



Systematic review on social acceptance of mining in the context of the energy transition

Technical Report

November 2025

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ISBN: 978-989-675-138-8

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How to cite: Santos, E., Simões, S.G. (2025) Systematic review on social acceptance of mining in the context of the energy transition. pp. 38. LNEG Technical Report, Amadora, Portugal.

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Key Points

This systematic review maps the factors that influence social acceptance of mining, exploring their relationship with the energy transition.

Strengths:

- The mixed-methods approach, combining quantitative and qualitative analyses, made it possible to compile a sufficient number of publications to map the scientific field of social acceptance of mining.
- The exploratory reading of articles from Portuguese and Spanish-language sources helped to partially mitigate the underrepresentation of scientific production from the Global South.

Main findings:

- Global trends: The quantitative analysis revealed a growing field, with an annual growth rate of 7.47%. Most publications were produced in the last decade, which aligns with the increasing demand for Social License to Operate (SLO), greater visibility of socio-environmental conflicts, and the rise of the sustainability and decarbonization agenda.
- Social acceptance factors: The qualitative analysis identified five core categories that shape social acceptance.
- Regional variations: Regions such as Europe tend to prioritize transparency and governance, while Latin America highlights socio-environmental justice and conflict.
- Energy transition: Terms like “energy transition” appear less frequently in studies related to social acceptance in mining.
- Gaps: The predominance of authors and institutions from the Global North suggests the need for more regionally focused research.



1 Contextualization

In the context of the energy transition and decarbonization, mining plays a strategic role, as the expansion of global energy infrastructure, geared towards increasing the share of renewable energy, depends directly on the greater availability of mineral resources. The International Energy Agency (IEA), in its *Global Critical Minerals Outlook 2024*¹ report, highlights that critical minerals, which are essential to a wide range of renewable technologies, have gained prominence on the political agenda in recent years. This growing focus stems from rising demand, price volatility, supply chain constraints, and geopolitical concerns, all of which intensify the need for more robust strategies for managing these resources

In this context, social dimensions emerge as central elements. Mining, in addition to being deeply embedded in the socio-economic fabric and fundamental to the material production of society, depends on social acceptance to ensure its full viability and continuity. This acceptance involves not only the local communities directly impacted and other stakeholders, but also broader society, which must recognize, and even reconsider, our dependence on mineral resources to sustain essential goods and services, such as batteries for the energy transition and basic infrastructure. Social acceptance, understood as the degree of legitimacy and support granted to mining activities, is shaped by factors that go beyond technical and economic considerations, encompassing cultural, environmental, and governance-related issues.

This report therefore analyzes, through the lens of the energy transition, the factors that influence social acceptance of mining, adopting a mixed-methods approach that integrates both quantitative and qualitative analytical techniques.

This is the first study by the National Laboratory of Energy and Geology (LNEG) dedicated to this topic, reflecting its strategic commitment to promoting inclusive and sustainable solutions. In line with its mission to serve as a repository of knowledge on endogenous resources and to support public policy, LNEG recognizes the centrality of social dimensions in ensuring the responsible development of the mining sector, contributing to the well-being of Portuguese society and to the fulfillment of international decarbonization and sustainability commitments.

¹ IEA (2024), *Global Critical Minerals Outlook 2024*, IEA, Paris <https://www.iea.org/reports/global-critical-minerals-outlook-2024>, Licence: CC BY 4.0



2 Introduction

Social acceptance of mining has become a central issue in the context of the energy transition, as the growing demand for critical minerals could intensify socio-environmental conflicts and presents significant challenges for the mining sector. In this regard, the analysis of mining requires a combination of methodological rigor with particular attention and sensitivity to local contexts and specific socio-economic dynamics. This report examines the factors that influence social acceptance of mining, focusing on their relationship with the energy transition, and seeks to answer the following guiding question, formulated based on the existing literature: **What are the factors that influence social acceptance in this context?**

The relevance of this study is reinforced by Portugal's commitment to achieving carbon neutrality latest by 2050, in line with the Paris Agreement, and by its contribution to the implementation of the European Critical Raw Materials Act (CRM Act), approved in March 2024. This regulation, which promotes access to essential minerals for renewable technologies, highlights Portugal's role in the production of lithium and other resources, further underscored by the selection of 47 Strategic Projects by the European Commission in March 2025. At the national level, the National Energy and Climate Plan 2030 (PNEC 2030) emphasizes the importance of mining practices aligned with carbon neutrality goals, requiring approaches that foster social acceptance and active dialogue with communities.

To address this issue, the report draws on a systematic literature review, covering academic articles, reports, case studies, and grey literature published between 1998 and April 2025, with a particular emphasis on the period from 2015 to 2025. Materials written in English, Portuguese, and Spanish were included, reflecting the global nature of mining and its economic and social relevance across different regions of the world. Latin America, for example, stands out as a region where mining plays a significant role in both the economy and local social dynamics. The analysis integrates both quantitative and qualitative approaches, allowing for the identification of global trends, specific social factors, and gaps in the literature, particularly the limited articulation between mining for the energy transition and processes of social acceptance. This report is therefore part of a broader effort to better understand the increasingly strategic debates surrounding this issue.



3 Methodology

3.1 Systematic review and search criteria

The systematic review covered publications from 1998 to April 2025, with an emphasis on the period between 2015 and 2025, due to the consolidation of energy transition policies during this timeframe. The review included academic articles, reports, case studies, and grey literature (e.g., thesis, dissertations, technical reports), written in English, Portuguese, and Spanish, reflecting the global relevance of mining and its economic and social impacts. The selected databases included Scopus and Web of Science for interdisciplinary academic articles; Google Scholar for grey literature; and CAPES Journals, Latindex, and Dialnet to ensure the inclusion of regionally published research.

Search terms such as “social acceptance” AND “mining”, “aceitação social” AND “mineração”, and “aceptación social” AND “minería” were applied to titles, abstracts, and keywords, aiming to identify studies that explicitly addressed social acceptance in mining, with a connection, when applicable, to the energy transition.

3.2 Planning of quantitative analysis – Trends

The quantitative analysis, conducted with the support of the Bibliometrix software (Aria & Cuccurullo², 2017), aimed to map global trends, including term frequency, co-occurrence networks, and the geographical distribution of the studies.

3.3 Planning of qualitative analysis – Factors of social acceptance

The qualitative analysis deepened the understanding of specific contexts through manual reading of the abstracts. Based on the social acceptance factors explicitly mentioned in the texts, the study's objective described in the abstract was recorded, along with the direct relation of the studies to mining for the energy transition — classified as “yes,” “no,” or “partial” — and the geographical context, when specified.

3.4 Justification of the approach

The adoption of a mixed and integrated methodology was justified by three fundamental reasons:

1. Quantitative analysis ensures objectivity by identifying statistical trends, while qualitative analysis reveals nuances, contradictions, and contextualization's absent from metadata;
2. The combination of methods reduces biases, preventing recommendations based solely on term frequency and favoring more comprehensive and contextualized interpretations;
3. The mixed approach strengthens the practical applicability of the results, providing support both for public policy formulation and the development of institutional strategies by simultaneously considering global trends and local specificities.

²Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of informetrics*, 11(4), 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>



3.5 Search, selection, and filtering procedure

Searches were conducted between February 25 and April 4, 2025, following the criteria described in Section 3.1. In Scopus, the initial search identified 109 articles; in Web of Science, the same search yielded 110 results. Google Scholar returned 16 documents; Dialnet 28 documents; CAPES Journals identified 18 articles by title and 478 by subject (totaling 517) for “social acceptance” AND “mining” in English, but no results for “aceitação social” AND “mineração” in Portuguese; and Latindex produced no relevant results for “aceptación social” AND “minería”.

Subsequently, documents were filtered using the following criteria:

- Removal of duplicates, since many articles were indexed simultaneously in Scopus and Web of Science;
- Manual screening of abstracts, retaining only studies that explicitly addressed “social acceptance” and “mining” in the context of natural resources, and excluding articles outside the scope, such as those related to data mining, text mining, or social acceptance in unrelated sectors.

Within CAPES Journals, the 18 results found by title and the 478 by subject for “social acceptance” AND “mining” were discarded as they were mostly duplicates (already included in Scopus or Web of Science) or irrelevant to the scope of this analysis. Furthermore, searches by title and subject did not allow direct export of metadata in standard formats (BibTeX, RIS, or CSV), limiting compatibility with Bibliometrix.

In Google Scholar and Dialnet, the 16 and 28 documents identified, respectively, were manually analyzed to explore the geographical context but were not integrated into the quantitative analysis database due to incompatibility of their metadata with the format required by Bibliometrix; they were used only for qualitative contextualization.

Besides the databases already mentioned, other sources such as OneMine and SciELO were initially considered but were ultimately excluded, prioritizing broader academic sources whose metadata were compatible with the analysis format.

3.6 Quality criteria and data consolidation

After the initial search across different databases, relevance-based screening criteria were applied: of the 109 documents identified in Scopus, 29 articles were considered directly relevant; in Web of Science, 95 out of 110 documents were selected. The results were then consolidated, with the removal of 6 duplicates between Scopus and Web of Science (from a total of 124 documents), resulting in a final sample of 118 publications. This reduction reflects a **deliberate methodological choice, prioritizing analytical quality over mere numerical scope.**

As previously mentioned, although 16 documents from Google Scholar and 28 from Dialnet were manually reviewed to explore the potential emergence of new factors, these documents were not included in the final analysis database. This decision preserved consistency between the quantitative and qualitative analyses, both of which were conducted using the consolidated set of 118 documents, ensuring coherence across approaches.



3.7 Data organization and analysis

The data were organized into two tables:

- The first table, formatted for quantitative analysis using Bibliometrix, includes the metadata of the articles.
- The second table, of a qualitative nature, contains columns dedicated to: (i) the objective described in the abstract; (ii) identified factors of social acceptance; (iii) geographical scope; and (iv) the study's relation to mining for the energy transition.

The systematic review, carried out with Bibliometrix (Biblioshiny interface) and following bibliometric principles, used only part of the data produced, selected according to relevance criteria described in Section 3.2 and complemented by qualitative interpretations..

The qualitative analysis followed this sequence: factors of social acceptance, objectives, geographical scope, and relation to the energy transition. The results are presented in the same order of categorization in Sections 5.0 to 5.4, reflecting the logical structure of the study, which prioritizes the challenges of acceptance of mining, followed by methodological, geographical, and energy-related perspectives.

The factors of social acceptance were extracted directly from explicit mentions in the abstracts and recorded in a dedicated column for each article. These factors were then semantically grouped into broader categories based on thematic similarities through manual coding. These results are presented in Sections 5.0 and 5.1.

The objectives of the articles were analyzed based on the abstracts, through a qualitative reading focused on passages that explicitly stated or inferred the purpose of the research. The objectives were synthesized and manually classified into recurring thematic categories, considering the nature of the approach (conceptual, empirical, or applied) and the authors declared intentions regarding social acceptance of mining (thematic focus). The resulting categories, which reflect the main perspectives in the literature, are presented in Section 5.2.

Next, the geographical scope of the studies was analyzed. A qualitative matrix was used to correlate the identified factors of social acceptance with the geographical contexts of the studies (defined by country or region). The regional patterns identified are detailed in Section 5.3.







The relation of the studies to the energy transition was classified as “yes,” “no,” or “partial,” based on the following criteria: “yes” when the term “energy transition” appeared explicitly in the abstract; “no” when there was no mention; and “partial” when the study had an implicit connection to the energy transition, such as the exploration of critical minerals (e.g., lithium mining in Portugal) representative of studies on critical minerals, but without direct mention of the energy transition in the abstract. Based on the results of this analysis, the general data of the selected publication universe are presented in Section 5.4.



4 Systematic quantitative analysis

The Bibliometrix software (Aria & Cuccurullo, 2017), through its graphical interface Biblioshiny, was used to conduct a systematic analysis guided by the principles of bibliometrics. Based on the results obtained, the following general data are presented regarding the selected body of publications.



Table 1: General data		
 Publications 118	 Authors 368	 Co-Authors per publication 3.58
 Annual growth rate of publications 7.47 %	 Average age of publication 5.39	 Average citations per document 27.27

Source: Developed by the authors based on data extracted from the Bibliometrix software (Biblioshiny interface).

The bibliometric analysis covered 118 publications, selected after filtering as described in the methodology. Although the number may appear modest, it reflects a deliberate **prioritization of quality over quantity**, focusing on documents directly relevant to social acceptance of mining and compatible with quantitative analysis. This volume is considered adequate for mapping the field, given that the topic constitutes an interdisciplinary niche within mining and the energy transition.

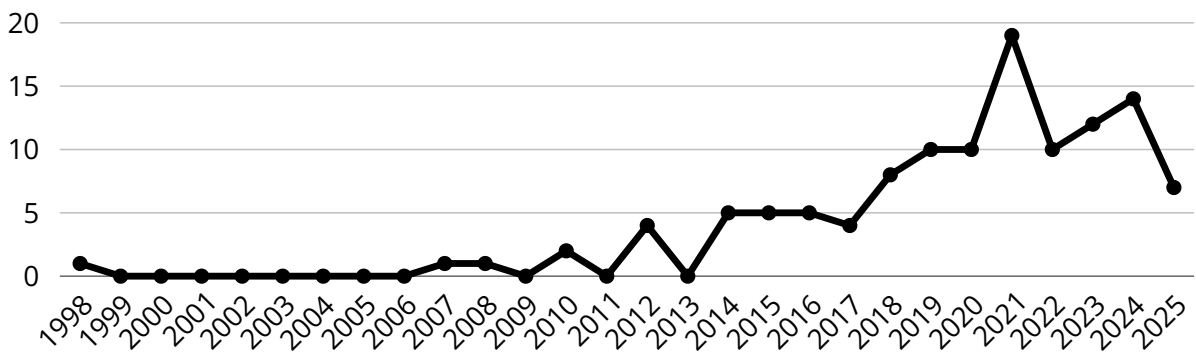
These **118 publications** reveal an **annual growth rate exceeding 7.47%**, which is typical of emerging areas that respond to contemporary challenges and reflect a growing interest from the scientific community. The high number of **authors (368)** in relation to the total number of publications suggests that the production is characterized by large research teams and interinstitutional collaborations.

Scientific output is marked by broad collaboration, with an **average of 3.58 authors** per article, indicating strong interinstitutional networks. The average of **27.27 citations per document** appears to be above typical levels in applied social sciences³, pointing to a relevant scientific impact. Finally, the **average age of the publications, 5.39 years**, suggests that the documents are relatively recent, in line with current debates.

³According to the 2024 Journal Citation Reports (JCR), the average number of citations per document in the category Sociology is approximately 50.8, while in Environmental Studies it is around 31.0. Although the average found in the present study falls below the general average for Sociology, it approaches that of Environmental Studies, suggesting that the impact of publications on social acceptance of mining is more aligned with this latter field, where socio-environmental and sustainability issues are predominant. The data were retrieved from the Journal Citation Reports (JCR) 2024, accessed on April 29, 2025, using the categories Sociology (Social Sciences, General; 218 journals, 8,755 citable items, 444,733 total citations) and Environmental Studies (Economics & Business; Multidisciplinary; Social Sciences, General; 184 journals, 33,999 citable items, 1,054,494 total citations). The average number of citations per document was calculated by dividing the total citations by the number of citable items in each category. Available at: <https://jcr.clarivate.com/jcr/home>



Chart 1: Annual scientific production: articles per year



Source: Developed by the authors based on data extracted from the Bibliometrix software (Biblioshiny interface).

Table 2: Most relevant sources	N° Articles
RESOURCES POLICY	18
EXTRACTIVE INDUSTRIES AND SOCIETY	13
JOURNAL OF CLEANER PRODUCTION	9
MINERAL ECONOMICS	5
GOSPODARKA SUROWCAMI MINERALNYMI-MINERAL RESOURCES MANAGEMENT	4

Table 3: Most relevant authors	N° Articles
MOFFAT K	8
AWUAH-OFFEI K	7
LACEY J	5
QUE S	5
ZHANG A	5

Source: Developed by the authors based on data extracted from the Bibliometrix software (Biblioshiny interface).

Table 4: Most relevant affiliations	Countries	N° Articles
LULEA UNIV TECHNOL	Sweden	15
MISSOURI UNIV SCI AND TECHNOL	United States of America	14
UNIV SALAMANCA	Spain	11
UNIV LAPLAND	Finland	8
CHONGQING UNIV	China	7

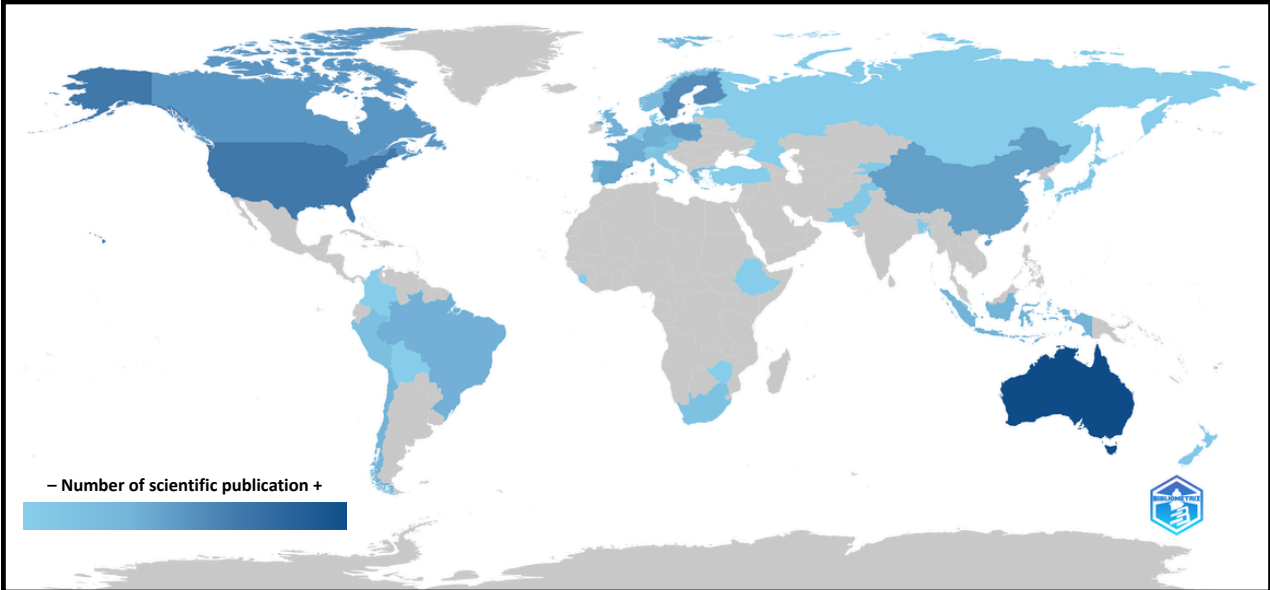
Source: Developed by the authors based on data extracted from the Bibliometrix software (Biblioshiny interface).

Annual scientific production shows significant growth after 2015, with peaks in 2019 and 2021. The increasing demand for critical minerals for the energy transition may have contributed to this rise, with the socio-environmental focus also influenced by globally impactful events such as the Brumadinho disaster (2019) in Minas Gerais, Brazil. Around 85% of the publications were produced in the last decade (2015–2025), and the output observed up to 2024 indicates sustained interest in the topic.

Among the **most relevant sources**, Resources Policy stands out with 18 articles, followed by Extractive Industries and Society and the Journal of Cleaner Production, each with 8 articles. These journals reflect the field’s emphasis on governance and sustainability in mining and natural resource extraction. **Authors** such as Moffat K. (8 articles) and Awuah-Offei K. (7 articles) emerge as key references in the field. Scientific production is led by institutions based in Sweden (15 articles), the United States (14 articles), and Spain (11 articles).




Map 1: Scientific production by country



Source: Map generated by the Bibliometrix software (Biblioshiny interface), with legend prepared by the authors.

Map 1: Scientific production by country indicates the predominance of developed countries such as Sweden, the United States, Australia, and Canada, while African countries are underrepresented, with production limited to South Africa, Zimbabwe, Sierra Leone, and Ethiopia. This is a significant point, considering that African countries like Ghana and the Democratic Republic of Congo, although central to the production of critical minerals, show gaps in academic output on these topics within the analyzed sample. The same is observed in parts of Latin America, such as Ecuador and Chile, where mining plays an important role in history and the economy.

The following table presents the 20 most cited countries:

Table 5: Most cited countries	Nº of citations	Continent	Global North and South
 Australia	1095	Oceania	North
 Canada	627	North America	North
 Finland	258	Europe	North
 Italy	238	Europe	North
 Chile	177	South America	South
 Norway	113	Europe	North
 Sweden	100	Europe	North
 Poland	99	Europe	North
 Czech Republic	96	Europe	North
 Germany	94	Europe	North
 China	71	Asia	South
 United States	70	North America	North
 Greece	25	Europe	North
 Brazil	24	South America	South
 New Zealand	22	Oceania	North
 Portugal	20	Europe	North
 Netherlands	14	Europe	North
 United Kingdom	13	Europe	North
 Indonesia	10	Asia	South
 Colombia	7	South America	South

Source: Developed by the authors based on data extracted from the Bibliometrix software (Biblioshiny interface).

Some noticeable patterns

For this analysis of the most cited countries in other works, two additional columns, “Global North and South” and “Continent”, were added to the table generated by Biblioshiny. These classifications draw on those commonly used by multilateral organizations, as found in international cooperation documents, in the OCDE⁴ (2023), which categorizes countries by levels of economic development, and in the World Bank, which, for instance, discusses the implications of the shift in markets from the North to the South in global value chains (Farooki & Kaplinsky⁵, 2010). It is acknowledged, however, that this classification is only one among several possible frameworks, such as the “core/periphery” dichotomy, formulated within the world-systems theory (Wallerstein⁶, 1974), or the contrast between “industrialized countries” and “raw material exporters,” characteristic of Latin American structuralism, especially in the work of Prebisch⁷ (2011). Each of these frameworks reflects different theoretical and political emphases.

⁴Organisation for Economic Co-operation and Development. (2023) OCDE - *Global trends in government innovation 2023*. Publishing. https://www.oecd.org/en/publications/global-trends-in-government-innovation-2023_0655b570-en.html

⁵Farooki, Masuma; Kaplinsky, Raphael Malcolm. (2010) *What are the implications for global value chains when the market shifts from the north to the south?* (English). Policy Research working paper; no. WPS 5205 Washington, DC: World Bank. <http://documents.worldbank.org/curated/en/807451468267002335>

⁶Wallerstein, I. (2011). *The modern world-system I: Capitalist agriculture and the origins of the European world-economy in the sixteenth Century* (1st ed.). University of California Press. <http://www.jstor.org/stable/10.1525/j.ctt1pnrj9>

⁷Prebisch, R. (1962). O desenvolvimento econômico da América Latina e seus principais problemas. CEPAL, *Boletín económico de América Latina*, 7(1), 1–22. Comissão Econômica para a América Latina e o Caribe (CEPAL), Organização das Nações Unidas. (N.º de venda: 62.II.G.I)



1. Predominance of the Global North

Among the 20 most cited countries in the analysis carried out with Biblioshiny, 15 are developed economies (Australia, Canada, Finland, Italy, Norway, Sweden, Poland, Czech Republic, Germany, United States, Greece, New Zealand, Portugal, the Netherlands, and the United Kingdom), accounting for more than 80% of the citations. This data indicates that academic debate is heavily anchored in the regulatory, institutional, and socio-environmental contexts of advanced economies, which appear to be more frequently explored in scientific research.

2. Disparities in Latin America

Despite the region's importance as a major mineral exporter, Chile (5th, 177 citations) and Brazil (14th, 24 citations) have limited visibility among the top five institutional affiliations, especially when compared to countries from the Global North, highlighting a contrast between their mineral relevance and their academic representation.

3. China: both producer and object of study

China (11th, 71 citations) occupies an intermediate position among the countries most referenced in scientific research on the social acceptance of mining. While it hosts one of the largest mining industries in the world, the volume of studies focusing on its case remains moderate, especially in comparison to countries of the Global North. However, with seven articles from a Chinese university among the most relevant affiliations (see Table 4), China also stands out as a producer of academic research on the topic, even if its visibility remains lower than expected, considering its central role in the geopolitics of minerals.

4. Peripheral exploitation

Countries such as Indonesia (19th, 10 citations, a leading nickel producer) and Colombia (20th, 7 citations, relevant in gold and nickel mining) illustrate a form of "peripheral exploitation", that is, countries with high levels of mineral production but low academic visibility in English-language research. Major emerging economies such as India and Mexico are also absent from the top 20.

5. Academic peripheralization and 'frontier dependence'"


Chile's prominence among emerging economies and China's higher position compared to Brazil point to dynamics in which raw material exports are disconnected from local knowledge production. Countries that consume or finance mining, such as Canada and Australia, dominate research on the Social License to Operate and social acceptance, while regions under intense exploitation, such as the Amazon or parts of Africa, continue to have limited local academic production, reinforcing a dependence on external knowledge.

6. Absence of African Countries

Despite their relevance as major mineral producers, countries like South Africa and the Democratic Republic of Congo do not appear among the 20 most cited, underscoring the persistence of an academic peripheralization dynamic, even in contexts marked by intense extractive activity.




Table 8: Most relevant keywords declared by authors	TOP 10 frequency
mining	38
social acceptance	16
social license to operate	15
social licence to operate	12
sustainability	10
corporate social responsibility	9
trust	8
acceptance	7
community	5
energy transition	5



Source: Developed by the authors based on data extracted from the Bibliometrix software (Biblioshiny interface).

Table 9: Most relevant keywords extracted from abstracts	TOP 10 frequency
mining	417
social	328
acceptance	191
local	113
community	112
environmental	96
development	94
slo	92
energy	88
communities	76



Source: Developed by the authors based on data extracted from the Bibliometrix software (Biblioshiny interface).



Keyword analysis by source: indications and trends

A comparative examination of the keywords derived from indexing, titles, authors, and abstracts—based on the generated word clouds, reveals patterns that may suggest different analytical approaches and potential biases within the literature.

In the keyword categorization provided by the publications, the terms generated automatically by database algorithms show a predominance of expressions such as operate, governance, acceptance, and license. This pattern suggests an algorithmic tendency to prioritize more technical and regulatory concepts, largely shaped by the articles' references and citation patterns. In contrast, the keywords extracted from article titles, directly defined by the authors, tend to emphasize terms like social and mining, suggesting a possible discursive strategy to highlight the sectoral and human dimensions of the topic under study.

Among the author-defined keywords, mining and social license to operate emerge as central terms, pointing to a more specific focus on the sector's challenges. The presence, though less prominent, of energy transition in this category may indicate an emerging or cross-cutting interest within the literature.

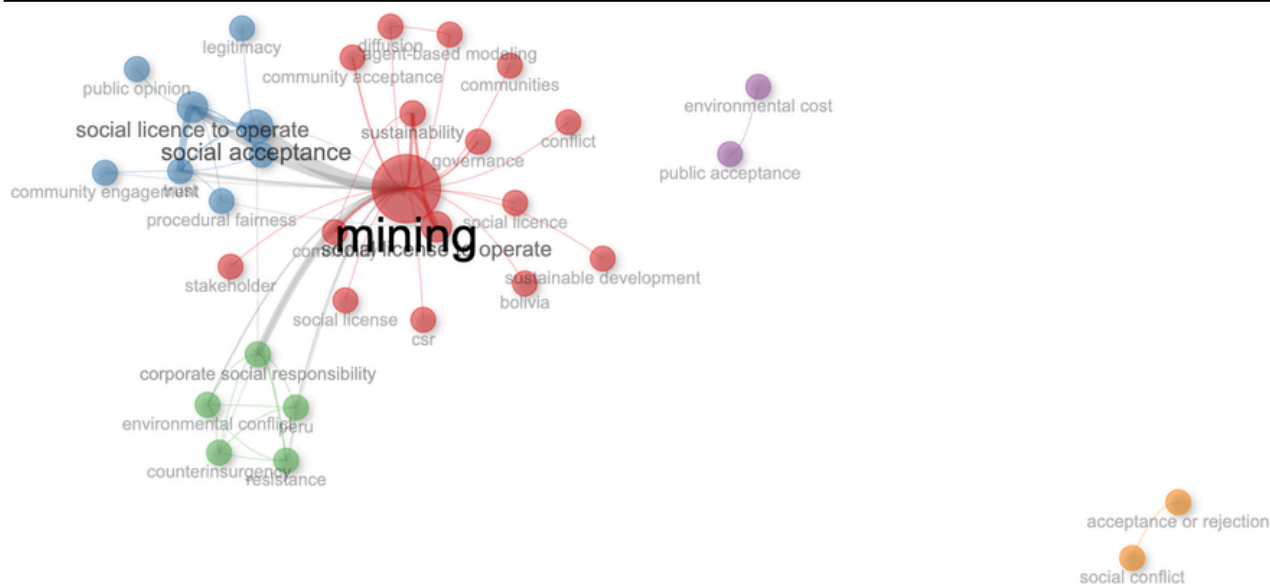
In abstracts, mining, social, and acceptance again stand out, reinforcing the centrality of the relationship between mining activity and society in academic discussions. Terms such as local and environmental gain more visibility in abstracts than in other sources, suggesting that, despite their importance within the article content, these aspects are not necessarily prioritized in indexing strategies or title formulation.

These differences across sources may reflect distinct emphases at various stages of the scientific communication process. While the indexing systems of journals tend to privilege more technical terminology, authors may be more focused on specific sectoral issues, and abstracts tend to surface concerns that are not always fully captured by official keywords. The relative scarcity of terms such as energy transition in titles and indexed keywords, despite their presence among the authors' chosen terms, may suggest a topic that, although under discussion in academic circles, has yet to gain full visibility in how studies are presented and categorized.

Without aiming to draw definitive conclusions, this analysis highlights how different actors, journals, authors, editors, may frame the topic in divergent ways, thereby influencing both the visibility and the future direction of research in this field.



Figure 1: Co-occurrence network based on keywords defined by authors



Source: Figure generated by the Bibliometrix software (Biblioshiny interface).

Cluster	Table 10: Main themes based on clusters
1	Social legitimacy and sustainability
2	Social license to operate and social acceptance
3	Corporate social responsibility and socio-environmental conflicts
4	Environmental costs
5	Social conflicts

Source: Developed by the authors.

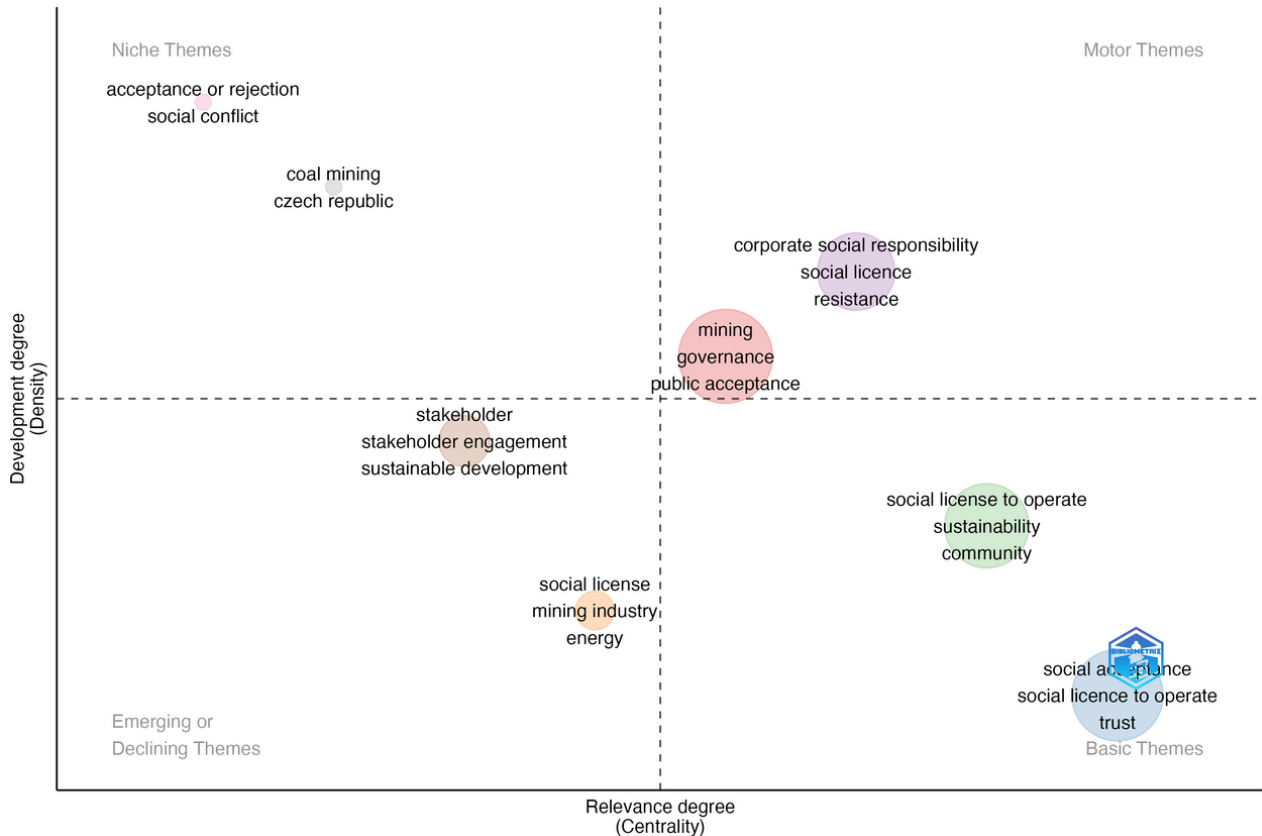
Figure 1 presents the keyword clusters defined by the authors, which frequently appear together in the analyzed articles. Each cluster or node (circle) represents a keyword, with the node size proportional to the frequency of the term. The following five clusters are identified:

- **Cluster 1 – Social legitimacy and sustainability (red):** includes terms such as mining (main node), governance, social license to operate (SLO), legitimacy, communities, and sustainability.
- **Cluster 2 – Social license to operate and social acceptance (blue):** includes terms such as social acceptance, SLO, procedural justice, community engagement, and trust.
- **Cluster 3 – Corporate social responsibility and socio-environmental conflicts (green):** includes terms such as corporate social responsibility, environmental conflicts, and resistance.
- **Cluster 4 – Environmental costs (purple):** includes the terms environmental costs and public acceptance.
- **Cluster 5 – Social conflicts (yellow):** includes the terms acceptance or rejection and social conflict.

The isolation of Cluster 5 (social conflicts; acceptance or rejection) indicates that studies on community opposition to mining projects are relatively disconnected from the central debates on legitimacy and sustainability (Cluster 1) and from the mechanisms of social acceptance (Cluster 2). This separation suggests that, in the analyzed literature, “acceptance” and “rejection” tend to be treated as distinct phenomena, without an integrated approach that examines the same projects from both perspectives. Similarly, the isolation of Cluster 4 indicates that environmental impacts are not widely associated with broader discussions on community acceptance or rejection.



Figure 2: Visual representation of thematic map based on keywords defined by authors



Source: Figure generated by the Bibliometrix software (Biblioshiny interface).

Figure 2, a visual representation of a thematic map based on the authors' defined keywords, suggests some interpretative pathways, although it does not allow for categorical conclusions:

1. **Motor Themes:** Represent the dynamic core of current research in the field, with key terms including corporate social responsibility, social license, resistance, mining, and public acceptance. The combination of governance and public acceptance suggests a maturing debate around formal mechanisms of social acceptance. The presence of resistance in this quadrant may indicate that community opposition is being incorporated into mainstream studies.
2. **Niche Themes:** Social conflict and acceptance or rejection reflect a specialized focus on the challenges of community acceptance, often linked to social conflict. Coal mining and Czech Republic point to geographically specific studies, possibly related to energy transitions (such as coal phase-out) or regional conflicts.
3. **Basic Themes:** Concepts such as sustainability, community, and trust (the latter as a basic element that appears as a prerequisite for processes such as social license to operate and social acceptance) emerge as potentially foundational, functioning as essential vocabulary. The dual presence of social license to operate (among both Motor and Basic Themes) suggests that the concept is in transition between theoretical foundation and practical application, indicating an evolution in the literature.








4. Emerging or Declining Themes: Stakeholder engagement and sustainable development indicate a growing interest in participatory processes and sustainability. The emergence of energy as a theme may reflect the pressure placed by the energy transition on the extractive industry. However, these themes have yet to become central or consolidated within the field.

Potential gaps: The limited presence of themes in the transitional zones between quadrants suggests that the analyzed research still lacks significant exploration of connections between distinct areas, which may point to a lack of interdisciplinary dialogue.

5 Systematic qualitative analysis

These categories were defined based on a semantic approach, grounded in the qualitative analysis of the studies. They represent critical factors for social acceptance in global contexts and are presented in Table 11 as the main emerging categories, along with the reasons why they stand out.

Table 11: Main emerging categories	Why do they stand out?
 <p>Community participation</p>	<p>It is widely mentioned, often as a condition for project legitimacy. Terms such as consultation, engagement, and active participation appear in various contexts.</p>
 <p>Transparency</p>	<p>Clarity of information and ongoing communication are considered important elements. Terms such as clear information, process transparency, and effective communication are highlighted.</p>
 <p>procedural justice</p>	<p>This is an emerging category, especially in more recent studies, which interprets social acceptance as linked to perceptions of justice in multiple dimensions: distributive justice (who benefits and who loses from the projects?), procedural justice (were decisions made fairly?), and restorative justice (are there mechanisms to repair damages?).</p>
 <p>Trust in institutions and projects</p>	<p>Projects associated with trusted institutions tend to be better accepted. Terms such as credibility, trust-based relationships, and institutional and relational track record are frequently used.</p>
 <p>Conflict and expectation management</p>	<p>Particularly relevant in contexts of tension. Mentioned through terms such as mediation, dispute resolution, interest alignment, and negotiation</p>

Source: Developed by the authors.



Why do these categories stand out?

These five identified categories stand out for being transversal across different studies and geographic contexts, showing high semantic recurrence in the analyzed literature. Their relevance is confirmed by how frequently they emerge as critical conditions for social acceptance of mining scenarios, from Brazil to Australia, for instance. Rather than isolated elements, they appear as interdependent factors, collectively forming the core framework for understanding social acceptance of mining.

Their identification resulted from an analytical reading of the abstracts, involving the semantic grouping of factors related to social acceptance. The categories were ranked according to their priority and frequency. Many of the reviewed abstracts address more than one of these categories, reinforcing their importance as key thematic axes.

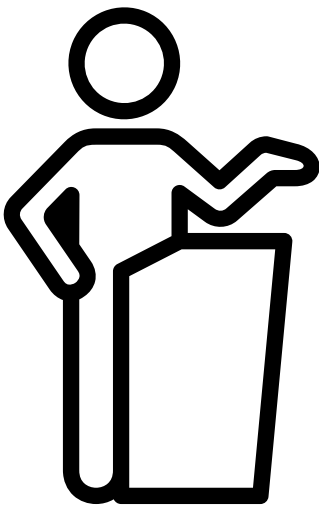
This manual qualitative analysis was later validated by the categories automatically generated by the Bibliometrix software (via the Biblioshiny interface), whose statistical outputs confirmed several of the patterns identified. Among them, one notable finding is the still limited articulation between the themes of energy transition and social acceptance of mining. This is also observable in the word clouds, where "energy transition" is absent in some visualizations, and when present, as in the cloud generated from author-declared keywords (Table 8), it appears with low frequency compared to terms such as "mining," "social acceptance," and "social license to operate."

It is worth noting that these proposed categories do not follow a rigid or predefined taxonomy: they emerged organically from the reading of the abstracts. Their interrelations are evident. Community participation, for example, frequently appears in connection with building trust, with terms such as transparency, participation, and dialogue forming a particularly relevant semantic cluster.

In addition to the five highlighted categories, the review also identified secondary categories that complement the analysis. These include local benefits (associated with the distribution of gains and development), perceptions of risk and environmental impacts (linked to ecological concerns and articulated with other factors), local social capital (connected to local traditions and ways of life), enabling technologies, media coverage of mining, the historical legacy of mining activities in certain areas, and population displacements caused by mining. While present in the studies, these categories appear less frequently, suggesting a complementary but less central relevance to understanding the social dynamics surrounding mining.



5.1 Most and least discussed categories



+ MOST DISCUSSED

The three most discussed categories are **community participation**, **transparency**, and **procedural justice**, indicating that the credibility of involved parties and trust in the process are central themes in the debate on social acceptance of mining.

- LESS DISCUSSED

The three less discussed categories refer to **media coverage**, including both traditional and social media, the **local history of mining activity**, and **population displacement caused by mining**. Their lower frequency may indicate areas that are either underexplored or more dependent on specific contexts within the analyzed literature.



5.2 Analysis of study objectives – Identified approaches

The sample of 118 studies revealed five main approaches that reflect, based on the objectives extracted from the abstracts, the different perspectives adopted in the literature on social acceptance of mining. These approaches were identified through a qualitative analysis, as described in Section 3.3 of the methodology, in which the objectives, either explicitly stated or implicit, were categorized based on recurring themes and the underlying theoretical or practical intentions, as well as how they articulate the notion of social acceptance. This synthesis makes it possible to understand current research priorities and identify relevant thematic gaps. In the list below, the approaches are presented from the most to the least frequent.

Instrumental, technical-managerial approach – applied

This approach views social acceptance as a practical goal to be achieved. Central question: How to obtain social acceptance to minimize operational risks? These studies tend to treat social acceptance as a procedural step, regarded as a “requirement to be met” in operational or management processes.

Governance and regulatory approach – empirical

Studies with this approach explore the role of public policies and regulation in shaping social acceptance. Central question: How do public policies shape social acceptance of mining? They comparatively analyze legal models across different regions, identifying practices such as prior consultation and transparency in procedures.

Critical socio-environmental approach – conceptual

This approach analyzes structural and power-related issues that generate resistance to mining. Central question: Why is mining socially and environmentally contested? It questions power structures, such as capitalism and colonialism, and examines symbolic disputes and discursive strategies.

Cultural, symbolic, territorial, and identity-based approach – empirical

This approach explores the cultural and identity-related dimensions that influence social acceptance, with an emphasis on territory. Central question: How do cultural values and ways of life influence social acceptance? It examines territorial meanings based on the identity and collective memory of affected or impacted communities.

Technological approach (innovation and acceptance) – applied

This approach investigates the influence of technological innovations on the perception and social acceptance of mining. Central question: How do technologies affect the social perception of mining activities? How can public understanding of projects be promoted? It analyzes the role of technological innovation in improving public perception and communication about mining projects.



5.3 Qualitative overview of the debate on social acceptance of mining: emerging categories and geographical contexts

This section organizes the main qualitative dimensions observed in the literature into five analytical categories, constructed from a cross-analysis of the identified social acceptance factors and the geographic contexts in which the studies are focused. These contexts were classified as Global North or Global South to correlate, within a qualitative matrix, the social acceptance factors with geographic regions, revealing regional and thematic patterns.

1. North–South differences in approaches

Studies from the Global North tend to prioritize governance and technical standards, while those from the Global South highlight the redistribution of benefits, social inclusion, and the direct impacts on affected communities. These differences may reflect not only different socioeconomic contexts, but also political and institutional priorities that shape how mining is problematized.

2. Rise of the Social License to Operate (SLO)

The Social License to Operate (SLO), originally conceived as a descriptive concept, appears to have been appropriated by corporate management practices, often reduced to a procedural tool. Some of the abstracts analyzed, both from the Global North and South, suggest a reconceptualization of SLO as a relational and dynamic process linked to energy justice and the ongoing participation of involved communities. In this sense, there is also criticism of simplistic social acceptance frameworks, which often fail to capture political, cultural, and institutional contexts.

3. Relevance of environmental aspects

Environmental impact frequently emerges as a potential axis of contestation in mining, often interconnected with other dimensions of conflict, particularly in ecologically sensitive regions (e.g., the Amazon, Brazil). In the Global North, the “environmentalization” of mining seems to be driven by regulation and public mobilization, while in the Global South, it is more often associated with environmental disasters and direct impacts on local communities.

4. Emphasis on conflict and risk

Overall, the analysis indicates a tendency to focus on case studies marked by conflict, such as protests, institutional tensions, or governance failures. Studies on successful experiences, where mining is socially accepted, appear less frequent. In both the Global North and South, some approaches explore innovation and process improvement as ways to promote public understanding of mining projects.

5. Underrepresentation of social groups

Historically marginalized groups, such as women, Indigenous peoples, and mine workers, appear to be underrepresented in the abstracts analyzed, despite their potential relevance in contexts of contestation. The labor dimension of the mining sector also seems rarely considered, as most studies focus primarily on affected communities, both in the Global North and South.



5.4 Relation of the studies to the energy transition

The relationship of the studies with the energy transition was classified into three categories: “yes,” “partial,” and “no,” based on the explicit presence or absence of the theme in the analyzed abstracts.

✓ 1. Studies related to the energy transition (yes)

- They show concern with legitimizing new extractive projects linked to renewable energies.
- They acknowledge emerging conflicts even in "green" ventures.
- They propose technologies and participatory approaches to reduce local resistance.

✗ 2. Studies without a direct focus on the energy transition (no)

- They present a critical perspective on the social impacts of mining in general.
- They discuss community participation, social justice, and territorial conflicts.
- Social acceptance is seen as a political and contested process, not merely a management requirement.

● 3. Studies with partial relation

- They reinforce the role of social acceptance of mining but do not always connect it to the global energy transition debate.
- The link is implicit and often instrumental, focusing on technical, environmental, or local social aspects, such as the exploitation of critical minerals.

Most studies do not explicitly address the energy transition in their abstracts. This analysis indicates that, despite the potential connection between mining and the energy transition, the theme is not widely treated explicitly in the analyzed literature. In cases where it is present, the approach focuses on practical and operational challenges of social acceptance, often associated with the Social License to Operate (SLO) in critical mineral projects.



6 Propositive conclusions

This first LNEG Technical Report on the social acceptance of mining suggests pathways toward more participatory practices. The combined quantitative and qualitative analysis revealed that social acceptance of mining is shaped by factors such as community participation, transparency, procedural justice, trust, and conflict management, with regional variations, for example, greater emphasis on governance in Europe and socio-environmental issues in Latin America (Section 5.3). Based on these conclusions, the following practices are recommended to promote more legitimate social acceptance processes aligned with the energy transition, aimed at decision-makers, companies, and communities in global contexts.

Foster community participation through continuous consultations:

It is recommended to establish permanent forums or platforms for dialogue to involve local communities in decisions regarding mining projects. It is also essential to conduct an analysis of existing participation in communities to assess how consultation and engagement processes are proceeding, especially in regions with a history of conflicts.

Ensure transparency in communication with communities:

Publishing clear and accessible impact reports that detail the benefits and risks of projects is essential for building trust within local communities. Transparency should be accompanied by collaboration between academics, communities, and companies, promoting interdisciplinary knowledge exchange.

Include underrepresented groups in decision-making processes:

Women, Indigenous peoples, youth, the elderly, and traditional communities should be included in consultation and decision-making processes.

Integrate justice criteria into project planning:

Mining project assessments should consider who benefits (distributive justice), how decisions are made (procedural justice), and who is heard (recognition justice) from the initial phase to mitigate possible inequalities.

Implement conflict management strategies:

In regions with a history of conflicts, it is recommended to use independent mediation and establish local committees to manage conflicts, fostering participatory resolution.

Consider the energy transition with justice and transparency:

The urgency to extract minerals for renewable energies must not overlook local concerns. Mining for the energy transition should be managed with transparency and justice, taking into account environmental and social impacts on local communities.



7 Final reflections

By mapping the factors that influence social acceptance of mining, this Technical Report aims to foster an interdisciplinary debate on the relevance of the topic within traditionally technical fields, such as those developed by LNEG and other public and scientific institutions. The SOLITEC project, which has been developed with the participation of one of the authors of this report, exemplifies this integration by articulating social and technical perspectives in the domains of mining and renewable energies, based on the premise that society lies at the heart of the energy transition debate.

During the analysis, it became evident that the concept of social acceptance is sometimes conflated with that of the Social License to Operate (SLO), which can lead to oversimplified approaches that fail to capture the complexity of the social processes involved. This conceptual overlap proves problematic and warrants deeper discussion, especially considering the increase in social and environmental conflicts associated with extractive projects.

It is important to emphasize that the objective of this report is not to directly resolve these conflicts, but rather to encourage researchers and practitioners to more effectively integrate social perspectives, contributing to strengthening project legitimacy and aligning technical innovations with societal expectations and concerns.

7.1 Practical applications and methodological limitations

The recommendations of this systematic review guide policymakers, companies, and mining communities and may support regulations on critical minerals as well as corporate community engagement programs. However, some methodological considerations and inherent limitations of the process should be highlighted to inform future research. The implementation of these recommendations requires financial resources, capacity building among stakeholders, time, and appropriate regulatory frameworks, which vary according to context. Resistance from communities or companies, as well as a lack of political alignment, may hinder the adoption of participatory or transparent practices.

The methodology adopted in this systematic review, combining quantitative and qualitative analysis, allowed for mapping global trends and identifying factors of social acceptance of mining. However, the qualitative analysis, based exclusively on abstracts, may have limited the depth of identification of certain social acceptance factors, especially those not explicitly mentioned or occurring in heterogeneous contexts. The construction of categories through semantic clustering, although systematic, may not have captured all nuances or their depth due to the variability of the abstracts.

Regarding the word clouds – it was noted that, when plotting the word cloud multiple times with the same parameters ("Number of words: 50" and "N-Grams: Unigrams"), the location of words may vary slightly due to the algorithmic nature of the layout, although frequencies and relative sizes remain consistent. The number 50 was considered adequate to capture the thematic diversity of the sample of 118 articles.



The predominance of publications from the Global North in the Scopus and Web of Science databases, a common limitation in systematic reviews, underrepresents perspectives from regions such as Asia, Latin America, and Africa, where mining generates significant socio-environmental conflicts and where relevant scientific contributions are also produced.

The database of 118 articles, extracted from Web of Science and Scopus, contains copyright-protected information such as abstracts and full texts, whose public sharing is restricted by the terms of use of [Clarivate](#) (Web of Science) and [Elsevier](#) (Scopus). In legal compliance, only aggregated results are presented, and the complete list of studies is provided in Appendix A, using publicly available metadata to ensure transparency.



Appendix A: list of coded studies



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