

Evaluating gold mining in Ranowulu between CSR benefits and social vulnerability

Mejjina Exreana Karundeng ^{1*} Michael Mamentu ² Burhan Niode ³

^{1*, 2, 3}, Program Pascasarjana, Universitas Sam Ratulangi, Manado, Indonesia.

Email: mejjinakarundeng15@gmail.com, mamentumichael@unsrat.ac.id, burhanniode@unsrat.ac.id

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ABSTRACT

Purpose: This study evaluates the social impacts of PT. Tambang Tondano Nusajaya gold mining activities on communities in Ranowulu District, Bitung City, North Sulawesi.

Research Method: An exploratory descriptive qualitative design was employed through semi-structured interviews, field observations, and documentation, involving one corporate representative and four ring-1 residents.

Results and Discussion: Mining generates local employment, skills training, micro-enterprise opportunities, educational support, and infrastructure assistance. However, residents also report land conversion, dust, blasting vibration, cracked houses, health concerns, passive participation, and dependence on company-driven economic circulation.

Implications: The study recommends participatory social impact assessment, independent monitoring by DLH Kota Bitung and Dinas PUPR Kota Bitung, transparent grievance mechanisms, and livelihood diversification beyond mining.

Originality: This article integrates outcome evaluation, process evaluation, CSR fit, social license to operate, and social impact assessment to demonstrate that mining legitimacy depends on balancing benefits, operational risk mitigation, and meaningful participation.

Keywords: social impact assessment; gold mining; corporate social responsibility; social license to operate.

1. Introduction

Large-scale mining is often justified as an engine of regional development because it can create employment, stimulate local business, expand infrastructure, and increase public revenue. Empirical studies on mining economies show that extractive projects may generate local income and procurement spillovers, particularly when firms purchase local inputs and employ local workers (Aragón & Rud, 2013; Loayza & Rigolini, 2016). At the same time, mining remains one of the most socially sensitive forms of development because it transforms land use, redistributes environmental and social risks, and changes the everyday life of nearby communities. These consequences are rarely one-dimensional: communities may experience new economic opportunities while simultaneously facing environmental disruption, pressure to relocate, health concerns, household property damage, and declining trust in corporate or government institutions (Mancini & Sala, 2018; Owen & Kemp, 2015).



The case examined in this study is located in Ranowulu District, Bitung City, North Sulawesi, a district situated within the social and spatial influence of the Toka Tindung gold mining complex. PT. Tambang Tondano Nusajaya (PT. TTN), together with PT. Meares Sopotan Mining (PT. MSM) forms part of PT Archi Indonesia Tbk's gold mining operations in North Sulawesi. Official company disclosures state that the Toka Tindung Gold Mine comprises two long-term Contracts of Work covering 39,817 hectares across North Minahasa and Bitung City, valid until 2041 (Archi Indonesia, 2026). Within this broader operational setting, communities in Ranowulu, particularly those near the mining area, encounter both the developmental promise and the social and environmental risks of gold extraction.

Recent scholarship and industry guidance increasingly emphasize that social impact assessment (SIA) should not be treated as a one-time administrative requirement. Good practice requires continuous identification, monitoring, management, and mitigation of intended and unintended social consequences across the project life cycle (Vanclay, 2003; Vanclay *et al.*, 2015). In the mining sector, systematic SIA is especially important because common impact categories include employment, income distribution, health and safety, land access, cultural change, social cohesion, and institutional trust (Mancini & Sala, 2018). The International Finance Corporation's environmental and social standards also stress the need to identify risks and impacts, develop management programs, engage affected communities, and maintain monitoring systems proportionate to project risks (International Finance Corporation, 2012).

In the mining sector, SIA is closely connected with social performance and the social license to operate (SLO). SLO refers to the informal and ongoing acceptance of a project by affected communities and stakeholders; it is not granted by law alone but is produced through legitimacy, credibility, trust, procedural fairness, and repeated interactions (Moffat & Zhang, 2014; Prno & Slocombe, 2012). Critical mining scholarship warns that companies may use the language of SLO narrowly as a tool to secure acceptance rather than as a mechanism for genuine deliberation and accountability (Owen & Kemp, 2013). Therefore, evaluating mining impacts requires attention not only to the presence of CSR programs but also to whether those programs respond to the risks and priorities experienced by communities.

The literature on CSR and SLO in mining shows that corporate programs can support community acceptance when they are perceived as relevant, fair, transparent, and aligned with local priorities. CSR fit is important because communities evaluate company programs through lived experience: whether the benefits are accessible, useful, and capable of addressing the burdens created by mining (Cesar, 2021; Lindman *et al.*, 2020). However, CSR is unlikely to secure legitimacy if it is experienced as compensatory symbolism, if participation is limited to one-way consultation, or if unresolved environmental impacts continue to affect daily life (Deonandan *et al.*, 2024; Saenz & Ostos, 2021). This is analytically important because mining companies may demonstrate visible social contributions, such as scholarships, local employment, or infrastructure. At the same time, communities continue to bear poorly mitigated risks such as dust, blasting vibrations, land conversion, and anxiety about future livelihood security.

Previous studies in Indonesia indicate that the benefits of mining can be significant but also fragile. The historical tin-mining case of Singkep Island, for example, shows that employment, infrastructure, education, and health facilities generated during the mining period can become long-term liabilities when mine closure and the post-mining transition are poorly managed (Syahrir *et al.*, 2020). This Indonesian evidence is relevant for Ranowulu because mining-dependent benefits may

appear positive in the short term but create vulnerability if community livelihoods remain tied to a single extractive economy.

Previous studies in North Sulawesi have addressed mining-related issues such as policy impacts, conflict handling, and licensing disputes. However, fewer studies examine the social impacts of gold mining in Ranowulu through an integrated qualitative framework that combines outcome evaluation, process evaluation, CSR fit, SLO, and SIA. This article, therefore, addresses the following research question: What social impacts are experienced by communities in Ranowulu District as a result of PT? TTN gold mining activities, and how can those impacts be evaluated through a social impact assessment perspective? The objective is to evaluate both positive and negative impacts, examine the adequacy of CSR and mitigation processes, and propose implications for more participatory and sustainable mining governance.

The novelty of this article lies in its effort to move beyond a simple positive-versus-negative impact inventory. It interprets the Ranowulu case as a tension between short-term socio-economic benefits and longer-term social vulnerability. The central argument is that CSR legitimacy in Ranowulu is not determined solely by the presence of social programs; rather, it depends on the perceived balance among benefits, mitigation of direct operational risks, transparent grievance handling, and meaningful community participation.

The remainder of this paper is organized as follows. Section 2 provides a literature review. Section 3 presents the research method. Section 4 provides the results and discussion; Section 5 provides Concluding Remarks and Recommendations.

2. Literature Review and Hypothesis Development

2.1 Social Impact Assessment as an Evaluative Framework

Social Impact Assessment refers to the systematic analysis, monitoring, and management of intended and unintended social consequences arising from policies, programs, plans, or projects. In extractive industries, SIA is crucial because mining alters the relationships among communities, land, livelihoods, institutions, and risk. Vanclay *et al.*, (2015) emphasize that SIA should be embedded in project planning and adaptive management, not limited to initial approval. This orientation treats affected communities as knowledge holders and rights-bearing stakeholders rather than passive recipients of corporate decisions.

Mining-specific SIA literature shows that impact domains are multidimensional and often cumulative. Mancini and Sala (2018) identify typical mining-related social impacts across employment, income, health and safety, land access, migration, cultural change, human rights, governance, and social cohesion. Rey-Martí *et al.*, (2023) further argue that social impact models in mining need to integrate diverse stakeholder perspectives and context-specific indicators, because the meaning of impact varies across communities and project phases. This is especially important for qualitative case studies, where the analytical value lies not in statistical representativeness but in understanding how affected actors interpret change.

The evaluative dimension of SIA can be linked to the distinction between outcome evaluation and process evaluation. Outcome evaluation asks whether an intervention has produced desired or undesired consequences, while process evaluation examines whether implementation is participatory, transparent, procedurally fair, and aligned with agreed standards. In the mining context, this distinction

matters because a company may deliver visible outputs - such as jobs or scholarships - while still failing to manage community concerns over land, health, housing, or safety. Evaluation must therefore assess not only what benefits are delivered but also how decisions are made, how risks are distributed, and how grievances are resolved.

Recent work on policy evaluation also highlights the need to combine effectiveness with efficiency and contextual interpretation. Mergoni and De Witte (2022) argue that public interventions should not be evaluated solely by output measures; rather, evaluation must assess whether outcomes align with policy goals and whether resources translate into meaningful public value. Applied to mining, this means that CSR and social programs should be judged not only by the existence of activities but by their fit with community needs, their contribution to resilience, and their capacity to reduce negative externalities.

2.2 CSR, Social License to Operate, and Community Legitimacy

Corporate Social Responsibility in mining is commonly framed as a mechanism for balancing business operations with social welfare, environmental stewardship, and stakeholder accountability. In practice, CSR programs may include employment, micro-enterprise support, education, health, infrastructure, and community development. However, CSR can have different meanings for companies and communities. For companies, it may represent risk management and reputational protection. For communities, it is judged through lived experience: whether programs are fair, useful, accessible, transparent, and capable of addressing the burdens created by mining.

The concept of social license to operate captures this informal but powerful dimension of legitimacy. SLO is not granted through law alone; it is built through trust, credibility, procedural fairness, and ongoing community acceptance (Moffat & Zhang, 2014; Prno & Slocombe, 2012). Nguyen's (2021) review of Southeast Asian mining emphasizes that SLO has become increasingly important in the region, as mining contributes to development while also generating protests, disparities, and social tensions. CSR may help build SLO when it is contextually fitted to community expectations, but it may fail when perceived as disconnected from the most urgent social and environmental concerns (Cesar, 2021).

Critical perspectives add an important caution. Owen and Kemp (2013) argue that SLO can become problematic when it is reduced to a managerial strategy for gaining consent rather than a deeper accountability relationship. Deonandan *et al.*, (2024) similarly highlight that private governance structures and unequal power relations can constrain community engagement. This matters for Ranowulu because a company-led CSR program may be materially valuable while still leaving residents with limited influence over priority-setting, monitoring, and grievance resolution.

Mining conflict literature further suggests that social acceptance is fragile when affected people believe that risks are imposed on them without a meaningful voice. Saenz and Ostos (2021) identify social conflict drivers in mining as closely related to legitimacy, trust, benefit distribution, environmental concerns, and unresolved grievances. Franks *et al.*, (2014) show that environmental and social conflict can translate into substantial business costs, meaning that weak social performance is not only a moral or public policy issue but also an operational risk. This implies that CSR cannot substitute for accountable social risk management. A scholarship program, for example, may be valued by residents, yet it does not automatically compensate for dust exposure, cracked houses, land loss, or anxiety about post-mining livelihoods.

2.3 Mining Impacts on Local Livelihoods and Community Resilience

Mining impacts can be immediate, indirect, induced, and cumulative. Direct impacts include employment, land conversion, blasting disturbance, and changes to infrastructure use. Indirect impacts may manifest as local business growth, migration, changes in household income, or altered consumption patterns. Induced and cumulative impacts emerge more slowly, such as dependence on mining-related income, the weakening of traditional livelihoods, or the gradual transformation of community cohesion. These categories are important because communities may initially welcome the benefits of mining but later become vulnerable when economic dependence exceeds local productive capacity.

Economic studies show that mining can generate measurable local benefits under certain conditions. Aragón and Rud (2013), using evidence from a Peruvian gold mine, show that local procurement and demand linkages can raise incomes in surrounding areas. Loayza and Rigolini (2016) find that mining districts may experience poverty reduction during commodity booms, but the effects on inequality and long-term development are uneven. These findings support a nuanced interpretation: mining can create benefits, but such benefits depend on distribution, local capability, institutional quality, and the capacity of communities to convert mining-linked income into durable welfare.

Indonesian evidence reinforces the importance of long-term resilience. Syahrir *et al.*, (2020) show that Singkep Island's historical tin mining created employment and infrastructure while the mine was operating. However, the sudden closure and weak post-mining governance led to long-term socio-economic losses. This suggests that mining-dependent communities need to diversify livelihoods and plan for post-mining transition long before closure. For Ranowulu, this means that employment, sewing programs, agricultural assistance, and food-production initiatives should be assessed not only as current CSR outputs but also as potential foundations for autonomous non-mining livelihoods.

Social impact measurement literature underlines the importance of capturing positive and negative changes, intended and unintended effects, and short- and long-term consequences. Rawhouser *et al.*, (2019) show that social impact measurement remains methodologically diverse, which requires researchers to be explicit about what counts as impact, whose perspective matters, and what evidence is used. For qualitative studies, the value lies in understanding how residents interpret change, how they compare benefits with burdens, and how they narrate the fairness of development.

In mining communities, resilience depends on more than employment numbers. It involves adaptive capacity, livelihood diversification, trust in grievance systems, environmental safety, and community participation in decision-making. Therefore, a mining project can be economically useful but socially fragile if benefits are short-term, concentrated among specific groups, or dependent on continuing corporate support. Conversely, social performance is stronger when community programs build autonomous capabilities and when environmental and social risks are transparently monitored throughout the mining life cycle.

2.4 Research Propositions

- P1:** *Gold mining activities in Ranowulu generate mixed social impacts, combining socio-economic opportunities with environmental, health, and spatial risks.*
- P2:** *CSR programs contribute to community welfare when they are aligned with local needs, but their legitimacy is weakened when participation is limited and environmental grievances remain unresolved.*

P3: *The long-term social sustainability of mining in Ranowulu depends on shifting from short-term assistance to participatory impact management, transparent grievance resolution, and post-mining livelihood resilience.*

Table 1. Research Focus and Analytical Orientation

Analytical Focus	Key Question	Main Evidence Used	Interpretive Lens
Socio-economic benefit	How does mining affect employment, income, and enterprise opportunities?	Interviews with residents and company representatives; documentation of CSR programs.	Outcome evaluation, CSR fit, and local economic linkage.
Education and capacity development	How does the company support human capital development?	Reports of scholarships, training, school facilities, and computer laboratory assistance.	Community development and capability building.
Environmental and health disturbance	What risks or burdens are experienced by nearby residents?	Community testimony on dust, blasting vibration, cracked houses, and discomfort.	SIA, risk distribution, and community health.
Participation and procedural fairness	How are residents involved in planning and evaluating CSR?	Interview evidence on one-way socialization and limited influence in program design.	Process evaluation, stakeholder engagement, and SLO.
Sustainability and dependency	Do programs strengthen long-term resilience beyond mining?	Thematic interpretation of assistance, livelihood patterns, and post-mining concerns.	Social resilience, livelihood diversification, and SLO.

3. Research Method

This study employed an exploratory, descriptive qualitative design to evaluate the social impacts of gold mining in Ranowulu District, Bitung City. A qualitative design was appropriate because the study sought to understand lived experiences, community perceptions, local meanings, and the social processes through which mining benefits and burdens are interpreted. Rather than measuring impact statistically, the study examined how residents and a corporate representative describe the consequences of mining for employment, livelihoods, education, environment, health, housing, participation, and social relations.

The research site was Ranowulu District, an area within the broader influence of the Toka Tindung gold mining operation. The case was selected because communities in the district are positioned near mining activities and experience direct or indirect effects of mine expansion. The study treated the area as a single qualitative case, consistent with case study logic in which a bounded social setting is examined in depth to explain a contemporary phenomenon within its real-life context (Yin, 2018).

Informants were purposively selected because the study required individuals with direct knowledge of the phenomenon. The informants consisted of one community relations representative from the company and four residents from affected communities. The four resident informants were selected based on their spatial proximity to the mining operations, particularly residents living within ring-1 of the operational area, and on their ability to represent different community experiences related to land, livelihood, household welfare, and participation. The corporate informant provided information

on CSR programs, community development activities, employment, and company-community relations. Resident informants provided accounts of perceived benefits, everyday disturbances, participation experiences, and expectations toward the company and local government. The resident informant profile is summarized in Table 2.

Table 2. Resident Informant Profile and Selection Criteria

Code	Local background	Selection criterion	The main perspective in the study
Resident 1	Local community leader living within ring-1 of the mining operational area.	Selected because of familiarity with community consultation, CSR socialization, and local collective concerns.	Participation, procedural fairness, and community expectations.
Resident 2	A farmer whose land and residence are adjacent to the mining area.	Selected because of direct exposure to land conversion, dust, and blasting vibration.	Land, housing condition, environmental disturbance, and livelihood risk.
Resident 3	Local trader involved in daily economic activities around the community.	Selected to capture mining-linked economic circulation and local business opportunities.	Local income, micro-enterprise opportunities, and dependency risk.
Resident 4	Housewife representing household-level welfare and health concerns.	Selected because of day-to-day domestic exposure to dust, discomfort, and family health anxiety.	Household health, comfort, and social vulnerability.

Data were collected through semi-structured interviews, field observation, and documentation. Interviews explored four main issues: positive impacts, negative impacts, CSR implementation, and community participation. Observation was used to understand the local setting and to contextualize interview statements, particularly regarding the proximity of the settlement to mining-related activities. Documentation was used to support the analysis of company programs, community development activities, and relevant institutional information.

Data analysis followed an iterative qualitative process consisting of data reduction, thematic display, and conclusion drawing. Interview and observation notes were first reduced into meaningful units related to social-economic benefits, education, environmental risk, land conversion, participation, and sustainability. These units were then organized into themes and compared across informant categories. The analysis did not treat the corporate and community narratives as identical; rather, it compared them to identify convergences, tensions, and gaps between intended CSR outcomes and the social impacts experienced. This procedure is consistent with thematic qualitative analysis, which emphasizes pattern identification, interpretation, and transparent movement from coded evidence to themes (Braun & Clarke, 2021).

Trustworthiness was strengthened through source triangulation, method triangulation, and sensitivity to negative cases. Source triangulation compared corporate explanations with resident testimonies. Method triangulation compared interviews with observation and documentation. Negative case sensitivity was applied by acknowledging that the same mining activity could be interpreted simultaneously as beneficial and harmful. Because the study involved a small number of informants, the

findings are not intended for statistical generalization; they provide analytical insights into the Ranowulu case and offer propositions for future research.

4. Results and Discussion

4.1 Analysis Results

The findings show that PT. TTN's mining presence in Ranowulu produces a dual social impact structure. On the one hand, mining is associated with employment, community economic programs, educational support, and infrastructure assistance. On the other side, residents report environmental disturbance, land conversion, property damage, and limited participation in CSR planning. The most important analytical finding is that these two impact streams do not cancel each other out. Benefits are real and recognized by residents, but negative effects remain socially significant because they affect daily security, comfort, health, and long-term livelihood certainty.

First, the mining operation contributes to local employment and skills development. Community informants described the company as an important source of jobs for residents, including family members who worked in the mine. The company representative reported that residents were prioritized where possible and that training programs helped convert workers from agricultural backgrounds into mining-related employment. This result indicates that mining has improved short-term household income and expanded work opportunities in an area where formal employment can be limited. This finding is consistent with studies showing that mining can create local economic spillovers when employment and procurement linkages are locally embedded (Aragón & Rud, 2013; Loayza & Rigolini, 2016).

Second, CSR programs create micro-enterprise opportunities. The study identified several community empowerment initiatives, including sewing work uniforms for mining employees, sewing filter cloth used in production processes, livestock and agricultural assistance, and the production of Moringa Cookies by women's groups. These programs are socially important because they target residents who are not directly employed by the company, especially women and household-based enterprise groups. They also demonstrate a form of local procurement linkage in which community production is connected to company demand. However, the sustainability of these enterprises depends on their ability to access markets beyond company purchasing.

Third, the company contributes to education and human capital development. The thesis reported evidence of scholarship programs, including diploma-level educational opportunities in China, collaboration with educational institutions, training, internship opportunities, school infrastructure assistance, and computer laboratory support. Official company information also identifies education as a CSR pillar, including scholarship support for communities around the mining area (Archi Indonesia, n.d.-b). These programs are relevant because they potentially extend benefits beyond immediate income and can support intergenerational mobility.

Fourth, infrastructure assistance was reported in areas such as clean water, electricity, road improvement, places of worship, village facilities, drainage, public lighting, and support for local institutions. These contributions indicate that the company is not only operating as an employer but also as a local development actor. However, the provision of infrastructure also raises an important governance issue: when a private mining company becomes a major source of community facilities, local welfare may become tied to corporate priorities rather than to public planning alone. Mining and



social development literature suggests that community investment should be strategic, participatory, and linked to long-term local sustainability rather than limited to short-term corporate visibility (Esteves, 2008; Lindman *et al.*, 2020).

Fifth, negative impacts are concentrated around land, environment, health, and housing. Residents reported that mining expansion has contributed to the conversion of agricultural or residential land into mining-related space. Field observations confirmed the continuous accumulation of fine dust on residential rooftops and public facilities near the mining perimeter. Furthermore, visual inspection of nearby houses revealed structural cracks in concrete walls, ranging from approximately 2 to 5 millimeters, which residents attributed to repeated blasting vibrations. A resident expressed the community's shared anxiety regarding the operations: "Every time there is blasting, our house walls vibrate, and new cracks appear. The dust makes it hard to breathe during the dry season, but we feel powerless to change it" (Resident 2, personal communication, 2026). These impacts are not merely environmental; they are social, affecting household safety, comfort, health, anxiety, and community-company relations. In SIA terms, operational impacts on housing, health, safety, and land access belong to core social impact domains and should not be treated as secondary externalities (Mancini & Sala, 2018; Vanclay *et al.*, 2015).

Sixth, participation appears weak. The evidence suggests that residents often receive information about CSR activities through company- and government-arranged socialization meetings. However, they are not consistently involved in defining program priorities, designing interventions, or evaluating outcomes. Regarding participation, another resident noted: "The company usually invites us just to inform us what program they will give, like scholarships or sewing training. We listen and accept, we are not involved in planning what we actually need most" (Resident 1, personal communication, 2026). This means participation tends to be informative rather than deliberative. Residents become recipients of programs rather than co-designers of social risk management. This is a central process weakness because SIA emphasizes public involvement as a core principle rather than an optional communication strategy. It also weakens SLO because trust and acceptance are shaped by the quality of contact, procedural fairness, and perceived company responsiveness (Moffat & Zhang, 2014; Ofori & Ofori, 2019).

Seventh, the sustainability of benefits remains uncertain. Employment and CSR activities support household welfare in the short term, but the study identified signs of dependency. Economic gains are partly tied to mining activity and corporate assistance. If alternative livelihoods are not strengthened, communities may become vulnerable when mining declines, closes, or changes its procurement priorities. The Singkep case in Indonesia demonstrates that strong mining dependence can lead to long-term post-mining vulnerability if closure planning, local economic diversification, and public governance are weak (Syahrir *et al.*, 2020). The effectiveness of social programs should therefore be measured not only by current assistance but by whether communities can maintain welfare independently beyond the mine life cycle.

Table 3. Thematic Summary of Findings

Theme	Positive Evidence	Critical Finding	Evaluation
Employment and income	Local workers absorbed; training and mining-related jobs increased household income.	Benefits are uneven and remain dependent on mining demand.	Positive short-term outcome, but vulnerable in the long term.
Community enterprises	Uniform sewing, filter cloth sewing, livestock, agriculture, and Moringa Cookies programs.	Programs need stronger market independence beyond company purchasing.	Relevant CSR fit, but sustainability remains incomplete.
Education and infrastructure	Scholarships, training, internships, school facilities, clean water, roads, and public facilities.	Corporate-led provision may create reliance on company priorities.	Meaningful contribution, but requires integration with public planning.
Environment, health, and housing	No direct positive evidence; mitigation efforts were not strongly visible in resident narratives.	Dust, blasting vibration, cracked houses, health anxiety, and discomfort.	The most serious negative impact area requires independent monitoring.
Participation	Residents receive information through socialization.	Participation is mostly passive; limited role in agenda-setting and evaluation.	Weak process evaluation results and a threat to social legitimacy.
Post-mining resilience	Some programs build skills and enterprises.	Dependency risk remains because livelihoods are tied to mine-related economic circulation.	Requires strategic diversification and community-led planning.

4.2 Discussion

The findings support Proposition 1 by showing that mining in Ranowulu produces mixed and simultaneous social impacts. Employment, enterprise support, education, and infrastructure represent tangible benefits. Nevertheless, land conversion, dust, blasting vibration, cracked houses, and health concerns represent serious negative consequences. This duality is consistent with SIA theory, which requires evaluators to consider both intended and unintended impacts as well as positive and negative effects (Mancini & Sala, 2018; Vanclay *et al.*, 2015). The Ranowulu case shows that a community can appreciate mining-related opportunities while still experiencing daily disruption and insecurity.

A critical implication is that positive CSR outcomes should not be used to obscure negative impacts. The fact that the company supports employment and education does not eliminate the need to address dust, vibration, and property damage. From an evaluative standpoint, these belong to different impact domains. Employment is an economic outcome, while blasting-related disturbance is a community health, safety, and housing issue. Treating them as interchangeable would create a misleading evaluation. A more credible assessment must ask whether each impact domain is being managed adequately, independently, and transparently.

The findings also support Proposition 2. CSR programs appear partly aligned with local needs because they address employment, education, and small enterprise development. This alignment is important in CSR fit theory because communities tend to value programs that respond to concrete needs (Cesar, 2021). However, fit is incomplete when the most intrusive risks are not adequately

handled. Residents who experience cracked homes, dust, or discomfort may perceive CSR as insufficient if the programs do not address the direct burdens they face. In this sense, legitimacy depends not only on the number of social programs but also on the perceived fairness between the benefits received and the risks imposed.

The participation finding is particularly important. The study suggests that community involvement remains closer to socialization than co-decision. This limits procedural fairness and weakens the transformative potential of CSR. In SIA good practice, affected communities should be involved in identifying impacts, defining alternatives, designing mitigation, monitoring outcomes, and evaluating whether commitments are fulfilled. If residents are mainly informed after program decisions have been made, participation becomes a communication tool rather than a governance mechanism. SLO literature indicates that contact quality and fair treatment are central pathways through which communities infer corporate trustworthiness (Moffat & Zhang, 2014).

The Ranowulu case, therefore, illustrates a common tension in extractive development: CSR may build goodwill in one domain while unresolved environmental impacts erode trust in another. Social license to operate is cumulative and relational. It is shaped by repeated interactions, grievance handling, and the belief that the company and government will respond fairly to community concerns. When residents perceive that blasting, dust, or land conversion is not sufficiently controlled, trust becomes conditional even when economic benefits are present. This finding is consistent with SLO literature emphasizing legitimacy, credibility, and trust as interdependent foundations of community acceptance (Nguyen, 2021; Prno & Slocombe, 2012; Saenz & Ostos, 2021).

Proposition 3 is also supported. The current pattern of benefits appears strongest in short-term welfare but less robust in long-term resilience. Local employment and company-linked enterprises increase income, but they may also deepen dependence on the mining economy. If mine closures, automation, market changes, or procurement shifts occur, households that rely heavily on mining-related income may face economic disruption. The Indonesian Singkep case provides an important warning that mining-based welfare can become fragile when transition planning is weak (Syahrir *et al.*, 2020). Therefore, CSR should move from assistance to capability building. Programs such as sewing, agriculture, and food production should be strengthened through independent market access, cooperative governance, financial literacy, product quality certification, and linkages with non-mining supply chains.

Theoretically, the study contributes to a more nuanced model of mining impact evaluation by combining outcome and process dimensions. Outcome evaluation captures what happened: jobs, scholarships, UMKM support, infrastructure, dust, vibration, land conversion, and property damage. Process evaluation captures how it unfolded: limited participation, top-down socialization, weak co-design, and unclear accountability for mitigation. This combination is important because the impacts of mining are not only material but also relational. The way a company engages communities can shape whether benefits are interpreted as a genuine partnership or as compensation for externally imposed risks.

Practically, the findings suggest that PT. TTN and relevant public authorities should strengthen four areas. First, environmental and structural impacts should be independently monitored by Dinas Lingkungan Hidup (DLH) Kota Bitung, including dust concentration, blasting vibration intensity, property damage complaints, and community health complaints. Second, Dinas Pekerjaan Umum dan Penataan Ruang (PUPR) Kota Bitung should be involved in documenting structural damage to houses and ensuring spatial justice between the mining-industrial zone and residential settlements. Third, a



transparent grievance mechanism should be established with clear timelines, accessible reporting channels, third-party verification, and public feedback. Fourth, CSR planning should become participatory and linked to post-mining resilience, allowing residents to influence priorities before programs are launched. The goal is not simply to reduce conflict but to build community capacity to remain socially and economically viable beyond the mine's active life.

From a policy perspective, the study highlights the need for stronger coordination among corporate CSR, community-based monitoring, and specific municipal agencies in Bitung City. Dinas Lingkungan Hidup (DLH) Kota Bitung should not function merely as a complaint receiver after disturbances arise; it should define and supervise clear indicators for dust thresholds, blasting vibration intensity, environmental reporting, and independent monitoring. Dinas Pekerjaan Umum dan Penataan Ruang (PUPR) Kota Bitung should strengthen oversight of spatial planning by protecting residential and agricultural areas and assessing whether the boundary between mining activities and settlement zones reflects spatial justice. In mining areas where corporate activity influences public infrastructure and livelihoods, governance must ensure that development remains accountable to public interest rather than solely to corporate discretion.

5. Concluding Remarks and Recommendation

This study evaluated the social impacts of PT. Tambang Tondano Nusajaya gold mining activities in Ranowulu District, Bitung City, using an exploratory descriptive qualitative approach. The findings showed that while the mining activities generated important socio-economic and educational benefits, including local employment, skills training, scholarships, and infrastructure assistance, communities simultaneously experienced significant negative impacts. These adverse effects were particularly evident in land conversion, dust pollution, blasting vibrations that caused cracked houses, health concerns, and weak community participation in corporate social responsibility (CSR) planning.

The main analytical conclusion indicated that these mining impacts were uneven, layered, and relational, meaning that visible assistance alone could not offset unresolved environmental disturbances or passive community engagement. Therefore, the theoretical contribution of this article lies in integrating social impact assessment (SIA), outcome evaluation, process evaluation, CSR fit, and the social license to operate into a localized framework. The study highlighted that a mining company must demonstrate credible mitigation measures, transparent grievance resolution, and genuine respect for the community's voice, rather than relying solely on material outputs.

In practice, the study suggested that the mining company should strengthen participatory planning, independent environmental monitoring, and sustainable livelihood programs. Policy-wise, the Dinas Lingkungan Hidup (DLH) of Bitung City should supervise the independent monitoring of dust and blasting intensity. At the same time, the Dinas Pekerjaan Umum dan Penataan Ruang (PUPR) must ensure spatial justice between industrial zones and residential settlements. Although the study was limited by a small sample of informants and a lack of technical environmental measurements, the researchers suggested that future studies should combine qualitative SIA with household surveys, spatial analysis, and longitudinal tracking to capture better the variability in risk exposure across the mining landscape.

Statement of Use of Generative AI

During the preparation of this work, the author used ChatGPT to assist in improving the manuscript's clarity, structure, and readability. The author reviewed and edited the output and takes full responsibility for the content of the publication.

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Corresponding author

Meijina Exreana Karundeng can be contacted at: meijinakarundeng15@gmail.com

