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Evaluation of criteria in mining units through the SMM

Valoración de criterios en unidad minera a través del MGS

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Abstract

A Sustainable Management Model is created, which in its implementation seeks to generate evidence of alignment of current environmental practices with four Sustainable Development Goals in the country's mining units. The implementation process closely follows the stages of a diagnosis, the result of which is documented in a Sustainable Technical Report that emanates mainly from the records issued by the database called MGS and that allows the assessment of criteria that denote the enablement or insufficiency of compliance with observed SDGs. This document presents the development of the implementation of the model, the recording of the information in the database and the valuation methodology; The Sustainable Technical Report is the product that the mining unit obtains and is subject to issuance by both internal and external authorities, intending as a scope, to be a means of information for the government agencies that formally follow up.

Sustainable management model, SMM database, Sustainable technical report

Resumen

Se crea un Modelo de Gestión Sustentable, el cual en su implantación busca generar evidencia de alineación de prácticas medio-ambientales vigentes con cuatro Objetivos de Desarrollo Sustentable en las unidades mineras del país. El proceso de implementación, sigue de cerca las etapas de un diagnóstico, del cual, el resultado se documenta en un Informe Técnico Sustentable que emana principalmente de los registros que emite la base de datos denominada MGS y que permite valorar criterios que denotan la habilitación o insuficiencia del cumplimiento de ODS´s observados. Este documento presenta el desarrollo de la implantación del modelo, el regsitro de la información en la base de datos y, la metodología de valoración; el Informe Técnico Sustentable es el producto que la unidad minera obtiene y es sujeto de emisión para autoridades tanto internas como externas, pretendiendo como alcance, ser un medio de información para los organismos gubernamentales que dan seguimiento formalmente.

Modelo de gestión sustentable, Base de datos MGS, Informe técnico sustentable

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Introduction

In search of the development of nations that flows in an economic, environmental and social balance, Sustainability can operate as a business strategy, in which the priority is interpreted as a balance that allows supplying and generating wealth through the system that operates, with commitment and responsibility to care for the environment and the social environment, simultaneously with the search for economic sustainability. For its part, the government designs regulations that allow for Sustainable Development, optimising social and economic well-being and environmental care (Velázquez and Vargas, 2012).

These regulations allow for the collection of the information that is generated and that results from this search to create prosperity and capitalisation of new resources. Traditionally, the objective of maximising economic gains, obviating social and environmental elements, provided the opportunity for sustainable strategies and programmes to be presented, obtaining credibility and permanence as a benefit. Timely sustainability analyses, presented in reports, allow organisations to demonstrate their commitment and the essence of what is expressed in the reports is considered as normative monitoring (Aplanet, n.d.).

The Sustainable Management Model is in itself a methodology for handling diagnostic information within the strategic planning of mining units in Mexico; in its implementation, which is recorded digitally through the MGS database created specifically for this purpose, it is observed that there is the technological possibility of creating a format of ordered elements that suggest the structure of a Sustainable Technical Report, a valid and reliable document for authorities of the unit of analysis or even governmental bodies (Martínez et al., 2023).

The resulting diagnosis concentrates collected information and interpretations of experts in the field, and places the authorities in a position to make decisions in favour of the environment. The recording of observations in the MGS, during the implementation of the model, generates quantifiable sections that, together with the interpretation of experts, allow the structuring of the report that provides the valuation of the unit of analysis.

Theoretical basis

Sustainable management model

Created for the mining industry, it meets international efforts through Sustainable Development Goals and complies with the requirements of the country's Mining Law through observable and evidentiary legislative parameters (Martínez et al., 2020).

It is a model that, due to its foundation, adheres to the strategic plans of Mexican mining units to strengthen their Environmental Management. The conservation of a safe, clean, healthy and sustainable environment is vital for the well-being of human beings and the guarantees offered by the right to enjoy them. This model contemplates in its construction two main axes:

1. Four Sustainable Development Goals assessed in the fieldwork, taken from the 2030 Agenda (ECLAC, 2018): SDG 9- *Industry, innovation and infrastructure*, SDG 11- *Sustainable cities and communities*, SDG 12- *Responsible production and consumption and* SDG 13- *Life of terrestrial ecosystems.*.

2. 16 legislative parameters are observed, which are documented in the Environmental Impact Manifest (MIA), in which companies are obliged to describe in the greatest detail how they will carry out the requested activities in terms of care for the environment. (SEMARNAT, 2002): *lifetime, technical manager, nature of the project, dimensions, land use, development of the area, site preparation, construction of works, operation and maintenance, abandonment, use of explosives, waste generation and management, waste management and disposal infrastructure, abiotic aspects, biotic aspects and landscape.*

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Database MGS

A database called MGS is designed and programmed, which involves field work to collect information. It was created specifically for the Mexican company Minera Tierra Adentro, S.A. de C.V. -MTA, which has been providing management, operational and environmental consultancy services to the mining and construction sector since 2012, the MGS database serves as a sustainable diagnosis, since, based on the Sustainable Management Model, it monitors SDGs and legislative parameters through the practices of the units analysed, thus exposing the reality, effectiveness and proposing recommendations generated by the firm.It consists of two modules, which systematically provide a work organisation to achieve the scope of the Sustainable Management Model to be implemented in the mining sector of the country; once there is a mining unit that accepts the diagnosis, the registration of the information obtained from the field, by means of the logarithms created, provides the structure of a technical report, which due to its approach, is called Sustainable Technical Report.

The MGS database is also a technological project in which the scope is integral in terms of environmental assessment; a third module is being analysed to involve monitoring of the units in terms of Circular Economy.

Sustainable technical report

Technical reports are characterised by the physical structure reflecting the planning and operation of companies, in which programmes and strategies that determine objectives and targets set in relation to the analysis of measurable and verifiable factors operating in key processes are interpreted and prepared to execute action plans for organisational improvements. They are based on scientific research or studies, and therefore, they must follow conceptual methods that cover stages of planning, development and conclusions, in order to carry out an analysis to understand the parts or elements through specialised techniques for their reordering and interpretation (Pazos, 2017).

The denotation of descriptions of business observations and strategic proposals must be supported by measurements that express the reality of the companies and project it over time for its effectiveness. To support the validity of the criteria or key elements, the measurement of indicators is recommended, which allow visualising through their value, whether or not the proposed objectives are met (Portugal, 2017; Aplanet, n.d.).

Therefore, a sustainable technical report should contain the analysis with a scientific approach based on current environmental practices, facilitating the communication of findings of deviations or adherence to sustainable development guidelines and the proposals for action derived from them.

Methodological basis

This document presents the process of implementing the Sustainable Management Model, the registration format in the MGS database and the formalisation of this work in a Sustainable Technical Report. By its nature, it is a diagnostic research study, with a mixed approach to information processing and transversal in continuity, since the comprehensive research, which consists of theoretical and methodological bases that determine the creation of the Sustainable Management Model dates from 2018 and is formalised in 2020; its implementation and extension have been constant and executed by researchers of the Academic Body 07 belonging to the San Luis Potosí Technological Institute in agreement with the company Minera Tierra Adentro.

The objective is therefore to provide value to the criteria that form part of the sustainable measurement carried out at mining units, considering the implementation of the model and using the MGS database, to structure a deliverable result in the format of a Sustainable Technical Report.

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Development of the implementation of the Sustainable Management Model

Module 1 MGS

Called the qualitative selection module of mining units, it is based on the applicability that today's technological advances have, via web or mobile, forming part of a new paradigm, in which time and the effectiveness of evidence reveal updating and credibility. In its execution, it considers the selection of units based on criteria defined by convenience (Hernández, 2018), which, when integrated, offer information on the units suitable for managing the request for implementation of the model, allowing it to be systematic in the country's mining sector.

The interface resulting from the modelling of the database suggests the registration of general information on mining units, which corresponds to the criteria defined to fulfil two purposes: first, to create a catalogue for MTA, which can be accessed at any time for consultation; second, to prioritise the units so that MTA can make a formal proposal for the implementation of the model and have options, if they are not to be accepted in the first instance.

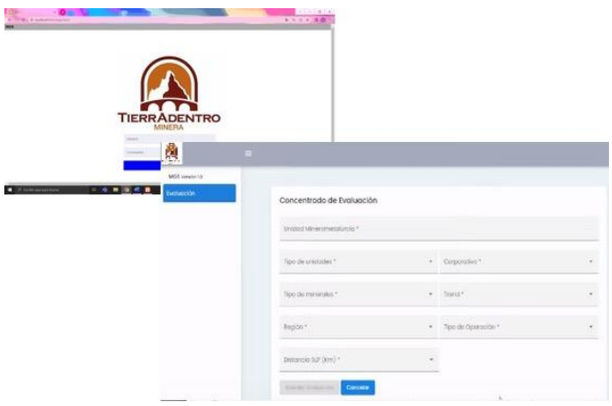

Figure 1 MGS Module 1 interface
Source: Own elaboration

Module 2 MGS

Once contact has been established with the unit that delivers module 1 as optimal, MTA staff approach the management and propose that the model be implemented; if it is accepted, a working agreement is established under an established programme.

The following is a summary of the registration form for the implementation of the MGS. The images show the interface designed for the database and the format for registering information on the legislative parameters that represent the MIA; the tab that indicates this interface is pointed out, the file of the unit analysed is generated and the information is registered. This process is repeated 16 times, corresponding to the selected parameters.

Figure 2 Legislative Parameters Registration Interface - MGS Module 2
Source: Own elaboration

Once the information obtained in the field of the 16 legislative parameters has been recorded, the database allows the export of this information to WORD, in which, as it is an editable file, the findings can be described with expert interpretations, in which it is also possible to detail, add and formalise the information.

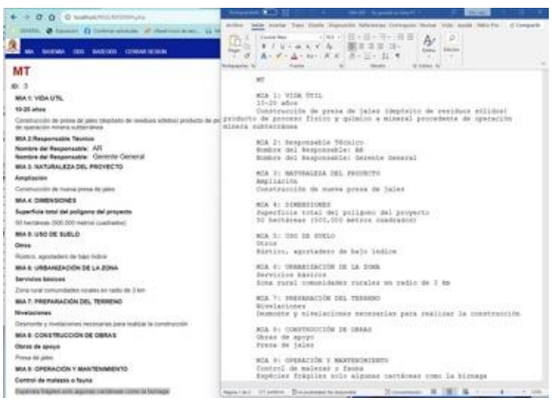

Figure 3 Summary interface of recorded information and word view - MGS module 2
Source: Own elaboration

The recording of SDG indicators has a quantitative format, in which the information collected involves field review - where it is generated -, confirmation of documents, verification with operational and administrative staff, review of national reports of agencies and calculations of economic factors; the export is made to an EXCEL spreadsheet where it is also possible to perform other operations or create representative graphs.

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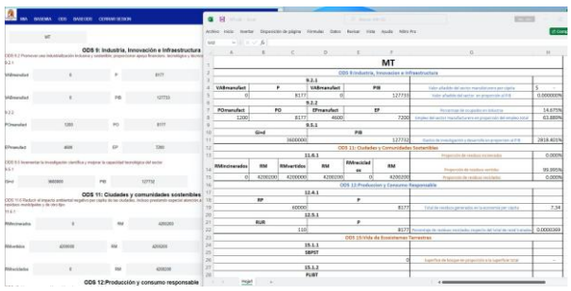

Figure 4 ODS data recording interface and excel view - MGS module 2.
Source: Own elaboration

Assessment of sustainable criteria of the units analysed

Indicators that reflect representative estimates of the SDGs are considered. Corresponds to the quantitative information recorded in the database. This quantification is required to know the degree of scope in the measurement of the criteria established in relation to the effectiveness of the actions carried out.

Interpretations are generated for each SDG evaluated, as well as for each legislative parameter, based on each origin, quantitative and qualitative cut-off respectively. In turn, recommendations are generated that are expressed globally, so that an improvement action programme can be integrated or, if necessary, a claim action programme can be integrated; the calculations issued by the base, are focused on a base technique that centralises the assessment in a range defined by MTA based on the results of the calculations made from the information in the database.

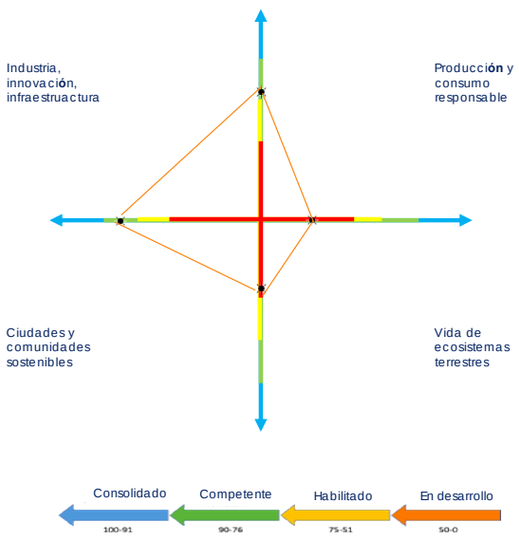

Figure 5 Assessment of the SDGs
Source: Own elaboration

The degree of measurement of the SDGs is based on a simple numerical scale, assessed by MTA staff; it is represented in a diagram with nomenclature related to colours and range of values:

- Blue-consolidated.
- Green-competent.
- Yellow-enabled.
- Red-developing.

The format in which the database sequence is arranged and thus how it presents the partial results offers the opportunity for MTA to write up findings and interpretations of the analysed unit and deliver the Sustainable Technical Report.

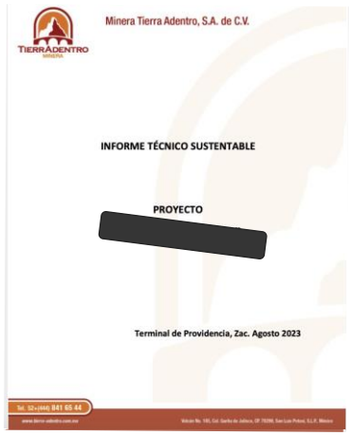

Figure 6 Sustainable Technical Report, front page
Source: Own elaboration

Conclusions

The scope of this document formalises the implementation of the Sustainable Management Model, the application of the MGS database, concluding that the assessment of the criteria can be fulfilled by systematically following this procedure, and can even be considered a sustainability methodology.

In addition to the process of a diagnosis, the stages proposed by Portugal (2017) are fulfilled and are linked to the recording of quantitative and qualitative information collected in the field within the units analysed.

The recording of the information collected in the field is done directly in the database, integrating the findings, the specific interpretations of the experts, and documenting them in the structure of a Sustainable Technical Report and thus being able to visualise the SDGs measured in a more objective way.

The stages fulfil the intention and promote the implementation of the activities involved, so that the observations and recommendations derived from it can be relied upon. The use of the database as a tool for collecting, ordering and structuring the results is satisfactory with opportunities for improvement; the final measurement complements the exercise in a practical way that is easy to understand and interpret.

General descriptions, particular interpretations, organisation of observations and findings, operational calculations, criteria measurements and interventions of the personnel of each unit, as well as of the managers of the implementation of the model, are recorded in the Sustainable Technical Report, a confidential file that MTA delivers to the mining unit analysed.

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