****Sustinere

Journal of Environment and Sustainability

Volume 8 Number 3 (2024) 321-332

Print ISSN: 2549-1245 Online ISSN: 2549-1253

Website: <https://sustinerejes.com> E-mail: sustinere.jes@uinsaid.ac.id

**RESEARCH PAPER**

**Mining activities and social sustainability: Lessons from coal transport mobilization activities in Jambi Province**

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Article history:

Received 6 Maret 2024 │ Accepted 19 September 2024 │ Available online 30 December 2024

**Abstract.** With significant coal resource potential, Jambi Province faces serious challenges in the mobilization of coal transportation, a crucial element in the energy industry supply chain. This research examines the complexity problems arising from coal mobilization activities in Jambi Province and their social and environmental impacts. The research employs a qualitative method, utilizing documentation from online news sources and official government documents, including regional regulations. Data analysis is conducted using Nvivo 12 Plus. The findings reveal mismatch between licensing and regulations, leading to severe traffic disruptions. The sustainability of mining activities is faces significant challenges that require holistic solutions. Strategic policy recommendations include thorough audits of industry regulations, strengthening law enforcement, and promoting economic diversification. Other solutions involve more efficient traffic management, such as constructing dedicated lanes to alleviate pressure on general traffic. This research also highlights the importance of open and inclusive dialogue among all relevant stakeholders, with the government playing a key mediating role. Achieving balanced economic, social, and environmental sustainability in Jambi Province requires cross-sector collaboration and the active participation from all stakeholders.

**Keywords:** Sustainable development; social sustainability; mining activities; policy initiation; sustainable mining

# Introduction

Mining activities involves extracting minerals or materials from the earth to meet human needs for various resources. This process encompasses a series of complex steps, from exploration and assessment of mining potential to the excavation and processing of mining materials ([Agboola et al., 2020](#Agboola); [Carvalho, 2017](#Carvalho)). While these activities contribute significantly to a country's economy by supplying resources for industry and development, they also have environmental and social implications for surrounding communities ([Nazir et al., 2020](#Nazir); [Ranjan & Das, 2015](#Ranjan)). In some cases, mining can make a positive contribution; however, it can also lead to environmental, social and economic challenges if not managed effectively ([Cetin et al., 2023](#Cetin); [Perni & Martínez-Paz, 2023](#Perni)). When managed efficiently and responsibly, mining can significantly contribute to a country's economy. It generates employment for local communities and income through the export of minerals and mining materials ([Cetin et al., 2023](#Cetin); [Hidjaz, 2019](#Hidjaz); [Perni & Martínez-Paz, 2023](#Perni)). Furthermore, the mining sector can stimulate the growth of related industries, such as processing and manufacturing ([Zhou et al., 2014](#Zhou)). Investments in mining infrastructure often lead to positive development impacts in surrounding areas, although this is not always the case ([Hidayati et al., 2020](#Hidayati); [Zhou et al., 2014](#Zhou)). With prudent management and implementation of sustainable mining practices, this sector can serve a pillar of sustainable economic development, delivering long-term benefits to both society and the country ([Dar et al., 2023](#Dar); [Dehghani et al., 2023](#Dehghani)).

Although mining significantly contributes to the economic sector, it often gives rise to complex challenges in environmental, social and economic domains. Environmentally, mining activities can lead to land degradation, water pollution, and ecosystem damage, threatening natural sustainability ([Gallay et al., 2018](#Gallay); [Mestanza-Ramón et al., 2023](#Mestanza); [Yang et al., 2019](#Yang)). Socially, mining can result in population displacement, unequal distribution of benefits, and conflict among stakeholders ([Antabe et al., 2020](#Antabe); [Dikgwatlhe & Mulenga, 2023](#Dikgwatlhe); [Jenkins, 2004](#Jenkins)). Economically, there is a risk of over-dependence on the mining sector, leaving the economy vulnerable to fluctuations in global commodity prices ([D. Wang et al., 2017](#Wangzheng)).

To address these negative impacts, serious efforts are required, including enforcement of strict regulations, the adoption of sustainable mining practices, and active involvement of stakeholders, particularly local communities. Such measures aim to ensure that mining activities contribute positively while minimizing associated risks and challenges.

In the Indonesian context, several problems have emerged, escalating across various aspects. Environmentally, mining practices often lead to deforestation, water pollution, and land degradation, threatening ecosystem sustainability ([Nasih et al., 2019](#Nasih); [Syahrir et al., 2020](#Syahrir)). From a social perspective, issues such as population displacement, unequal distribution of benefits, and conflicts with local communities frequently arise ([Purnomo et al., 2021](#Purnomo); [Syahrir et al., 2020](#Syahrir)). Economically, the country faces the risk of over-dependence on fluctuating global commodity prices ([Ekananda, 2022](#Ekananda); [Spiegel, 2012](#Spiegel)). To address these issues, the Indonesian government continues to implement stricter policies, encourage sustainable mining practices, and involve relevant stakeholders to balance the exploitation of natural resources and environmental preservation and community welfare. Mining activities is also spread across several regions in Indonesia, especially in Jambi Province ([Rustiadi et al., 2018](#Rustiadi)).

Jambi Province has a significant coal resource potential; therefore, coal transportation is a crucial element in the energy industry supply chain ([Purnamayani et al., 2019](#Purnamayani); [Rustiadi et al., 2018](#Rustiadi)). Coal trucks are often used to transport mining products from mining sites to processing facilities or nearby ports. Although this mobilization supports economic growth by exploiting natural resources, it often has negative impacts. There include air and road pollution, as well as the potential for conflict with local communities due to intensive transportation activities. The number of coal transport trucks on the roads exceeds the permitted quota of 4,000, with the actual number reaching around 8,300 to 11,500 units. These trucks pass through national roads in Jambi because there are no designated routes to them ([cnbcindonesia.com, 2023](#cnbcindonesia); [Suwandi, 2023](#Suwandi)). Traffic management and environmental impacts are critical challenges that must be addressed to ensure coal transport mobilization runs efficiently while minimizing negative impacts on the environment and society.

Research on mining activities and social sustainability, particularly focusing on lessons from coal transport mobilization activities in Jambi Province, is both compelling and underexplored. While considerable research has been addressed the environmental and economic impacts of the mining of the mining industry, a critical knowledge gap remains regarding the social impacts arising from coal transportation activities. This research has the potential to delve into the dynamics of the relationship between the mining industry and local communities in Jambi Province, identify conflicts arising from these mobilization activities, and assess their implications for social sustainability. By adopting this approach, this study can offer more holistic and in-depth insights, enriching our understanding of how mining activities - particularly in the context of coal transport mobilization - affect social sustainability at the local level. Furthermore, it could provide valuable guidance for crafting more effective and inclusive policy interventions.

# Material and method

The research method employed in this research is qualitative, utilizing documentation from online news sources. A keyword search for "Jambi coal mine" identified several relevant news articles for analysis, offering detailed insights into the dynamics of coal mining activities in Jambi Province and their impacts on local communities. Additionally, the research relies on official government documents, particularly Regional Regulations (Perda) related to mining. These documents are important for establishing a regulatory framework and providing policy guidance for mining activities. They also serve as a reliable data source for analyzing the sustainability aspects outlined in the regulations. By integrating data from online news sources with official government documents, the study aims to provide a more comprehensive understanding of the interactions between coal mining activities, their social impacts, and the associated frameworks in Jambi Province.

After collecting data from online news documents using the keyword "Jambi coal mine" and official government documents, specifically Regional Regulation No. 11 of 2019 concerning Mineral and Coal Mining Management, the next step is data validation. A total of 36 online news documents were identified, alongside the single relevant government regulation. The validation process ensures the accuracy, reliability, and relevance of the information. For online news, validation involves cross-referencing facts from multiple sources and assessing the balance of perspectives. For official government documents, it entails verifying consistency with applicable legislation and ensuring relevant to the research period. This critical step establishes a solid foundation for analysis, significantly enhancing the understanding of the social impacts of coal transportation mobilization activities in Jambi Province.

After collecting data from online news and official government documents, the next step involves transferring the data into the Nvivo 12 Plus analysis tool. This tool was selected for its ability to efficiently manage and analyze qualitative data. In Nvivo 12 Plus, the units of analysis include cases and classification, enabling researchers to organize data into identifiable and categorized units. This structured approach supports data coding, allowing researchers to uncover key themes, patterns, and relationships between concepts or categories. Furthermore, Nvivo 12 Plus’s data visualization capabilities are instrumental in efficiently presenting research findings and facilitating interpretation and decision-making. By leveraging this analytical tool, the research can provide a detailed and contextual analysis of the social impacts of coal transport mobilization activities in Jambi Province.

Overall, this method was chosen because it allows researchers to capture complex phenomena more flexibly. In the context of this research, online news documents provide direct narratives from affected communities, including the responses of authorized parties or authorities ([Stutzer et al., 2021](#Stutzer)), while official government documents, such as regulations, offer the relevant legal and policy framework ([Nurkaidah et al., 2024](#Nurkaidah)). This highlights that qualitative methods enable a high-quality analysis of diverse data sources, including textual data from news stories and government documents, which can be coded and analyzed to uncover relevant themes and patterns.

To support this, Nvivo 12 Plus has been widely used in qualitative studies ([Ibrahim et al., 2023](#Ibrahim); [Nurdin & Baharuddin, 2023](#Nurdin)). The integration of these two data sources, combined with optimized analysis using Nvivo 12 Plus, facilitates a more holistic and contextual understanding, which is critical in this research.

# Result and discussion

This section discusses the research findings on coal transportation mobilization activities in Jambi Province and their impact on social sustainability, especially the potential for conflict. It then transitions to a discussion of the relationship between social sustainability and the sustainability of mining activities, concluding with relevant policy recommendations.

# Coal transportation mobilization activities in Jambi Province

Coal transport mobilization activities in Jambi Province present complex challenges that significantly disrupt traffic flow ([cnbcindonesia.com, 2023](#cnbcindonesia); [Suwandi, 2023](#Suwandi)). The large vehicles used to transport coal often overcrowd roads, causing congestion and reducing the smooth traffic flow. Additionally, dust and air pollution from these activities can be detrimental to the environment and pose health risks to local communities ([Pernebek et al., 2024](#Pernebek); [Pradono et al., 2019](#Pradono)). These issues have also been raised a complaint by local residents ([Pratama, 2023](#Pratama)). The problems extend beyond traffic congestion to includes environmental and health impacts, which may require holistic solutions involving collaboration among key stakeholders, such as local governments, mining companies, and local communities. It is well-documented that coal transport mobilization in Jambi Province contributes to social problems, particularly traffic jams ([cnbcindonesia.com, 2023](#cnbcindonesia); [Suwandi, 2023](#Suwandi)).

[Figure 1](#Figure1) illustrates the complexity of coal transport mobilization activities, which lead to in traffic jams ([Afriyadi, 2023](#Afriyadi)). This issue has attracted the attention of various parties, including the police ([Tambunan, 2023](#Tambunan)). The Jambi Regional Police's decision to issue a discretionary letter prohibiting coal transport on public roads in Jambi Province reflects a response to repeated violations by mining business operators and transporters, failed to uphold their commitment to maintaining order on the roads ([Tambunan, 2023](#Tambunan)). These actions highlight violations by business actors, prompting the expansion of law enforcement measures. The prohibition of coal the transport on public roads is a decisive step taken to address these violations and ensure traffic security and order.

The Jambi Regional Police's decision to prohibit coal transport on public roads is a firm response to repeated violations by mining businesses and transporters. The suspension of coal transportation operations due to traffic jams and road damage underscores the serious impacts that must be addressed. the record of 629 violation cases reflects the challenges of monitoring and enforcing regulations in the region, with enforcement efforts carried out in accordance with applicable regulations ([Tuyani, 2023](#Tuyani)). Furthermore, the lawsuit filed by the Aliansi Rakyat Jambi



**Figure 1.** Coal transport mobilization activities result in traffic jams (source: [cnnindonesia.com, 2023](#cnnindonesia))

 (ARJ) highlights the issue of non-compliance with regulations by both the government and companies, emphasizing the need to review business permits and address their societal and the environmental impacts ([Yudha, 2023](#Yudha)). Overall, addressing the coal transportation issue in Jambi Province requires a balanced approach that integrates law enforcement, economic sustainability, and community welfare.

Additionally, ARJ claims to have taken legal action by filing a lawsuit against the government, including the Indonesian Minister of Energy and Mineral Resources, the Governor of Jambi, and eight coal companies, over coal transportation issues in Jambi Province ([Mairiadi, 2023](#Mairiadi)). In this lawsuit, ARJ and the community highlighted inconsistencies between the granting coal mining business permits (IUP) by the Ministry of Energy and Mineral Resources and the Governor of Jambi and the lack of regulations addressing road facilities and infrastructure ([Mairiadi, 2023](#Mairiadi); [Sanjaya, 2023](#Sanjaya)). The use of national roads by coal transporters was highlighted as a major cause of severe traffic congestion, which is adversely affects the public and is considered violation health and human rights laws. This lawsuit emphasizes that such condition deprives people of their right to live a healthy life and, therefore, constitute unlawful actions.

Addressing the complexity of coal transportation issues in Jambi Province requires multifaceted approach. Enforcement policies by the police, such as discretionary letters prohibiting coal mobilization on public roads, serve as a response to repeated violations by business actors. Meanwhile, ARJ's lawsuit highlights discrepancies between the issuance of permits and the absence of regulations governing road facilities and infrastructure, which have led to significant impacts on traffic and community welfare. The social, economic, and legal implications of conflicts arising from coal transportation in Jambi Province highlight the need for a holistic resolution that balances security, economic considerations, and community well-being. Cross-sectoral coordination and an in-depth understanding of the impacts of each policy are essential foundations for achieving sustainable solutions.

# Social sustainability: Mapping adverse impact

Social sustainability is central to understanding and addressing the negative impacts of activities such as coal mobilization. A deeper exploration of this impact highlights their significant implications for society and the surrounding environment (see [Figure 2](#Figure2)). This research aims to detail and analyze these implications, contributing to the development of effective mitigation strategies and the formulation of more holistic policies.

In the context of traffic security and order, the Jambi Regional Police's decision to prohibit coal mobilization on public roads reflects the high frequency violations and potential conflicts with coal transportation. This decision underlines the serious impact on traffic safety and order in the region ([Tambunan, 2023](#Tambunan)). Halting operations serves as a preventive measure to mitigate



**Figure 2.** Several significant implications

traffic accidents and safeguard road users. Persistent violations pose significant risks to traffic safety, necessitating strict actions such as these bans to protect public safety and maintain road order.

In the context of the economy and community welfare, ARJ’s lawsuit against the government and coal companies underscores the substantial economic and social impacts of coal transportation. The irregular use of national roads for coal transport has caused traffic congestion, negatively affected community, and hampered local economic growth. The decision to cease operations may also impact related economic sectors and jobs tied to the coal industry. However, this temporary halt presents an opportunity to evaluate the long-term economic impacts of coal transportation activities, including potential strategies for restructuring these operations to be more sustainable and supportive of local community welfare. Through this approach, holistic and sustainable solutions can be identified to balance industrial demands with community well-being.

In the realm of human rights and public health, lawsuits highlighting violations of health and human rights laws emphasize the significant implications for societal well-being. The use national roads by coal trucks not only causes severe traffic jams and adversely affect communities but also deprives people’s rights to live in a healthy and comfortable environment ([Pernebek et al., 2024](#Pernebek); [Pradono et al., 2019](#Pradono)). In similar cases, the negative impacts on human rights include violations of the right to a healthy environment and the right to life - fundamental rights that government is obligated to uphold and protect ([Dehm, 2020](#Dehm)). Therefore, safeguarding human rights and promoting community welfare should be prioritized in addressing the harmful effects coal transportation activities.

In terms of environmental impacts, irregular and uncontrolled coal mobilization can have severe consequences. The use of public roads by coal trucks often result in physical damage to road infrastructure and generates air and noise pollution that negatively affects the surrounding environment ([de Saxe et al., 2023](#deSaxe); [Pernebek et al., 2024](#Pernebek); [Pradono et al., 2019](#Pradono)). Similar cases have shown that such harmful activities can damage local ecosystems, degrade air quality, threaten biodiversity, and pose significant health risks to nearby populations ([Mishra & Das, 2017](#Mishra); [Pandey et al., 2014](#Pandey)). Therefore, addressing these issues is important to promoting economic and social sustainability, safeguarding biodiversity, and preserving environmental integrity in the affected areas.

In the context of industrial regulation and governance, this issue highlights the challenges in managing the coal industry in Jambi Province. Persistent violations reveal significant weaknesses in oversight and enforcement, including a lack of transparency, inadequate resources for supervision, and regulatory loopholes or deficiencies. Addressing these challenges requires comprehensive reforms in industrial regulation, enhanced supervisory capacity, and active government engagement in sustainable industry management (Pradono et al., 2019). Similar cases have shown that stricter policies, greater transparency, and stronger law enforcement can contribute to creating a more orderly and sustainable industrial environment ([Liu et al., 2021](#Liu); [Y. Wang et al., 2022](#Wang)).

In the context of social sustainability, the coal transportation issue in Jambi Province poses a significant challenge that can affect the stability and welfare of the broader community. The Jambi Regional Police's decision to ban coal mobilization reflects a significant step toward maintaining social sustainability by addressing widespread violations and mitigating potential conflicts arising from coal transportation activities. The serious impact on traffic safety and order, community economic welfare, human rights, and public health are central in lawsuit filed by ARJ [(Mairiadi, 2023](#Mairiadi); [Sanjaya, 2023](#Sanjaya); [Yudha, 2023](#Yudha)). The suspension of coal transportation and efforts to improve industrial regulation offer opportunities to promote social sustainability by balancing industrial interests with community needs, protecting fundamental rights, and restructuring industrial practices for greater sustainability. Addressing this issue extends beyond environmental and economic concerns, representing a commitment to fostering inclusive and equitable social sustainability for all communities in Jambi Province.

# Social sustainability and sustainability of mining activities: A policy recommendation

Policy recommendations to support harmony between industrial interests and social welfare are essential for addressing the complexity of mining activity sustainability (see [Figure 3](#Figure3)).

Several strategic policy recommendations can be proposed to overcome the complex issue of coal mobilization in Jambi Province. The recommendations are based on case studies from various countries facing similar challenges. A thorough audit and evaluation of the mining industry’s regulations and practices in the region should be conducted. This evaluation assesses law enforcement capacity, the level of transparency in the licensing process, and the economic, social and environmental impacts caused by mining activities. Such evaluations have been considered and studied in several cases ([Agboola et al., 2020](#Agboola); [Trechera et al., 2021](#Trechera)). Furthermore, concrete steps are necessary to strengthen law enforcement related to the mining industry [(Espin & Perz, 2021](#Espin)). Increased sanctions and stricter supervision are essential to address repeat violations, create a more disciplined legal environment, and encourage compliance with applicable regulations. This approach has also been considered and studied in many countries.

Encouraging open and inclusive dialogue between all parties involved, including mining businesses, local communities, NGOs and government, is important [(Pérez & Claveria, 2020; Smits et al., 2020](#Smits)). This approach facilitates effective communication channels to understand the various



**Figure 3.** Strategic policy recommendations

perspectives, concerns, and needs for each party, with the aim of creating consensus on sustainability measures. Additionally, economic diversification should be encouraged by supporting the development of alternative economic sectors. Investments in other industries, such as tourism, sustainable agriculture, or other sectors of the local economy, will help reduce dependence on the mining industry and promote long-term economic sustainability [(Upadhyay et al., 2021](#Upadhyay)). Education and skills training for local communities must also be strengthened to increase their competitiveness in the changing job market.

Furthermore, the government's active role in managing risks and dealing with conflicts between interested parties is crucial. The government must function as a fair and neutral mediator, ensuring a just and sustainable solution for all parties involved (Heffron, 2020; Qi, 2020). Developing a comprehensive and sustainable regional development plan is also a crucial step. This plan must involve all relevant parties and include strategies to optimize economic benefits of natural resources while protecting the environment and human rights [(Alves et al., 2020](#Alves); [Hilson & Maconachie, 2020](#Hilson)). Additionally, increased monitoring of the environmental and social impacts of mining activities needs to be implemented. Stricter monitoring of environmental impacts, including water, air and land sustainability, should be carried out regularly and transparently ([Agboola et al., 2020](#Agboola); [Marimuthu et al., 2021](#Marimuthu)).

Apart from that, with the number of coal transports exceeding the stipulated quota and the density of transportation trucks, traffic congestion is worsening on the roads of Jambi Province. Solutions to consider include efficient traffic management and better environmental impact mitigation. Crucial recommendations include creating special lanes for coal trucks to reduce traffic burden and minimize negative impacts on the environment and welfare of local communities. Improving infrastructure and policies that support the construction of special routes are strategic steps in ensuring balanced economic sustainability and positively impact ([Bretas et al., 2023](#Bretas); [M. Wang et al., 2022](#Wangbao)), especially for Jambi Province.

The complex issue of coal mobilization in Jambi Province requires the involvement of all parties to achieve a sustainable solution. In addressing this challenge, auditing and evaluating industrial regulations, strengthening law enforcement, and diversifying the economy are strategic steps that require cooperation between the government, mining business actors, local communities and NGOs. Open and inclusive dialogue is becoming increasingly important to understand the needs and concerns of all parties involved, creating a common agreement towards sustainability. The government's involvement as a fair mediator also supports problem-solving and the development of sustainable regional development plans. With increased monitoring of environmental impacts, there needs to be active participation from all parties to ensure transparent and sustainable implementation of actions. The urgency of this problem emphasizes the need for cross-sector collaboration to achieve economic, social and environmental sustainability in Jambi Province.

# Conclusion

The complexity of the coal mobilization in Jambi Province, reflected the discrepancy between granting permits and regulations, is detrimental to traffic, the local economy, and human rights. The sustainability of mining activities faces major challenges that require holistic solutions. Strategic policy recommendations include thoroughly auditing industry regulations, strengthening law enforcement, and promoting economic diversification. Open and inclusive dialogue between all parties, along with the government's active role as a fair mediator, is crucial. Developing sustainable regional development plans and improving monitoring of environmental impacts should also be a prioritized. Thus, only through cross-sector collaboration and the involvement of all stakeholders can balanced economic, social and environmental sustainability be achieved in Jambi Province.

Apart from that, with the high number of coal transports exceeding the stipulated quota and the density of transport trucks, traffic jams are increasingly worsening road conditions in Jambi Province. Solutions that must be considered include more efficient traffic management and optimal environmental impact mitigation efforts. A particularly important recommendation involves building dedicated lanes specifically for trucks carrying coal, aiming to reduce pressure on general traffic and reduce its negative impact on the environment and the well-being of local communities. Improving infrastructure and implementing policies that support the construction of special routes are strategic steps to ensure balanced economic sustainability and positively impact Jambi Province.

The limitations of this research lie in the lack of field data that can provide direct insight from related parties. Although descriptive analysis and research have been carried out based on available data sources, field data in interviews can provide additional dimensions and a deeper understanding of the complexity of the coal mobilization problem in Jambi Province. Interviews can enrich research with direct perspectives from stakeholders, such as local governments, mining companies, local communities, and environmental advocacy groups. Therefore, future research should consider adding this data source to detail and confirm the findings that have been identified to provide a more comprehensive and accurate picture of the dynamics of the problems being faced.

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DOI: <https://doi.org/10.22515/sustinere.jes.v8i3.391> [↑](#footnote-ref-1)