding of the ranking of activities and results (presented in Tab. 5.8, Tab. 5.9), three categories of importance were established, shown in Tab. 5.6.

Tab. 5.6: The categories of importance of activity and result to contribution to the SLO for Neves Corvo, Somincor (original source)

Normalized sum (NS)		Category	Meaning
for Activity	for Result		
NS > 9%	NS > 35%	Category 1	Activity or result tackles most SLO criteria, thus, have the greatest impact on meeting the specified criteria. This category reflects the focus of the company in achieving the SLO.
7%>NS<9%	NS < 5%	Category 2	Activity or result is beneficial in earning the SLO (according to the analyzed company), however not crucial.
NS < 7%	-	Category 3	Less impactful activity or result.

The HOQ analysis can also provide insights about the SLO components among 6 analyzed, which, according to the company’s performance, are the most crucial in building SLO (see Appendix A). These criteria were also categorized (Tab.5.7).

Tab. 5.7: The categories of importance of specific SLO criteria to building the SLO, for Neves Corvo, Somincor (original source)

Normalized sum (NS)		Category	Meaning
for Activity	for Result		
NS > 19%	NS > 20%	Category 1	The SLO criteria is impactful in obtainment of the SLO
8% <NS < 19%	6%<NS<20%	Category 2	The SLO criteria is less important in obtainment of the SLO
NS < 8%	NS < 6%	Category 3	The lowest importance in obtainment of the SLO

Thus, the overall ranking of both activities and results are displayed in Tab. 5.8, Tab. 5.9, accordingly.

Tab. 5.8: The results of the ranking of activities of Neves Corvo, Somincor (original source)

Activity of the mining company		Ranking
The investments in community initiatives	A11	1
The incident and compliance disclosure	A7	2
The grievance management	A10	3
Providing water for benefit of local communities: water for agricultural use and potable water	A2	4
Conducting surveys. The "Local Voices Matter" initiative	A9	5
Land use and mining compatibility	A6	6
An active collaboration with municipal authorities on water issues	A3	7
Government-supported regional social responsibility initiatives	A12	8
The SLO Index integration: a perception-based surveying methodology	A8	9
Obtaining a unified environmental permit (TUA) to operate the expanded tailings	A5	10
The collaboration with the universities on aquatic research	A4	11
Biodiversity initiatives: conservation of the river	A1	12

Tab. 5.9: The ranking of achieved results by Neves Corvo, Somincor (original source)

Activity of the mining company		Ranking
1.161.000\$ of direct investments in community initiatives	R3	1
The access to clean water: 56,236 cubic meters of potable water provided to villages around the mine	R2	2
Zero-discharge operation and 90% of reusage and recycling operational water	R1	3
7 % of total volume of fresh water abstracted from the dam by Somincor		

Findings from HOQ analysis for Neves-Corvo mine, Somincor

From analysing the ranking of this sample of activities (Tab. 5.8) it can be argued that the activities that engage with multiple criteria get higher rankings. For instance, looking into the

activity A11 “Investments in Community Initiatives”, it can be understandable why it was ranked as a first. It distributes benefits and burdens equitably, it prioritizes and responds to the pressing issues and needs that community faces, which is a very good way of engaging with involved stakeholders. This way, it is reasonable to assume that the activity builds trust between the mining company and the local community. A similar conclusion can be made about activities A7 “Incident and compliance disclosure” and A10 “Grievance management”, which are of the same ranking category 1. Specifically, they contribute to the perception of legal fairness by allowing stakeholders to influence decision making, as well as both help to gain a deeper understanding of stakeholders and broaden social engagement.

Activities such as A4 “Collaboration with university on aquatic research” and A1 “Biodiversity initiatives: conservation of the river” represent the lowest ranked activities (category 3). It could be reasoned that biodiversity and aquatic research initiatives are not perceived as immediate priorities for this specific studied community. Additionally, they receive less support from communities because it is harder to find clear evidence and tangible results of the positive outcomes or benefits. Therefore, these initiatives may contribute less to building trust and considering values of communities, which according to this analysis are the strongest criteria of obtainment and maintenance of SLO.

When it comes to the results and outcomes (Tab. 5.9), there is an observation that they contribute significantly to distributional fairness, but to a lesser extent to legal fairness. It might be due to the direct impact these outcomes have on the local community. For example, providing an access to a clean water and investing in the community initiatives are benefits that are more tangible and visible to the community, leading to a greater perception of fairness in the distribution of benefits.

On the other hand, legal fairness may involve procedural aspects that are not as impactful to the local community in a short term. It means that results and the outcome achieved by the mining company under the study may have a relatively lesser impact on perceptions of legal fairness.

5.2 Riotinto Mine, Atalaya Mining

Riotinto Mine is an operating open-pit mine, located in the south of Spain, the area of Seville (Fig. 5.8). The company is the Spanish subsidiary of the company Atalaya Mining Plc.



Fig. 5.8: The location of Atalaya Riotinto mine (from ATALAYA MINING PLC, 2023)

Riotinto Mine has the largest mining and metallurgical activity in the world and a long history that goes back at least 1,000 BC (OLÍAS & NIETO, 2012). The region has had constant difficulty sustaining its economy, as it was heavily dependent on mining. Crises in the 1980s and 1990s led to the high unemployment rates in the Mining Basin, but the socio-economic situation in the Huelva areas reached a peak in the fall of 2002, with the lowest copper prices and unbearable unemployment rates (around 50%) among the most vulnerable groups - young people and women. Mines throughout the province closed one after another, losing most of the population (Fig. 5.9) until the Huelva pyrite belt was no longer exploited at all. For instance, Nerva, the largest of all municipalities, lost 20% of its population during the 13 years that the mine remained closed (HIPÓLITO, 2022).

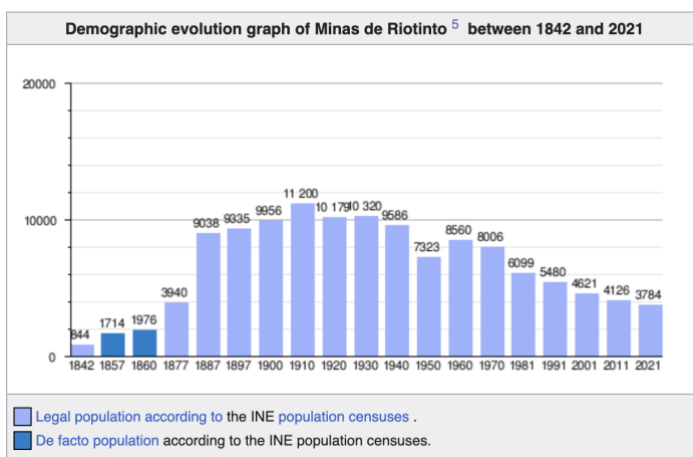


Fig. 5.9: The demographic evolution graph of Riotinto Mine between 1842 and 2023 (from INE INSTITUTO NACIONAL DE ESTADISTICA, 2023)

Currently the municipality *Minas de Riotinto* has a population of 3,703 inhabitants (INE INSTITUTO NACIONAL DE ESTADISTICA, 2023). The region faced numerous protests, demonstrations, and road blockades in strategic locations, waiting for the support of the mining sector (HIPÓLITO, 2022).

The construction of the new Riotinto mine started in 2015, which meant a significant socio-economic upturn for the Mountain Basin in Huelva province (ATALAYA MINING PLC, 2023). According to the company's report, one of the primary benefits has been the establishment of direct employment opportunities, with over 500 individuals employed in the Atalaya region, along with numerous indirect job opportunities arising from contractor engagements and secondary activities necessary for mining operations. The impact on neighboring municipalities has been substantial, with some experiencing a decline in job demand of up to 50%. A study conducted by Sintering (subsidiary of the University of Huelva), revealed that in 2021, the Atalaya Mining Riotinto project generated over 2,000 jobs, which "... represents 1,2% of the total for the province of Huelva in 2021"- states the company (ATALAYA MINING PLC, 2023). The average percentage of employees from the local community (from the Mining Basin) maintains at 68% over the three years (2020-2023), which the company considers as the "key performance indicator" (R1). It contributed a gross value added of 305 million euros. "In wages alone, this employment amounts to more than 60 million euros per year" (ATALAYA MINING PLC, 2023). This data shows that the mine is the driving force of the province. A preference for local hiring of both people and local subsidiary companies gains credibility, as well as it contributes to the goal of promoting inclusive and sustainable economic growth (Tab. 5.14).

The company reaches stakeholders out through consultations with established general procedure of communications with stakeholders (A1). It aims at addressing the issues that stakeholders hold, informing them regarding legal requirements, objectives and goals, customer requirements, environmental aspects and occupational health and safety measures. However, the specific events or initiatives of engagement with stakeholders are not stated in the report.

Additionally, the project generated over 35 million euros in taxes and nearly 800,000 euros were made by *Fundación Atalaya Riotinto* in local social investment (R1). The areas of social projects are presented in Fig. 5.10.

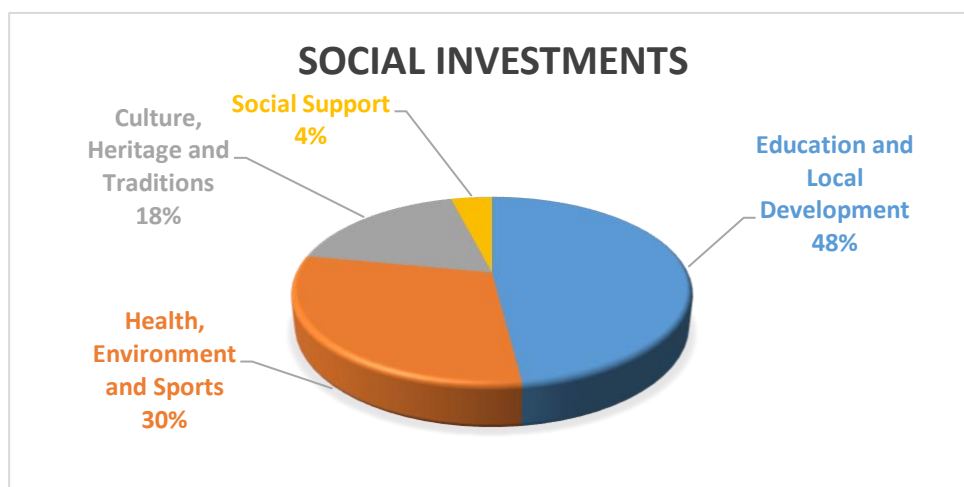


Fig. 5.10: The allocation of Atalaya social investments (original source based on information provided (from ATALAYA MINING PLC, 2023))

There are several municipalities that form part of the Riotinto Mining Basin: *Minas de Riotinto, Nerva, Berrocal, Campofrío, La Granada de Riotinto, El Campillo* and *Zalamea la Real*. The company states to support all of them through collaborating with each local administration. The following activities and projects are reported:

1. Partnerships with educational organizations (A2)

There are several partnerships established, particularly with High Schools, Andalusian universities, in the Plan of the Huelva Provincial Council, promoting students' education (**A3**). The main idea is to provide not only with a theoretical training, but also an internship experience in maintenance, technical services, administration, IT, etc. (ATALAYA MINING PLC, 2023).

- The university internship program in Nerva and *Minas de Riotinto*.
- A creation of the municipal foreign languages school, kindergarten of Nerva.

This initiative consists of offering young people from Nerva the possibility of doing internships in the different departments of the local administration, from the administrative areas to those of culture, communication, social services, education, sports, etc. The participants received a financial reward of 400 euros for the two months they collaborated and learned at the Nerva city council, carrying out their internships (FUNDACIÓN ATALAYA RIOTINTO, 2022)

2. The mining facilities operator course for unemployed people in the Cuenca Minera (A3)

The mining facilities operator course is a free program for unemployed people in the region. Every municipality has 20 available places to get in. Participants are coordinated by Seville chamber of commerce business school. The Program includes not only theory, but the opportunity to attain the professional license ITC 02.01.02 General services operator, a practical training, and an internship in the industrial sector. This capacity-building program becomes a real opportunity to find job: "Of the group of students in the second edition, more than 50% have found employment in the mining or auxiliary sector"- states the company.

3. Commitment to socio-economic contribution to local municipalities (A4)

There are lots of representative examples of company's impact on improving areas of the Riotinto Mining Basin. Each municipality has experienced a positive effect from the mining company. Following improvements are taken from the annual report of province Huelva (FUNDACIÓN ATALAYA RIOTINTO, 2022):

- Pavements in streets of Nerva.

One of the great premises of any City Council is, without a doubt, the maintenance and improvement of municipal streets and infrastructure, as well as the construction of new ones in order to meet the needs of citizens and provide coverage for them, improving public spaces. The execution of this project has benefited the residents of Nerva, allowing the conservation and repair of certain spaces that are of primary use among citizens and has improved the urban image of the town. The paving of part of the local street was launched, urbanization and general improvements in different roads in the municipality that deteriorated by the passage of the time.

- Maintenance and cleaning work in *La Dehesa*.

These works have been developed in two lines of action: on the one hand, the clearing of areas with vegetation as a preventive method against summer fires, and on the other hand, the cleaning of areas enabled to improve the circulation of pedestrians.

- Public space created by the Rio Tinto city council, located on *Paseo del Coso* street

The collaboration of the Atalaya Foundation in this project has made it possible to locate benches and litter bins in this new social point of the municipality, an initiative that helps revitalize life among the inhabitants of the town.

- Refurbishment of the *Plaza de España* in *Campofrío*; Refurbishment of *Zalamea Home for the Elderly*; Refurbishment of a rotating social housing in *El Campillo*.
- Improvement of the sewerage network in *Zalamea La Real*.
- Canteen services for the *Minas de Riotinto* kindergarten.

Company’s Foundation reinforced the scholarships for the school cafeteria that have benefited 25 students with three meals a day, a figure that increases to 52 beneficiaries if the students from the IES Vázquez are considered (FUNDACIÓN ATALAYA RIOTINTO, 2022).

- Sponsorship of football teams and other sporting events in *Minas de Riotinto*, *Nerva* and *Campofrío*.
- Reparation of the sports center in *La Granada de Riotinto* (ATALAYA MINING PLC, 2023).

Such a performance undoubtedly enhances the overall quality of life in the community and contributes to building a resilient infrastructure. The overall connection with Agenda 2030 is displayed in Tab. 5.10.

Tab. 5.10: The alignment of activities and results with SDGs (original source)

Activities and results	SDG
R1 Creation of jobs with a prevalence of local workers	SDG 8: Decent Work and Economic Growth
A1 The general procedure of communications with stakeholders	SDG 11: Sustainable Cities and Communities
A2, A3, A4	SDG 3: Good health and well-being
R2 Local social investments €791.770	SDG 4: Quality education SDG 10: Reduced inequalities SDG 9: Industry, Innovation, and Infrastructure

There is no information about the SLO as a concept in the report, but there is mention of the risks that the company can be exposed to. Among social risks Atalaya highlights ecological and/or socio-labor demonstrations, in other words protests; poor staff participation and involvement in communication, in other words poor engagement and poor procedural fairness; societal disapproval of the company’s management of the asset of cultural interest and its elements; and lastly loss of confidence by the stakeholders because of unethical behavior by the company. All the mentioned risks could lead to a loss of trust and confidence. All these risks are the opposite to the SLO and can be indicators of withdrawing the SLO or its absence. Therefore, if a company realizes these risks and makes an effort to

mitigate them, then the company’s acknowledgment of importance of SLO can be reasonably assumed.

Riotinto supports employees’ families with disabilities through created program “The family plan” (A5) which received significant approval from the stakeholders. It includes training activities and diversity awareness sessions performed by a specialized staff of the Atalaya foundation (ATALAYA MINING PLC, 2023). The company works on this matter with the special employment centers through supply or service contracts. The social inclusion and equality in the workforce are also demonstrated by hiring staff with special needs above the required threshold, set by Spanish legislation, and supporting integration actions (A5). This activity contributes to the SLO by promoting social inclusion and equality in the workforce, which corresponds to sustainable practices (Tab. 5.11). Specifically, it supports the criteria of equal distribution of mining benefits and engagement.

Tab. 5.11: The alignment of activities with SDGs (original source)

Activity	SDG
A5 Hiring staff with special needs and support of family members of employees with disabilities	SDG 10: Reduced Inequalities SDG 5: Gender Equality
18% women working in the Company	

Men represent most employees (Fig. 5.11), but the company assures that it is making efforts in promoting of equal opportunities for women and claims that the company's performance in terms of the percentage of women working in the mining industry in Spain is the best.

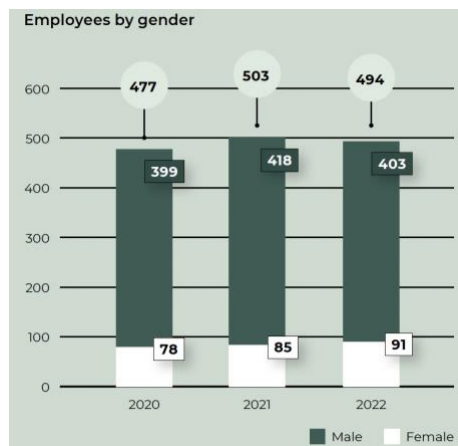


Fig. 5.11: The employment in Rio Tinto by gender (from ATALAYA MINING PLC, 2023)

Sustainable and local supply chain

Atalaya Rio Tinto supports the local and regional economy. The company chooses local companies over the international ones for sourcing and subcontracting providers (A6). The independent study held by Sintering, spin-off of Huelva University, reports that 47,9% of the purchases made by the company in 2021 (R2) were in the province of Huelva, shown in Fig. 5.12. In 2022, 92,6% were national suppliers. By focusing on the local procurement, local businesses are allowed to participate in the company's supply chain. It significantly contributes to the SLO, especially to the equal distribution of mining benefits and procedural fairness criteria.

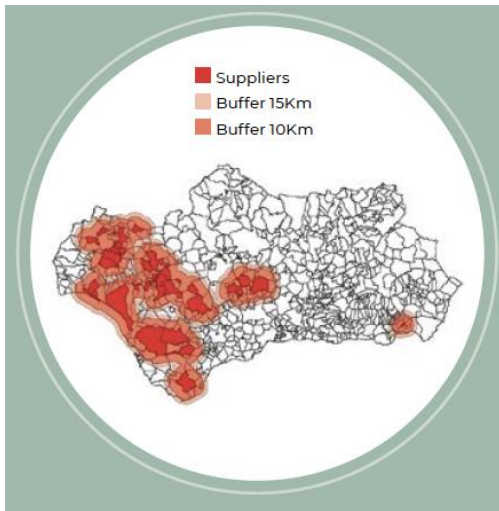


Fig. 5.12: Half of the supplies are from the local market, concentrated in the province of Huelva (from ATALAYA MINING PLC, 2023)

The efficient water management and zero discharge approach (A7)

Atalaya Riotinto is trying to manage how much water do they use by collecting their own water, so they do not affect the supply of water of the rest of the stakeholders in the region. The company is investing in ways of reprocessing more water, e.g. by investing in tailings thickener that has resulted in 22% surface water savings per ton ore processed compared to 2021 (R4). It is water that was going to get deposited in the dump, but instead was taken from the tailings and used again. It is stated by the company that 75% of the water they use for ore processing is recirculated. Tab. 5.12 demonstrates that the company has been improving in 3 years recycling more water, while trying to be more productive.

Tab. 5.12: Water recycling (ATALAYA MINING PLC, 2023)

	2020	2021	2022
% recycled water to total water consumed (%)	74,1	77,0	79,3

Fig. 5.13 shows that the company used to consume more water, but after the installment of the thickener it allowed to recycle more water, so there is no need to withdraw so much.

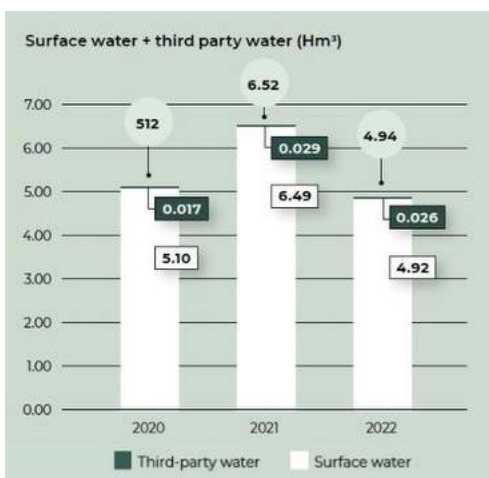


Fig. 5.13: The water withdrawal (from ATALAYA MINING PLC, 2023)

In 2021, the *Zalamea la Real* City Council has opted to focus the framework agreement, signed jointly with the Atalaya Foundation, to carry out improvements in the water supply, which correct deficiencies reported by the neighbors. These improvements and arrangements mean gaining water quality, as well as better use, especially in the domestic environments. The action was carried out in seven streets of the town that had presented more than a hundred incidents. These are large-scale works, which have involved lifting soil, as well as renewing pipes and improving the infrastructure (FUNDACIÓN ATALAYA RIOTINTO, 2022).

The management of historical environmental liabilities (A8)

As has been mentioned earlier, Riotinto mine faced challenges in the past and has a history of protests, especially concerning the acid mine drainage (MACÍAS PÉREZ ET AL., 2007).

Mine was reactivated again in 2015, and the operating company has inherited environmental liabilities. Most of the basins of the *Tinto* and *Odiel* rivers run through the Iberian Pyritic Belt (OLÍAS & NIETO, 2012). There is historical evidence that the *Odiel* and *Tinto* rivers had good condition and water quality. Thus, the degradation of rivers is largely due to the mining since the second half of the nineteenth century (OLÍAS & NIETO, 2012).

Atalaya is fully committed to changing the situation that was left after previous exploitation of the mine. These commitments relate to the formation of acid mine drainage. Atalaya assures to eliminate the drainages gradually with the goal of a full environmental recovery (absence of pollutants in the rivers) by the eleventh year of operation (ATALAYA MINING PLC, 2023).

Since the start of operations, the company has been continuously monitoring the quality of diffuse waters. The focus falls on improving the infrastructure that generates these waters (ponds, pumping stations, bottom drains) and continuing the rehabilitation of passive tailings dams. The company invests in preventive technologies to minimize the formation of acidic waters. Within the framework of the collaboration with the University of Huelva, an innovative water treatment system called "dispersed alkaline substrate" is being developed, aimed at increasing pH and precipitating metals. It is carried out through a passive process in which acidified water from the territory is passed through a reactive filter. Preliminary experiments in the field have shown successful results, therefore a larger plant is planned to be implemented.

According to a study carried out by an independent party, namely the University of Huelva, the company has been able to achieve results. In the 6 years since the reopening of the mine up to the time of the analyzed report (2015-2021), a "radical change in the hydrological behavior of the basin" has been observed (ATALAYA MINING PLC, 2023). Factors include the closure of channels where discharges to the environment used to be made, as well as the base pollutant load has been significantly reduced (by more than 50%).

The environmental restoration plan (A9)

The company also inherited the "inactive" waste dumps, on which it focused its work in 2022. The reclamation work affected an area of 49,74 ha, including *Ilmenitas-Piritas* waste dump, *Vacie Marginal* waste dump. The work included removal of waste, reshaping, sealing the surface and revegetation. Both projects were morphologically and slope adapted for the restoration. As reported, canal and ditch system were designed to manage stormwater flow (ATALAYA MINING PLC, 2023). The relationship of the mentioned approaches in the company to the SDGs are presented in Tab. 5.13.

It can be reasonably assumed that by reinvesting the profits to offset the historical environmental liabilities of mines, Atalaya Riotinto demonstrates an example of accountability and trustworthiness. Practices that were used in the mining industry hundreds of years ago were undoubtedly less sustainable. The mining industry has evolved and as can be observed, companies now are taking responsibility for historical issues and damage that was made. Such an approach not only affects trust of local communities, but trust in industry as a whole: it could change the perception of mining industry as more committed, responsible, and transparent.

Tab. 5.13: The alignment of activities and results with SDGs (original source)

Activities and Results	SDG
A6 A sustainable and local supply chain	SDG 8: Decent Work and Economic Growth
R3 47,9% of supplies from the local market	
A7 The efficient water management and Zero discharge approach	SDG 6: Clean Water and Sanitation SDG 14: Life Below Water
R4 22% surface water savings in water consumption with respect to 2021	
A8 The management of historical environmental liabilities	SDG 15: Life on Land
A9 The environmental restoration plan	

5.2.1 The assessment of an actual social performance and perception of the Riotinto mine, Atalaya Mining

One might suggest that Riotinto Mine has gained approval from the local communities. It is reflected by the awards given to the company in 2022 by a third party: several local initiatives, local media (*Huelva Información*) with the sponsorship of the *CaixaBank*. Namely the “Gold Medals”, “*Onubenses del Año*” and the “International Projection” category awards were given for the significant contribution to the quality of life and a positive impact on the province of Huelva (ATALAYA MINING PLC, 2023). Local communities appreciate the mining company for structuring the territory and for its role in generating employment in the Huelva province, which once again indicates the social acceptance.

However, there are some environmental groups, for instance *Ecologistas en Acción* (an organization with a small number of members in the province), who are concerned. The reason is the Andalusian government's approval to increase the retaining wall of the waste ponds given to the Riotinto mine, which will hold 161 million tons of sludge, adding to the 182 million cubic meters of toxic sludge already accumulated (ECOLOGISTAS EN ACCION, 2024). The group claims that Riotinto's ponds are in a state of a collapse, referring to several scientific reports that claim a 95% chance of Riotinto's ponds collapsing in the next 20 years (STEVEN H & EMERMAN, 2016).

Such concerns are expected due to the region of operation is close to the Seville, where 25 years ago the biggest environmental disasters in the history of Spain occurred: the failure of

the waste pond at the *Aznalcóllar* mine, known as the *Doñana disaster*. Since further investigation of this matter is out of the scope of this study, the following information is only provided for current understanding of how different stakeholders perceive the company.

To address these concerns, Atalaya Mining publicly shows the process of tailings management, providing interested parties with a technical report about the increase of the tailings. There are four main points extracted from the technical report (ATALAYA MINING PLC., 2023).

- 1) Riotinto mine is reinforcing the walls with stronger, more competent material (riprap loose stone used to form a foundation for a breakwater instead of technical sand).
- 2) The company has installed a more efficient tailings deposition system that allows safer and better position of tailings, that in turn allows the layers to dry quickly and push the water away from the walls.
- 3) By using geotextiles in waterproofing the layers on the slopes of this new wall they reduce the probability of leakages, that can compromise the stability of the retaining wall.
- 4) Atalaya Mining has invested in increasing the capacity of the drainage systems that will protect against all heavy rainwater events which might occur in this area.

The company claims that with all these improvements done, the safety factor reaches 1,88, when minimum required by Spanish legislation is 1,4.

There is another indicator of misunderstanding that is occurring. The recent case of the Factory of fertile soils in Riotinto (*Fábrica de suelos fértiles en Riotinto*), consisting of manufacturing fertile soils and acidity correctors with which to provide the mining company with the necessary material to undertake the restoration. The project was opposed by residents of nearby cities in the region. However, the same community seems not to be preoccupied with the potential risk of a breach of the Riotinto ponds, which as has been mentioned earlier is only a concern of *Ecologistas en Acción* but are cautious about the Huelva industrial waste dump. This only confirms that the reactions of local communities are not always predictable and justified.

These sorts of concerns might be reasonable, since people are worried that the company is going to build a waste dump, which is not the case. This project is not a landfill, it is a plant facility that aims to provide fertile soils for reclamation. Atalaya Mining, as a response, detects and admits that there are concerns of the population and addresses all of them. The company states that it is understandable that communities perceive such initiative so biased, since Nerva is sensitive to topics related to landfill management. However, the company clarifies that this project has nothing to do with landfill. It is a factory where the raw materials are organic materials, biomass ash, mine soil or trimmings, after the production process become soils that correct acid drainage and, therefore, guarantee water quality and absence of metals in it. Just claiming alone will not help in gaining trust, the company believes that transparency in running the factory will help increase acceptance. Therefore, the company is willing to provide information to citizens about the activities at the factory, how the fertile soil is organized, what they are made of and where they come from. "This is a measurable commitment to which the local population will have access and in which the city council, as a direct representative of citizens, will play a fundamental role in oversight" - states Atalaya Mining (PINEDA, 2024).

5.2.2 The house of quality analysis of Riotinto mine, Atalaya Mining

To categorize the ranking of activities and results achieved by the company, Tab. 5.14 was used.

Tab. 5.14: The categories of importance of the activity and result to contribution to the SLO for the Riotinto mine, Atalaya Mining (original source)

Normalized sum (NS)		Category	Meaning
for Activity	for Result		
NS > 12%	NS > 26%	Category 1	Activity or result tackles most SLO criteria, thus, have the greatest impact on meeting the specified criteria. This category reflects the focus of the company in achieving the SLO.
8% > NS < 12%	NS < 26%	Category 2	Activity or result is beneficial in earning the SLO (according to the analyzed company), however not crucial.
NS < 7%	-	Category 3	Less impactful activity or result.

The HOQ analysis can also provide insights about the SLO components among 6 analyzed, which, according to the company's performance, are the most crucial in building the SLO (see Appendix B). The SLO criteria were also categorized (Tab. 5.15).

Tab. 5.15: The categories of importance of specific SLO criteria to building the SLO for the Riotinto mine, Atalaya Mining (original source)

Normalized sum (NS)		Category	Meaning
for Activity	for Result		
NS > 19%	NS > 19%	Category 1	The SLO criteria is impactful in obtainment of the SLO.
8% < NS < 19%	6% < NS < 19%	Category 2	The SLO criteria is less important in obtainment of the SLO.
NS < 8%	NS < 6%	Category 3	The lowest importance in obtainment of the SLO.

Tables 5.16 and 5.17 are the outcomes of the carried analysis, providing the overall ranking of both activities and results.

Tab. 5.16: The results of ranking of the activities of the Riotinto mine, Atalaya Mining (original source)

Activity of mining company		Ranking
The commitment to socio-economic contribution to the local municipalities	A4	1
The management of historical environmental liabilities	A8	2
Hiring staff with special needs and support of family members of employees with disabilities	A5	3
The mining facilities operator course for unemployed people in the Cuenca Minera	A3	4
The local supply chain and local commitment	A6	5
Efficient water management and zero discharge approach	A7	6
The environmental restoration plan	A9	7
Partnerships with educational organization	A2	8
The general procedure of communications with the stakeholders	A1	9

Tab. 5.17: The ranking of achieved results by the Riotinto mine, Atalaya Mining (original source)

Activity of mining company		Ranking
The local social investment (791,770 €)	R2	1
47,9% of supplies from the local market	R3	2
Creation of jobs with a prevalence of local workers (68,3%)	R1	3
22% surface water savings in water consumption with respect to 2021	R4	4

Findings from HOQ analysis for Riotinto mine, Atalaya Mining

It emerges from the results of this analysis that trust, and respect of community values are the strongest indicators of the presence of the SLO. Since mining activities in the region have been carried out for many years by different mining companies, some of which have brought the damage and imposed negative consequences on the local communities, the operating company Atalaya Mining realizes how essential it is to build and gain trust of the population for a beneficial existence of both parties.

The equal distribution of mining benefits, qualitative engagement, and procedural fairness rank next in importance, to a lesser extent. It was found that most initiatives demonstrate a commitment to supporting local economies and developing fair and sustainable business practices, which strongly influences the criteria of equal distribution of mining benefits and procedural fairness in the SLO.

As for the company's social performance, there is a more even distribution of initiatives in terms of the importance of contribution to the SLO. Commitment to socio-economic contribution to the local municipalities (A4) takes the leading position, which once again

proves the company's intention to build trust among all stakeholders. The analysis reveals that Atalaya Riotinto recognizes the socio-economic realities of its immediate environment, socio-economic development efforts in the Riotinto Mining Basin.

In second place is the management of historical environmental liabilities (A8). Previous mining projects and their results affect the way people perceive mining in their region, in a country or in general. Therefore, being aware of a current economic situation in an operating region, knowing its history and most importantly taking the responsibility for all damage done at an extraction site, regardless of who operated, might be another crucial driver in earning and maintaining the SLO.

Activities A5, A3, A6, are of relatively the same importance due to the primary common goals: to make sure that marginalized groups have access to employment opportunities and a social support, and to foster economic growth.

The general procedure of communications with stakeholders (A1) is ranked the last, which is due to the unclear positioning of the system of stakeholder engagement (based on the surveyed sustainability report). The contribution to the local community is evident, but the process of involvement of the local community in issues that the region holds, is not described clearly and is not supported by examples.

5.3 Aguas Teñidas mine, Sandfire MATSA

The Aguas Teñidas mine is an underground copper, lead and zinc mine located in the Iberian Pyrite Belt, located in the municipality of *Almonaster la Real*, in the north of the province of Huelva, the same area where the Riotinto mine operates.



Fig. 5.14: The location of Aguas Teñidas mine (from SANDFIRE RESOURCES, 2024)

The deposit was discovered in the 1980s. Mine project was crisis-prone in the past due to the low prices of metals, and in 2001 suspended its operations. Currently the mine is operated by Sandfire MATSA, which is 100% owned by Sandfire Resources Ltd (SANDFIRE RESOURCES, 2024). The company reports about its activity since 2010, and for the last 2 years, it follows GRI Standards 2021.

The local procurement and employment (A1)

The company commits itself to equal distribution of benefits through supporting the local suppliers. When hiring, priority is given to employees from the nearest municipalities of the

Huelva province. It is accomplished through the company's sustainable procurement standard, which implies that every project of Sandfire Resources is obliged to develop a local procurement strategy and implement it. According to the report, the number of employees from the local population of the province is 80% (R1), which is reported in numbers as 766 direct employees in 2023 and 2,231 contractors engaged throughout the year on average (R1). This is certainly reflected in the economic growth of the region: the company believes that the contribution to the province's GDP is approximately 5% for 2023. Another confirming indicator is that 97% of procurement spent with national suppliers in Spain (R2).

The gender equity

Among all the employees in the company 21% are women. By law, Sandfire Resources has an obligation to report on the pay equity, which brings a transparency among the stakeholders.

The community grievance mechanism (A2)

Like Somincor (Neves-Corvo mine), Sandfire Resources developed a system to ensure that every stakeholder could report rights violations, if there any. As it was already explained in chapter 5.1, this approach has a significant impact on the quality of engagement with the stakeholders, the transparency and potential for more successful resolutions of the issues. The local stakeholders are not only participants, but additionally the ones who design the mechanism itself, in a way they think it's the most beneficial and equitable, especially for vulnerable groups. The company claims that it monitors complaints and responds to them, however, the details and number of complaints are not presented in the analyzed report.

The community investments and development (A3)

In the sustainability report, the concept of the SLO is mentioned, and maintaining the SLO at the highest possible level is a priority for Aguas Teñidas mine. Speaking about community acceptance, the company highlights meeting expectations of the community and fulfilling commitments is essential. If these factors are not in place, the SLO could be threatened. Therefore, only after a qualitative engagement with the local communities and thorough analysis of what are the expectations of the region from the mining companies, Sandfire Resources develops an investment plan that would be appropriate and prior to the needs of the region. It is usually based on social baseline studies that the company carries out.

In 2023 the community investments amounted to 124,833\$ (R3). Financial support is provided through the implemented "Alliance program" (A3), which used to imply an annual contribution of 45,000€ to various projects. However, from 2024 the amount allocated to this initiative was increased to 100.000€. The investments are aimed at the development of local projects and programs in different spheres of influence, mainly including education, health, social assistance, employment and entrepreneurship, support of women, and preservation of historical heritage. At the time of 2023, the company stated that the fund has reached 650.000€, and the company had more than 500 collaborations on its account, which testifies to a significant impact on stakeholder engagement in Huelva Province. Every program since the beginning to the implementation stage, or negotiating land access agreements, is controlled by the community relations team in Sandfire MATSA (SANDFIRE RESOURCES, 2023).

“Alliance program” has been functioning for 5 years. An internal Evaluation Committee accesses every project submitted by non-profit organizations and allocates the grants. In 2024, 45 projects were chosen for financial support.

A project of rehabilitation and landscaping of degraded areas of the village won the largest grant. It also aims to create spaces for socialization for its inhabitants. The company also favored projects aimed at improving infrastructure, projects to support the elderly, activities carried out by parents of students in schools, actions to empower women in rural areas, providing support to needy families with physical or mental illnesses.

Outside the scope of this program, Sandfire MATSA mentions in their sustainability report MATSA’s scholarship program, created for the support of students in the province and neighboring towns. Over 35 scholarships have been awarded since the program has been developed.

Sandfire MATSA was helping to build new nursery in 2023 in the local town of *Almonaster la Real*. The fund also allocates money for the Spanish association against cancer in Huelva.

Analyzing the company's social activities, one can see a well-structured framework of mutual interaction with stakeholders, providing financial support on an annual basis and covering a wide range of problems of the local population. This continuous support goes a long way in building confidence in the company. It is reasonably assumed that Sandfire MATSA recognizes the importance of equitable distribution of benefits from mining activities. Significantly, financial support is directed where it is needed and desired by the local communities, demonstrating the company's inclusion in local communities and respect for their values and needs.

Training courses for the residents (A4)

In 2024, the company launched a training course for professions that would meet the needs of the mining companies in the region. It is intended only for residents of the region of operation. This way, Sandfire MATSA addresses the problem of unemployment and raises the level of professional development. As a result, 80% of the participants were women, allowing the company to involve women in the mining sector.

Water initiatives

The company reports 69% recycled water for 2023 (**R4**). The Aguas Teñidas mine has also reduced freshwater withdrawals due to reduced rainfall in the region. The company uses significantly less water than it is licensed to use, employing a highly efficient water conservation program that demonstrates a responsible and proactive approach in a changing environment.

The Mining water living lab project (A5)

As part of a collaboration with the Life Remine Water project (co-financed with the EU), in 2022 the company placed an installation called the “Mining Water Living Laboratory” and tests it on the territory of the Aguas Teñidas mine. The project aims to address the issue of reducing the amount of water returned to the environment and aims to recover up to 90% of water for reuse. The trial technological solutions seem to be effective, as following results are reported by the company: the quality of water has improved with significant reductions in sulfate and calcium during the nanofiltration stage (98% and 96%, respectively). This

initiative serves as an example of the company’s commitment to innovations in water management.

Biodiversity

Available baseline biodiversity studies in MATSA have not identified direct or indirect impacts on species or habitats of conservation significance. Since the results of the biodiversity research currently being carried out by the company will be presented in the sustainability report for 2024, aspects of biodiversity will not be considered in the ongoing analysis.

The overall connection of the company’s performance with Agenda 2030 is displayed in (Tab. 5.18).

Tab. 5.18: The alignment of activities and results with the SDGs (original source)

Activities and Results	SDG
<p>A1 The local procurement and supply chain</p> <p>R2 97% of procurement spent with national suppliers in Spain</p> <p>R1 80% of employees are local population of the province; 766 direct employees; 2,231 contractors engaged</p>	<p>SDG 8: Decent Work and Economic Growth</p>
<p>A1 The general procedure of communications with the stakeholders</p>	<p>SDG 11: Sustainable Cities and Communities</p>
<p>A3 The Alliance program: an annual socio-economic contribution of 100.000€</p> <p>R3 The investments in community development programs (124,833\$)</p> <p>A4 Training courses for the residents</p>	<p>SDG 3: Good health and well-being</p> <p>SDG 4: Quality education</p> <p>SDG 10: Reduced inequalities</p> <p>SDG 9: Industry, Innovation, and Infrastructure</p>
<p>A5 The Mining Water Living Lab project</p>	<p>SDG 6: Clean Water and Sanitation</p> <p>SDG 14: Life Below Water</p>
<p>A2 The community grievance mechanism</p>	<p>SDG 16: Peace, Justice and Strong Institutions</p>

5.3.1 The assessment of an actual social performance and perception of Aguas Teñidas mine, Sandfire MATSA

In 2022, the *Serrana Fuente Vieja* Association (the association of people with disabilities) awarded the company for the social and economic contribution to the local communities, which carries a considerable significance. According to GUADALUPE ET AL., 2022, Aguas Teñidas mine has positive relationship with neighboring municipalities.

The authors of work “Innovation and sustainable mining in Andalusia” (ANTONIO & GIL, 2015) positively evaluate the work of the Aguas Teñidas mine, calling it an exemplary mining company and a model of modern, productive and sustainable mining, not only in Andalusia. Located in an area particularly degraded by historically poorly managed mining, the company is minimizing its impact on the atmosphere and "zero discharge" of acidic water into the river network.

However, during the analysis, indicators of the concerned public have been detected. To understand this matter, a brief analysis of the area will be provided. The territory of *Andevalo Minero*, is characterized as a vast and dry area located in the Iberian Pyrite Belt and is one of the most depressed regions of the Huelva province. Huelva was particularly affected by the depopulation process (lost 70% of the population of the village) because of the mining crisis in the eighties. As a response in 2005, the community of *Andevalo Minero Irrigation*, a private organization, was formed. The region seeks to increase its wealth and employment through irrigation. It is already showing effective results by supplying water for irrigation on 1,035 hectares and is intended to supply about 45 farms (LANDERO, 2020). They use water from the *Olivargas* reservoir, from which the nearby *Agua Teñidas* also uses water. In 2018 and 2019 there were 2 incidents of MATSA discharges in *Olivargas* (DIARIO DE HUELVA, 2019; HUELVA BUENAS NOTICIAS, 2018). This infrastructure significantly improves the availability of water resources, that is why *Andevalo Minero* irrigation community got the most affected. The spills generated concern among farm owners, agricultural companies and endanger agricultural jobs in the region. Two accidents in just seven months that have put them in danger of contamination by heavy metals and acidic waters from the *Rivera de Olivargas* mine, a channel that flows into the *Olivargas* reservoir and where they have allocated water to irrigate their incipient crop fields. MATSA has managed to stop the two spills recorded at the mine in time, before the water contaminated by sludge and mineral paste met the waters of the swamp, claimed by the company. Due to these events that had place in the past, the company now invests a lot in effective and safe water initiatives.

Another concerned party was organisation *Ecologistas en Acción*, who filed an official request asking the authorities to not authorize the construction of a mining sludge pond between *Andevalo* and the *Sierra of Huelva*, requested by the company Sandfire MATSA. *Junta de Andalucía*, the representative of municipalities, has denied Sandfire MATSA the permit for the construction of a tailings management facility (DIARIO DE HUELVA, 2023; FLORENCIO, 2023).

5.3.2 House of quality analysis of *Agua Teñidas* mine, Sandfire MATSA

The relative importance of each activity for each SLO criteria and for all SLO criteria taken together was found (see Appendix C for results of scoring). To categorize the ranking of activities and results achieved by the company, Tab. 5.19 was used.

Tab. 5.19: The categories of importance of activity and result to contribution to the SLO for *Agua Teñidas* mine, Sandfire MATSA (original source)

Normalized sum (NS)		Category	Meaning
for Activity	for Result		
NS > 12%	NS > 23%	Category 1	Activity or result tackles most SLO criteria, thus, have the greatest impact on meeting the specified criteria. This category reflects the focus of the company in achieving the SLO.
8% > NS < 12%	16 < NS < 23%	Category 2	Activity or result is beneficial in earning the SLO (according to the analyzed company), however not crucial.
NS < 7%	NS < 5%	Category 3	Less impactful activity or result.

The HOQ analysis can also provide insights about the SLO components among 6 analyzed, which, according to the company's performance, are the most crucial in building the SLO. These criteria were also categorized (Tab. 5.20).

Tab. 5.20: The categories of importance of specific SLO criteria to building the SLO for for Aguas Teñidas mine, Sandfire MATSA (original source)

Normalized sum (NS)		Category	Meaning
for Activity	for Result		
NS > 19%	NS > 31%	Category 1	Impactful in obtainment of SLO
17% < NS < 19%	-	Category 2	Less Important
NS < 5%	-	Category 3	Low importance

Table 5.21 and Table 5.22 present rankings from carried HOQ analysis.

Tab. 5.21: The results of the ranking of activities of Aguas Teñidas mine, Sandfire MATSA (original source)

Activity of mining company	Ranking	
The Alliance program: an annual socio-economic contribution of 100.000€	A3	1
The local procurement and employment	A1	2
The community grievance mechanism	A2	3
Training courses for the residents	A4	4
The Mining Water Living Lab Project	A5	5

Tab. 5.22: The ranking of achieved results by Aguas Teñidas mine, Sandfire MATSA (original source)

Activity of mining company	Ranking	
97% of procurement spent with national suppliers in Spain	R2	1
Investments in community development programs (124,833\$)	R3	2
80% of employees are local population of the province 766 direct employees; 2,231 contractors engaged	R1	3

Findings from HOQ analysis for Aguas Teñidas mine, Sandfire MATSA

According to the results, analyzed company recognizes the cruciality of both trust and qualitative engagement in gaining the SLO. Another focus of all conducted and potentially implemented programs is on fair decision-making processes.

From the results of the analysis, the allocation of grants by the company to the local projects aimed at improving the quality of life in the region (A3) has the highest priority. This may indicate that residents appreciate the company's efforts to improve their living conditions,

which contributes to their social acceptance. The local employment and procurement (A1) rank second, which is also important for the sustainability and development of the local economy. These results can be explained by the region's historical dependence on the mining industry. After ceasing mining operations in Spain in 2000, locals faced absence of work, technological decline in Andalusia (Garrido et al., 2016). This fact makes such company initiatives particularly meaningful for the local population.

Water-related initiatives (A5) scored relatively lower due to the region's sensitivity to water-related issues. It becomes very challenging to gain local trust because of past ineffective water management and the impacts on water left by past operating companies.

6 Discussion of the results

As has been mentioned earlier, the HOQ analysis can be used to analyze the importance and contribution of each single SLO criterion to the obtainment of SLO. In this HOQ analysis, calculations for the company's activities and results were performed (scored) separately, as both are different in nature: activities are the ongoing processes implemented by the company to achieve the SLO, while results are the final accomplishments achieved by the company due to certain activities. To understand the significance of the input of a certain SLO criterion in building the SLO, the average of the value of normalized score for the activity and the result for each individual company was calculated using Formula 6.1.

$$\text{Average NS} = \frac{\text{NS Activities} + \text{NS Results}}{2}, \quad (6.1)$$

Where NS - normalized score.

The average for 6 analyzed SLO criteria among all 3 companies was then found (using formula 6.2), which reflects the average amount of points given in HOQ analysis to score a particular activity/result against a specific SLO criteria.

$$\text{Average NS for } n \text{ companies} = \frac{\sum \text{Average NS}}{n}, \quad (6.2)$$

Where n - number of companies.

The results are presented in Tab. 6.1 and illustrated in the Fig. 6.1.

Tab. 6.1: An average of normalized sums of given scores to specific SLO criteria in the HOQ analysis (original source)

	Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural fairness	Respect of community values
Normalized score (NS), %						
NS Activities Company 1	21,5	11,5	11,5	19,5	15,5	20,5
NS Results Company 1	23,0	21,0	5,0	13,0	11,0	27,0
Average NS for Company 1	22,25	16,25	8,25	16,25	13,25	23,75
NS Activities Company 2	20,32	17,74	7,42	17,1	16,45	20,97
NS Results Company 2	19,12	22,06	5,88	13,24	17,65	22,06
Average NS for Company 2	19,72	19,9	6,65	15,17	17,05	21,51
NS Activities Company 3	20,33	17,03	4,95	20,33	19,23	18,13
NS Results Company 3	18,42	23,68	4,39	18,42	18,42	16,67
Average NS for Company 3	19,37	20,35	4,67	19,37	18,82	17,40
Average NS for all three companies	20,45	18,84	6,52	16,93	16,38	20,89

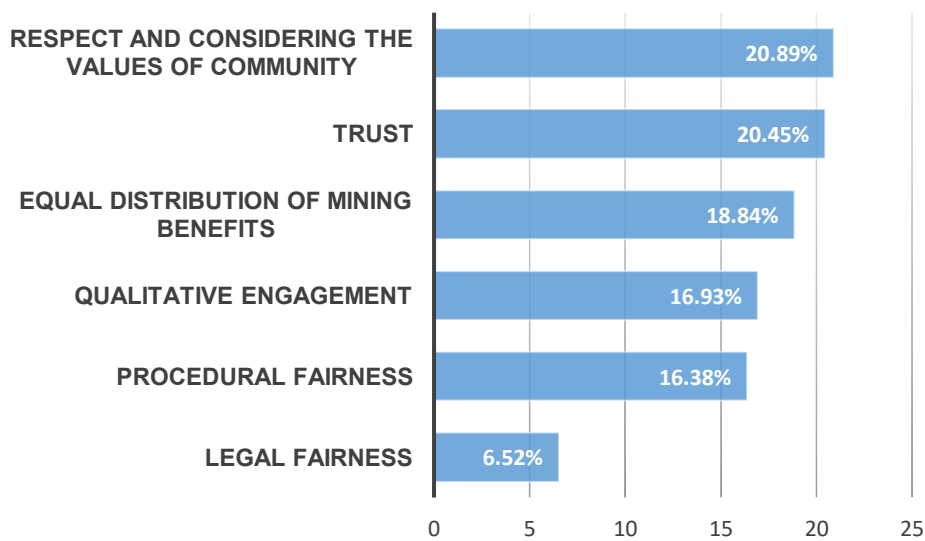


Fig. 6.1: The average of normalized sums of given scores to specific SLO criteria during the analysis (original source)

Fig. 6.1 portrays the average amount of points given to score a particular activity/result against a specific SLO criteria, in all 3 companies. This means, for example, that, on average, respect and considering the values of community is awarded 20,89% of the total of points awarded in a specific company analysis.

After analyzing the activities and results achieved by each company, this analysis concludes that the activities employed by the companies and detailed in their sustainability reports, have the highest impact on the following SLO criteria: respect and considering the values of communities, trust, and equal distribution of mining benefits. A key takeaway from this result is that for these companies, the key challenges in terms of the SLO performance are gaining trust, being seen as respectful of the values of communities, and distributing the benefits appropriately.

As “legal fairness” being the lowest ranked by this analysis, it can be inferred that these mining companies, in this case scenario, do not seek to show that there is legal justice in their operations, presumably, because they are already operating in an environment that provides this legal justice by default, they are in a judicial state country with all rights well established. It, therefore, follows that the companies do not really feel the need to prove through activities and efforts to the stakeholder’s the legal fairness, since a country already has the legislation that assumes this and strong institutions that enforce it.

The Venn diagram (Fig. 6.2) represents detected similarities and differences in the activities that the studied companies take to be more sustainable and, therefore, maintain a good SLO performance.

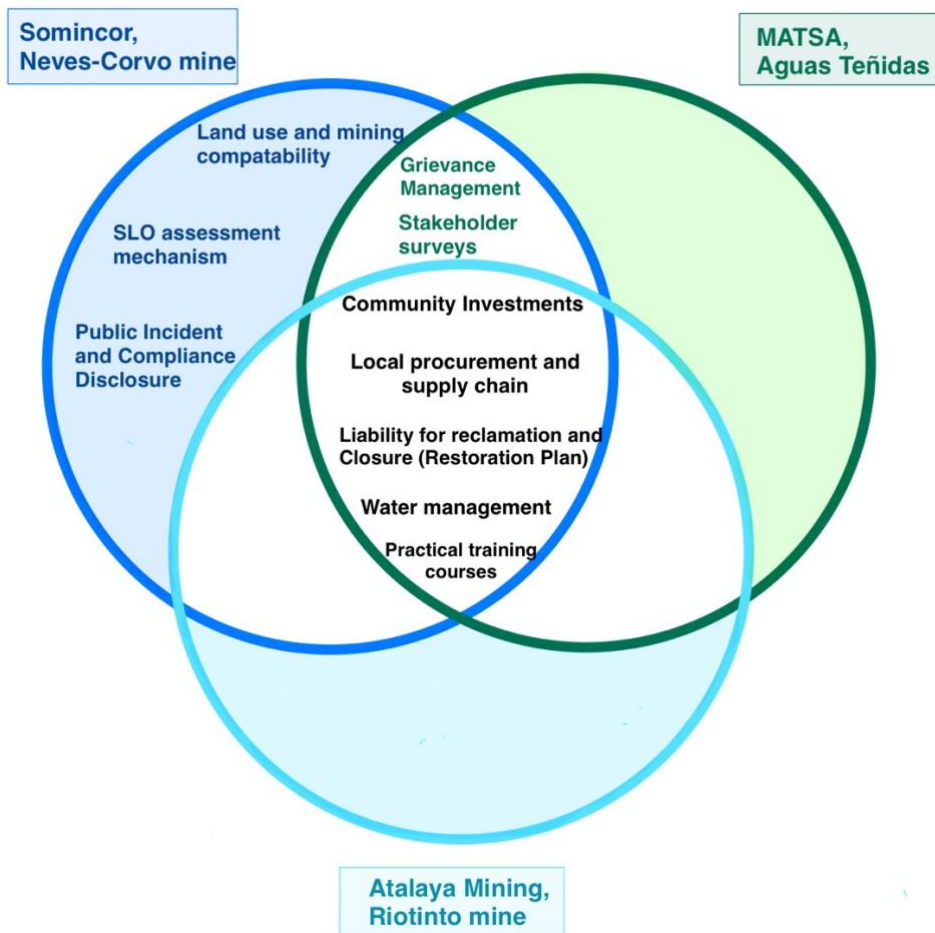


Fig. 6.2: The similarities and differences in the activities detailed by studied companies (original source)

The analysis suggests that, throughout all companies, the activities broadly categorized as “investments in community initiatives and projects”, which are aimed at improving and maintaining the quality of life in the region of operations, scores the highest. This type of activity has a very high performance for every single company since it tackles multiple important criteria at the same time (trust, distributional and procedural fairness, qualitative engagement, and respect and considering the values of community). In this analysis, this activity is the most efficient at achieving the SLO. This analysis also assumes that activities such as “local procurement and supply chain” are scored highly at all analyzed companies and boost the SLO performance by significantly contributing to distributional fairness and procedural fairness.

It is observed that investments in education, focusing on practical application of students' skills, implementation of internships, are priorities for the analyzed companies. All three companies have practical courses aimed at training workers in specialties that provide jobs, expecting that these skills will be useful when the company leaves the region. The region of Andalusia has often been characterized by inequality between foreign companies and small communities, who have always been wary of large-scale mining, fearing for their way of life (GARRIDO ET AL., 2016). As we can see from the analyzed reports, companies now are prioritizing the lifestyle and quality of life of local communities, recognizing the importance of the sustainable distribution of benefits and procedural fairness. Only a genuine interest in the well-being of local stakeholders will help a company win the trust of the locals.

Most of the times mining companies operate in rural places and, therefore, these initiatives are beneficial for both parties, as it helps the mining company by creating a supply of skilled workers as well as increasing the quality of life of the people in the region and their prospects, once the mining operation leaves. It also ranks high since it tackles most of the SLO criteria and plenty of SDGs (3, 4, 5, 8, 9).

Only 2 companies (Neves-Corvo mine, Somincor and Minas de Aguas Teñidas, Sandfire MATSA) have implemented grievance management mechanisms. A grievance redressal not only identifies stakeholder concerns and proactively addresses issues, but also identifies stakeholder groups or topics that require additional attention. According to the analysis, it is a great instrument that has the potential to significantly contribute to the SLO performance through transparency, engaging and involving stakeholders in the process. It is also general and could be easily implemented in any mining context.

Another frequently occurring element in all the reviewed sustainability reports is the mine water management and acid mine drainage management. It is noteworthy to mention that, for this specific case scenario, all the mines are in an area with very low precipitation, and where water resources are scarce, and thus, proper water management is essential and significant for the SLO. Not only are these mining operations big water consumers, but they also must store contaminated water in the tailing dams, so their whole operation relies on good water management. Therefore, it is crucial from the perspective of the SLO, to demonstrate to the local communities and other stakeholders the responsible water management.

As we could see from the house of quality analysis, all three companies are trying to efficiently manage the quantity and quality of the area's water resources, aiming to minimize the consumption of water as a natural resource. The local population has faced in the past with an irresponsible behavior of mining companies within this issue, therefore, it is extremely important for the SLO in this area to ensure effective water management.

The findings on activities are consistent with the findings on the results, as the results reported by all three companies are related to the top three initiatives: either the local procurement, water management achievements, or social investments.

Through this analyses one could assume that the company that seems to be more confident about their data and even makes an SLO assessment is, presumably, the company that of all the three have the best SLO performance – Neves-Corvo mine, Somincor. It is the only company that does not have any conflicts according to the database of map of mining environmental conflicts in Andalusia and Portugal (UNIVERSIDAD DE HUELVA ET AL., N.D.) and analyzed publications in newspapers, articles, NGO's comments. Somincor is the only company that has implemented the SLO assessment mechanism and seems to be the only one who is conducting surveys among stakeholders that other companies are not practicing, or do not mention these activities in their reports. Somincor once again confirms that for them the SLO has a fundamental influence in decision making. This methodology of continuous monitoring through surveys, community meetings, and grievance analysis can be applied to any mining company and bring significant results in promoting a company acceptance. Such an initiative identifies what generates community trust in a company and measures how it changes over time. By implementing this tool, a mining company can determine where their focus should be in their operations and how effective and productive the measures already in place are.

Biodiversity is an important aspect in terms of sustainability and SDGs, but among all cases under study, biodiversity activities are not perceived as very important to this studied communities, who are the most impacted stakeholder. The initiatives the companies are taking in this field might tackle a lot of SDGs, however, they might not be the best at yielding results when it comes to the SLO performance.

Even though all the three companies have similarities environmentally and culture wise, it must be taken into consideration that the location differs (one mine is in Portugal and the other two are in Spain), as well as the mining method: one is an open pit mine and two are underground mines. Therefore, it would be inaccurate to draw definitive conclusions or directly compare them. This paper argues that creating a universally applicable system that could be suitable for every mining project is unlikely: the SLO is site-specific and unique for each project. However, a demonstrated approach of analyzing the SLO performance of studied mining companies, could serve as a potential mechanism that could be used by any mining company. The approach includes a reviewing of the sustainability report, examining the current state of the SLO (whether there are indicators of an acceptance or a resistance), defining the SLO criteria, and assessing sustainability report using the HOQ analysis. Such an analysis provides an opportunity to see the full picture of the expectations, concerns and values of local communities, and the way the mining company addresses these needs. By clearly defining the key SLO criteria (it is important to note that these may differ from those proposed in this paper), a mining company can identify which initiatives are yielding great results and which are having less impact on the SLO. Hence, depending on the impact on the SLO criteria, prioritized activities can be identified, allowing the company to allocate resources more efficiently and set a precise focus.

Chapter 4 of this thesis suggested that there is a link between the SLO concept and the SDGs. After considering the best activities and results highlighted in this analysis, there is an observation that the activities or results of a company are very closely related to the specific SDGs or align tightly with a group of SDGs. SDGs presented in Fig. 6.3 are the ones where mining companies can have the greatest impact in terms of the SLO according to this analysis. Thus, an assumption could be proposed that by looking how well activity tackles SDGs, one can have a perspective on company’s social performance. Even though it might seem obvious: a good SDG performance yields a good SLO performance.



Fig. 6.3: The most impactful SDGs from the perspective of the SLO (original source)

Conclusion

Considering the identified issues within the scope of the thesis, the primary objective of this research is to conduct a comprehensive analysis of SLO and present critical review of SLO criteria. Outlined tasks, aimed to address those problems and contribute to a more comprehensive and nuanced understanding of SLO in the mining industry, are as follows.

Different SLO theories analyzed converge on the unresolved issues of SLO management. While the concept of the SLO has complex nature, this research contributes to the existing body of knowledge on the SLO, clarifying its evolving nature and the factors influencing its attainment. It concludes by arguing that SLO is a continuous process of obtaining approval from most stakeholders involved. The SLO is intangible in nature and does not represent a formal agreement or document, it cannot be granted by civil authorities or the legal system, but it is an ongoing maintenance of approval for the company and its projects. This implies that SLO is prone to changing over time with changing economic conditions in the region or changing priorities or concerns of local communities. Hence, the SLO can be lost due to a loss of confidence in the company, for instance, in case of failure to fulfill existing obligations or providing inaccurate or incomplete information.

A comprehensive analysis of case studies based on their issued sustainability reports was conducted. A demonstrated approach of analyzing the SLO performance of studied mining companies is applicable as a potential mechanism for other mining company to thoroughly assess the expectations, concerns and values of local communities, and the way the mining company addresses these needs.

The SLO criteria may vary according to the specific features of a mining project, region of operation and affected communities, however, this research proposed the most important SLO criteria in evaluating the SLO: trust in the mining industry, distributional fairness, legal fairness, qualitative stakeholder engagement, procedural fairness, respect and considering the community values. The key takeaway from this study is that trust and respect of the values of local communities are fundamental criteria without which a social license to operate cannot exist in the long term. The expectations of the local population regarding the impact of a mining project must match the actual results once the mining company has started operations, otherwise the trust of the local population may be lost.

From a comparative analysis of mining companies, it was possible to detect similar approaches as well as variations in the SLO performance, and thus, identify best practices and actions to ensure the SLO, which could be applicable within the mining sector.

First, companies need to obtain a deep understanding of the communities in which they operate. For that, thorough monitoring and surveying of impacted stakeholders must be always conducted. It will give the perspective of what are the priority needs of communities and will prevent possible conflicts. Building enduring trust while addressing operational impacts is vital for the mining companies to secure and uphold their SLO.

The results of this study showed that the most difficult task for a company is to establish trust, especially in places where mining has historically been discouraged due to the negative impacts. The history of mining in a country and region could be another influencing factor on obtaining the SLO. Negative past experiences, such as environmental damage or social

issues linked to mining, can strongly impact people's attitudes. Hence, the next important finding is that the management of historical environmental liabilities is of great importance in terms of sustaining trust in the mining industry and its creditability.

Measures and activities undertaken by the mining company should be based on the needs of local communities and their priorities. According to the results of the study, the most efficient mining companies' initiatives in the specific case scenario are financial social contributions to the improving the quality of life in the region, commitment to a local procurement and supply chain, and being environmentally responsible and transparent. Transparency and clarity in communication contribute to the level of procedural fairness perceived by the community members. Based on the results of this research, the grievance management and incident and compliance disclosure stood up as effective tools in strengthening the SLO.

The paper concludes by arguing that certain SDGs align closely with the primary objectives of the SLO. The present findings from case studies confirm, that mining companies that have achieved a degree of SLO to a greater extent, invest in specific SDGs, such as SDG 3 Good health and well-being; SDG 4 Quality education, SDG 5 Gender equality; SDG 6 Clean Water and Sanitation; SDG 8 Decent Work and Economic Growth; SDG 9 Industry, innovation and infrastructure; SDG 10 Reduced inequalities and SDG 16 Peace, Justice and strong institutions.

Future research is necessary to validate the conclusions drawn from this study. To further understand the effectiveness of different SLO strategies, a wide variety of case studies need to be reviewed. Future research can expand by considering comparisons between large and small mining companies, as well as old vs. new mines.

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Appendix A

House of quality analysis of Neves-Corvo mine, Somincor

Scoring of each activity to each SLO criteria

		SLO criteria						
		Trust	Distributional Fairness	Legal Fairness	Qualitative Engagement	Procedural Fairness	Respect and considering the values of community	
Activities of mining company		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6	
Biodiversity initiatives: conservation of the river	A1	3	1	1	5	1	9	
Providing water for agricultural use and potable water to local communities	A2	9	7	3	5	5	9	
An active collaboration with the municipal authorities on water issues	A3	7	5	5	7	7	5	
The collaboration with university on aquatic research	A4	5	5	1	7	1	3	
Obtaining a unified environmental permit (TUA) to operate the expanded tailings	A5	7	1	9	3	5	5	
Land use and mining compatibility	A6	7	5	5	3	7	9	
The incident and compliance disclosure	A7	9	1	9	7	9	5	
The SLO index integration	A8	7	1	1	9	7	5	
Conducting surveys	A9	7	3	1	9	7	9	
The grievance management	A10	9	1	1	9	7	9	
Investments in community initiatives	A11	7	9	1	9	5	9	
Government-supported regional social responsibility initiatives	A12	9	7	9	5	1	5	
SUM		86	46	46	78	62	82	400
Normalized sum		21,5%	11,5%	11,5%	19,5%	15,5%	20,5%	100%

Normalized scores of each activity to each SLO criteria

		SLO criteria						Sum	Normalized sum
		Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural Fairness	Respect and considering the values of community		
Activities of mining company		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6		
Biodiversity initiatives: conservation of the river	A1	0,65	0,12	0,12	0,98	0,16	1,85	3,85	5,45
Providing water for agricultural use and potable water to local communities	A2	1,94	0,81	0,35	0,98	0,78	1,85	6,68	9,45
An active collaboration with the municipal authorities on water issues	A3	1,51	0,58	0,58	1,37	1,09	1,03	6,13	8,67
The collaboration with university on aquatic research	A4	1,08	0,58	0,12	1,37	0,16	0,62	3,90	5,52
Obtaining a unified environmental permit (TUA) to operate the expanded tailings	A5	1,51	0,12	1,04	0,59	0,78	1,03	5,04	7,13
Land use and mining compatibility	A6	1,51	0,58	0,58	0,59	1,09	1,85	6,17	8,73
The incident and compliance disclosure	A7	1,94	0,12	1,04	1,37	1,40	1,03	6,87	9,72
The SLO index integration: a perception-based surveying methodology	A8	1,51	0,12	0,12	1,76	1,09	1,03	5,60	7,92
Conducting surveys. The "Local Voices Matter" initiative	A9	1,51	0,35	0,12	1,76	1,09	1,85	6,65	9,41
The grievance management	A10	1,94	0,12	0,12	1,76	1,09	1,85	6,85	9,69
The investments in community initiatives	A11	1,51	1,04	0,12	1,76	0,78	1,85	7,03	9,94
Government-supported regional social responsibility initiatives	A12	1,94	0,81	1,04	0,98	0,16	1,03	5,93	8,39
								70,7	100%

Scoring of each result to each SLO criteria

Achieved results	SLO criteria							
	Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural fairness	Respect and considering the values of community		
	Crit1	Crit2	Crit3	Crit4	Crit5	Crit6		
Zero-discharge operation and 90% of reusage and recycling operational water	R1	7	5	3	3	3	9	
7% of total volume of fresh water abstracted from the dam by Somincor								
An access to clean water: 56,236 cubic meters of potable water provided to villages around the mine	R2	9	7	1	3	3	9	
1.161.000\$ of direct investments in community initiatives	R3	7	9	1	7	5	9	
SUM		23	21	5	13	11	27	100
Normalized sum		23%	21%	5%	13%	11%	27%	100%

Normalized scores of each result to each SLO criteria

Achieved results	SLO criteria						SUM	Normalized sum	
	Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural fairness	Respect and considering the values of community			
	Crit1	Crit2	Crit3	Crit4	Crit5	Crit6			
Zero-discharge operation and 90% of reusage and recycling operational water	R1	1,61	1,05	0,15	0,39	0,33	2,43	5,96	29,59
7% of total volume of fresh water abstracted from the dam by Somincor									
An access to clean water: 56,236 cubic meters of potable water provided to villages around the mine	R2	2,07	1,47	0,05	0,39	0,33	2,43	6,74	33,47
1.161.000\$ of direct investments in community initiatives around the mine	R3	1,61	1,89	0,05	0,91	0,55	2,43	7,44	36,94
								27,6	100%

Appendix B

House of quality analysis of Riotinto mine, Atalaya Mining

Scoring of each activity to each SLO criteria

		SLO criteria						
		Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural Fairness	Respect and considering the values of community	
Activities of mining company		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6	
The general procedure of communications with the stakeholders	A1	5	1	1	7	5	7	
Partnerships with educational organizations	A2	5	5	1	5	3	7	
The mining facilities operator course for unemployed people in the Cuenca Minera	A3	7	9	1	9	7	5	
The commitment to socio-economic contribution to the local municipalities	A4	9	9	3	7	7	9	
Hiring staff with special needs and support of family members of employees with disabilities	A5	7	7	5	5	7	9	
The local supply chain and local commitment	A6	7	9	1	7	9	5	
Efficient water management and zero discharge approach	A7	7	5	3	5	3	7	
The management of historical environmental liabilities	A8	9	7	3	5	7	9	
The environmental restoration plan	A9	7	3	5	3	3	7	
SUM		63	55	23	53	51	65	310
Normalized sum		20.32%	17.74%	7.42%	17.10%	16.45%	20.97%	100%

Normalized scores of each Activity to each SLO criteria

		SLO criteria						Sum	Normalized sum
		Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural Fairness	Considering community values		
Activities of mining company		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6		
The general procedure of communications with the stakeholders	A1	1,02	0,18	0,07	1,20	0,82	1,47	4,75	8,59
Partnerships with educational organizations	A2	1,02	0,89	0,07	0,85	0,49	1,47	4,79	8,66
The mining facilities operator course for unemployed people in the Cuenca Minera	A3	1,42	1,60	0,07	1,54	1,15	1,05	6,83	12,34
The commitment to socio-economic contribution to the local municipalities	A4	1,83	1,60	0,22	1,20	1,15	1,89	7,88	14,24
Hiring staff with special needs and support of family members of employees with disabilities	A5	1,42	1,24	0,37	0,85	1,15	1,89	6,93	12,52
The local supply chain and local commitment	A6	1,42	1,60	0,07	1,20	1,48	1,05	6,82	12,32
Efficient water management and zero discharge approach	A7	1,42	0,89	0,22	0,85	0,49	1,47	5,35	9,66
The management of historical environmental liabilities	A8	1,83	1,24	0,22	0,85	1,15	1,89	7,19	12,99
The environmental restoration plan	A9	1,42	0,53	0,37	0,51	0,49	1,47	4,80	8,67
								55,3	100%

Scoring of each Result to each SLO criteria

		SLO criteria						
		Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural fairness	Respect and considering the values of community	
Achieved results		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6	
The creation of jobs with a prevalence of local workers (68,3%)	R1	7	7	3	3	7	9	
The local social investment (791,770 €)	R2	7	9	1	7	5	9	
47,9% of supplies from the local market	R3	7	9	1	5	9	5	
22% surface water savings in water consumption with respect to 2021	R4	5	5	3	3	3	7	
SUM		26	30	8	18	24	30	136
Normalized sum		19,12%	22,06%	5,88%	13,24%	17,65%	22,06%	100%

Normalized scores of each Result to each SLO criteria

		SLO criteria							
		Trust	Equal distribution of mining benefits	Confidence in the governance capacity or Legal fairness	Qualitative Engagement	Procedural fairness	Respect and considering the values of community	SUM	Normalized sum
Achieved results		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6		
The creation of jobs with a prevalence of local workers (68,3%)	R1	1,34	1,54	0,18	0,40	1,24	1,99	6,68	26,40
The local social investment (791,770 €)	R2	1,34	1,99	0,06	0,93	0,88	1,99	7,18	28,37
47,9% of supplies from the local market	R3	1,34	1,99	0,06	0,66	1,59	1,10	6,74	26,63
22% surface water savings in water consumption with respect to 2021	R4	0,96	1,10	0,18	0,40	0,53	1,54	4,71	18,60
								25,3	100%

Appendix C

House of quality analysis of Aguas Teñidas mine, Sandfire MATSA

Scoring of each Activity to each SLO criteria

		SLO criteria						
		Trust	Equal distribution of mining benefits	Legal fairness	Qualitative Engagement	Procedural Fairness	Respect and considering the values of community	
Activities of mining company		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6	
The local procurement and employment	A1	7	9	1	7	9	5	
The community grievance mechanism	A2	9	1	1	9	7	9	
Alliance program: an annual socio-economic contribution of 100.000€	A3	9	9	3	9	7	9	
Training courses for the residents	A4	7	7	1	7	9	5	
The Mining Water Living Lab Project	A5	5	5	3	5	3	5	
SUM		37	31	9	37	35	33	182
Normalized sum		20,33%	17,03%	4,95%	20,33%	19,23%	18,13%	100%

Normalized scores of each Activity to each SLO criteria

SLO criteria

		Trust	Distributional fairness	Legal fairness	Qualitative Engagement	Procedural Fairness	Considering community values	Sum	Normalized sum
Activities of mining company		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6		
The local procurement and employment	A1	1,42	1,53	0,05	1,42	1,73	0,91	7,07	21,10
The community grievance mechanism	A2	1,83	0,17	0,05	1,83	1,35	1,63	6,86	20,48
Alliance program: an annual socio-economic contribution of 100.000€	A3	1,83	1,53	0,15	1,83	1,35	1,63	8,32	24,84
Training courses for the residents	A4	1,42	1,19	0,05	1,42	1,73	0,91	6,73	20,09
The Mining Water Living Lab Project	A5	1,02	0,85	0,15	1,02	0,58	0,91	4,52	13,49
								33,5	100%

Scoring of each Result to each SLO criteria

		SLO criteria						
		Trust	Equal distribution of mining benefits	Confidence in the governance capacity or Legal fairness	Qualitative Engagement	Procedural fairness	Respect and considering the values of community	
Achieved results		Crit1	Crit2	Crit3	Crit4	Crit5	Crit6	
80% of employees are local population of the province; 766 direct employees; 2,231 contractors engaged	R1	7	9	1	7	7	5	
97% of local procurement	R2	7	9	3	7	9	5	
The investments in community development programs (124,833\$)	R3	7	9	1	7	5	9	
SUM		21	27	5	21	21	19	114
Normalized sum		18,42%	23,68%	4,39%	18,42%	18,42%	16,67%	100%

Normalized scores of each Result to each SLO criteria

Achieved results	SLO criteria						SUM	Normalized sum	
	Trust	Equal distribution of mining benefits	Confidence in the governance capacity or Legal fairness	Qualitative Engagement	Procedural fairness	Respect and considering the values of community			
	Crit1	Crit2	Crit3	Crit4	Crit5	Crit6			
80% of employees are local population of the province 766 direct employees 2,231 contractors engaged	R1	1,34	1,54	0,18	0,40	1,24	1,99	36,00	31,58
97% of procurement spent with national suppliers in Spain	R2	1,34	1,99	0,06	0,93	0,88	1,99	40,00	35,09
The investments in community development programs (124,833\$)	R3	1,34	1,99	0,06	0,66	1,59	1,10	38,00	33,33
								114	100%