



The Public Perception of the Existence of Coal Mines in South Kalimantan Province, Indonesia

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background and Objectives: The coal mining business is a source of foreign exchange for the country, but it is also thought to have a negative impact on the environment, therefore its continued existence can lead to a variety of public perceptions, both positive and negative. The purpose of this study is to ascertain public perceptions of the coal mining industry's existence and operational implications.

Methods: The survey approach was used in this study to obtain information from respondents. Questions were posed using interviews, questionnaires, and secondary data.

Results: The community leadership structure in the study area is that 35 respondents (48%) follow non-formal leadership, while 38 respondents (52%) follow formal leadership. Most community conflicts are usually triggered by land boundary disputes (38%), and complaints are not responded to (38%), and are resolved by consensus deliberation. Community responses to the impact of coal transportation are health problems (52%), the impact of the presence of coal mines is an increase in the economy (54%), disruption to public roads (66%), noise (66%), and air quality (72%). Coal

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hauling activities also have an impact on improving business prospects, namely 10% of respondents stated significant (high), 66% moderate, and 24% none. while for the criteria for increasing income, 16% of respondents stated an increase of 62%, a small increase, and 22% did not report. The environmental disturbance parameter stated that 60% of respondents felt disturbed and 40% did not. Environmental management activities on the impact of coal mining operations are 20% of respondents stating good, 34% abstaining and 22% not good.

Conclusion: Community development and empowerment programs around the mine site must be implemented properly, and mine exploration permit holders must strictly adhere to the environmental impact analysis document and environmental management monitoring plan approved by the Ministry of Environment and Forestry.

Keywords: Perceptions; community; empowerment; environmental impact assessment; coal mining industry.

1. INTRODUCTION

The mining industry is a source of foreign exchange for a country. This sector also absorbs a large number of workers so that it has a positive impact on job creation and increases economic growth. Coal is an important commodity in the Indonesian mining sector. The mapping of the upstream coal industry sector shows that in 2020 Indonesia will have 144 billion tons of resources and 39 billion tons of reserves. Indonesia's coal production reached 566 million tonnes, with domestic consumption of around 132 million tonnes. The potential for state revenue from Non-Tax State Revenue (PNBP) and taxes from the expansion of the coal sector is estimated to reach IDR 136 trillion with foreign exchange savings of IDR 140 trillion in 2045. [1]. South Kalimantan Province has abundant natural resources, especially mining. Mining minerals found in the South Kalimantan region include coal which is a leading commodity; thus, coal mining is one of the most important businesses in supporting the economy of South Kalimantan [2].

Tanjung Alam Jaya incorporated company is one of the mining companies that has obtained a coal mine exploration permit in South Kalimantan based on an evaluation of the feasibility study report that is an attachment to the Techno-Economic Approval for Open Mining Feasibility Studies from the Directorate General of Minerals and Coal, Ministry of Energy and Mineral Resources of the Republic of Indonesia. PT. Tanjung Alam Jaya has been carrying out coal mining operations in Pengaron District and Makmur Connect District, in Banjar Regency and Binuang Regency and Hatungun Regency, in Tapin Regency, South Kalimantan Province, since 2004, and adjusted the Mining Business Permit Area (WIUP) code in 2021 based on data from Minerba One Data Indonesia (MODI) [3].

Coal mining is a high-risk business sector, in accordance with Government Regulation Number 5 of 2021 concerning Implementation of Risk-Based Business Licenses, so a special study is needed regarding environmental impact analysis, including discussion of active community involvement and assessment of public perceptions of the impact of coal mining [4].

The impact of this mining operation will undoubtedly have an impact on the socioeconomic conditions of the local community, both positively and negatively [5] Socio-economic impacts can be categorized as real impacts and special impacts. The real impact category includes the effects of project operations, such as population movement, noise, and air pollution, that occur throughout the pre-construction, construction, operation, and post-operation stages. A special impact is one that results from a community's perception of a project's risk [6].

The impact on socioeconomic conditions is investigated through business opportunities, higher income, changes in livelihood, changes in people's behavior, and the risk of communal disputes (6) Mining activities have societal consequences, which can take the shape of negative perceptions of coal mining activities [7]. Community perceptions are heavily reliant on community acceptability and how people see the impact of mining [8]. Inequality in socio-economic conditions can lead to horizontal conflicts in society which lead to negative perceptions of the existence of coal mines. [9] This encourages the local community to not participate actively and fosters social jealousy, which leads to a negative perception of coal mining activities; however, if community participation and involvement is carried out properly, it will lead to good perceptions [10].

Community perception is the community's ability to process stimuli from environmental impacts through what is felt, through a series of complex processes so as to give meaning to something that is felt regarding the existence of coal mining activities [11]. Most studies reveal that socio-economic factors, age and education, type of gender, social status, affect the perception of a community group [12].

Based on this background, the purpose of this study is to ascertain public perceptions of the coal mining industry's existence and operational implications.

2. METHODS

2.1 Communities Impacted

The research was conducted from 17 June to 19 July 2022, and was centered on the village directly affected by the coal mining activities of PT Tanjung Alam Jaya (PT TAJ). A quantitative descriptive analytic approach was used to survey respondents from the directly affected population. Quantitative studies seek to characterize events or understand their patterns in measurable terms [13].

Based on the study area, villages directly affected by PT. TAJ covers 5 villages namely: Benteng Village, Lumpangi Village and Mangkauk Village, Pengaron District as well as Batang Banyu Village and Sungai Lurus Village, Sambung Makmur District, Banjar Regency.

Based on data from the Banjar Regency Central Bureau of Statistics for 2021, the total population of the five villages is 8,846 people.

Analysis of the needs of the number of responses using Slovin's formula, as follows [14]

$$n = \frac{N}{(1+(N.e^2))}$$

Keterangan:

- n : Sample atau respondent
- N : Population
- E : Error

The total population (N) is 8,846 people; if the objective level of confidence is 90%, then e is 0.1, and the number of samples required is:

$$n = \frac{8.846}{(1+(8.846 .0,1^2))} = 98,88 \approx 99 \text{ respondent}$$

This village is directly affected by coal mining activities covering 5 villages; to ensure equity in each village, the number of respondents in each village is 30 people, bringing a total of 150 respondents. Withdrawal of respondents has met the basic needs of respondents as well as achieving the goal of trust (minimum 99 respondents using Slovin's formula)

2.2 Respondent Profile

Based on the profile of the respondents, 88% of those surveyed were male, while 12% were female. The education level of the respondents included 44% graduating from high school, 14% graduating from tertiary education, and 38% graduating from junior high school and 4% graduating from elementary school, so that a total of 96% had completed 9 years of compulsory education. The majority of respondents 72% were born in the study region, and 12% had lived in the study area for more than 30 years, thus they were familiar with the environmental conditions before to and during PT. TAJ's coal mining operations. The majority of respondents (60%) are farmers with monthly incomes of less than 2 million rupiah (54%) and no supplemental income (80%). The following respondent profiles are presented: respondent's additional income Respondent's gender.

3. RESULTS AND DISCUSSION

Geographically, the mining region of PT Tanjung Alam Jaya (PT TAJ) is located in the District of Connect Makmur, Pengaron District of Banjar Regency, and Hatungun District of Tapin Regency, South Kalimantan Province. Based on Banjar Regency Regional Regulation No. 4 of 2021 paragraph 4 of the Banjar Regency Spatial Plan for 2021-2041 [15]. The coal mining area is distributed across Simpang Empat District, Connect Makmur District, Telaga Bauntung District, Cintapuri Darussalam District, Karang Intan District, Mataraman District, and Pengaron District, and spans an area of roughly 2,352 hectares. Based on Regional Regulation No. 10 of 2014 concerning Spatial Plans for Tapin Regency 2014-2034, Paragraph 5 is Mining Designated Areas [16] The main activity of PT. Tanjung Alam Jaya at the location of the Coal Mining Concession Work Agreement is a coal mining business which includes the stages of general investigation, exploration, feasibility study, construction, mining, processing, transportation and sale of coal, using open pit mining operations. Map. 1 shows that the coal mining area is in accordance with the spatial plan

of Banjar Regency and Tapin Regency, South Kalimantan.

3.1 Socio-Economy and Culture

3.1.1 Demographics

Tapin Regency will have a population of 38916 people in 2021, with 18352 men and 20564 women. Tapin Regency has a population density of 88 persons per km² [17].

Banjar Regency has a population of 27,653 people with a population of 18,352 males and 13,944 females. The population density is 506 people per square kilometer [18].

3.1.2 Socio economic

The growth rate of the Banjar Regency's Gross Regional Domestic Product in 2020 declined by -

1.96% when compared to 2018. According to data from the Banjar Regency Statistical Center, the agriculture category contributes 17.65% of the Gross Regional Domestic Product in 2020, trade contributes 14.67%, and mining contributes 13.50%.

The residents around the TAJ Coal Mine mostly make a living by cultivating crops or farming, especially through rubber fields and paddy fields whose production is the mainstay of the farmers. Other occupations include those in the service sector, traders, private employees, and government officials. Furthermore, coal mining locations generate jobs for the community as miners, coal transport truck drivers, or heavy equipment operators in the mining area.

Table 1. The number of villagers directly affected by mining

Regency	Subdistrict	Village	Man	Women	Population	Population density /km ²
Banjar	Pengaron	Benteng	972	909	1881	99
		Lumpangi	185	174	359	8,95
		Mangkauk	2027	1946	3973	99,33
	Sambung Makmur	Batang Banyu	656	679	1335	92
		Sungai Lurus	634	664	1298	90
Total					8846	

Table 2. Banjar regency's gross regional domestic product from 2017 to 2021

No	Business/Industry Sector	2017	2018	2019	2020	2021
1	Agriculture, Forestry and Fisheries	2.619,31	2.758,92	2.949,76	2.918,96	3.007,76
2	Mining and excavation	2.332,36	2.497,47	2.419,57	2.231,37	2.546,40
3	Processing industry	1.043,86	1.098,86	1.143,04	1.130,20	1.223,63
4	Procurement of Electricity and Gas	18,83	21,88	23,46	25,25	27,11
5	Water Procurement, Waste Management, Waste and Recycling	32,73	35,14	37,86	39,74	42,12
6	Construction	1.449,93	1.602,85	1.741,06	1.732,04	1.855,07
7	Wholesale and Retail Trade	2.050,17	2.260,27	2.493,03	2.419,98	2.561,36
8	Transportation and Warehousing	669,87	731,65	806,15	792,30	819,43
9	Provision of Accommodation and Meals	445,62	492,93	542,69	549,31	576,06
10	Information and Communication	518,30	567,22	623,65	676,07	740,45
11	Financial Services and Insurance	321,12	345,33	366,63	376,80	403,65
12	Real estate	489,05	525,40	567,61	596,43	643,28
13	Company services	50,86	55,53	61,73	62,26	65,03
14	Government Administration, Defense, and Social Security	1.022,22	1.101,85	1.224,17	1.270,84	1.259,23
15	Education services	786,30	856,93	925,53	988,69	1.037,87
16	Health Services and Social Activities	325,17	353,98	383,24	426,49	475,24
17	Other Services	236,26	262,84	289,91	291,87	302,19
Gross Regional Domestic Product (GRDP)						

Source: Figures for Banjar Regency 2021 [18]

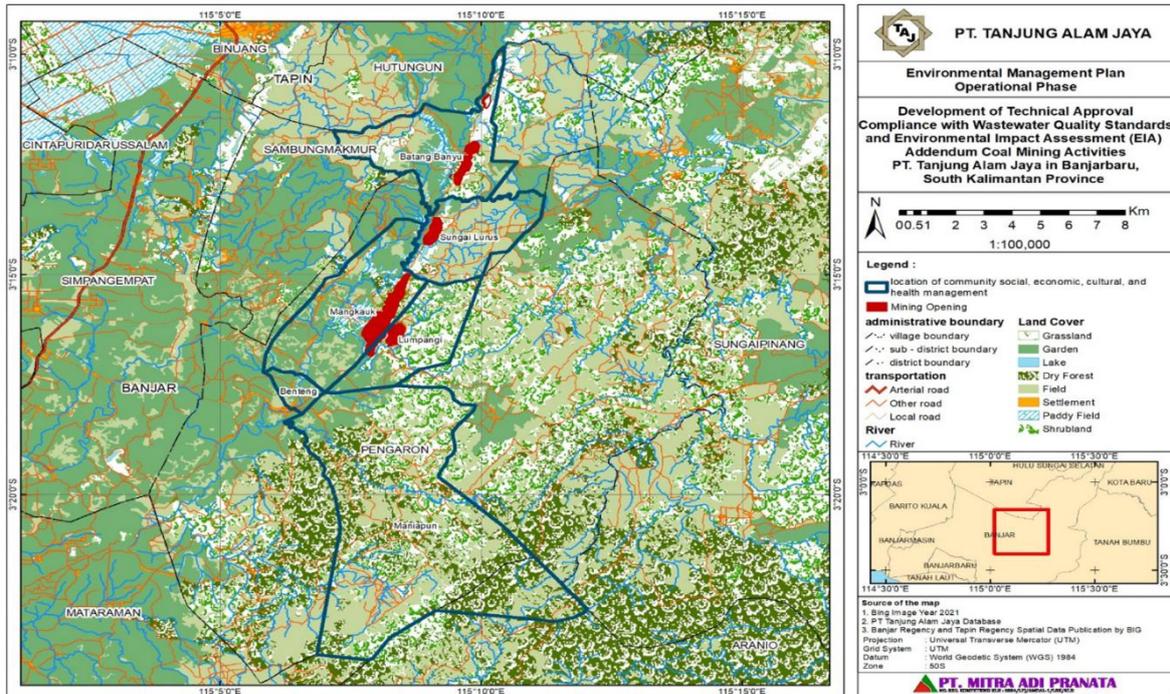


Fig. 1. Map of suitability of business activity location with spatial and regional layout and Environmental Management plans

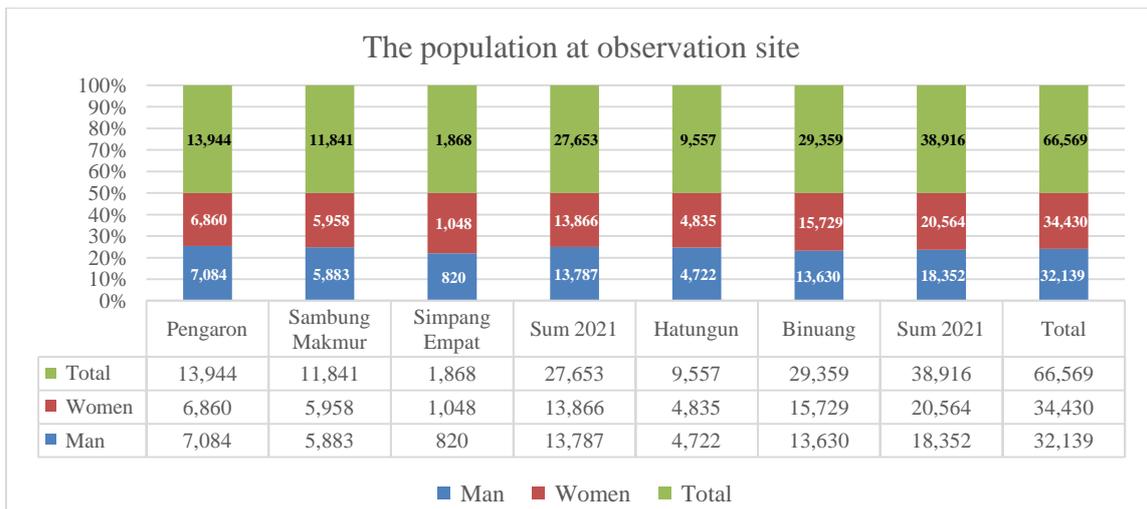


Fig. 2. Population Residents at the observation site

From 2017 to 2021, the mining sector in Banjar district generates approximately 15% of the Regency's Gross Regional Domestic Product.

Tapin Regency's GRDP increased by 3.41% in 2021 compared to 2020. Agriculture, Livestock, Forestry, and Fishery recorded the lowest growth of -1.57%. Health services grew the most, with a 9.13% increase. Tapin Regency's Gross Regional Domestic Product (in billions of rupiah) from 2017 to 2021 is given below.

The mining sector in Tapin district is the business sector which contributes the highest to the Regency's Gross Regional Domestic Product from 2017 to 2021, around 28%.

Socio-Cultural: The Banjar people, who practice Islam, live in the villages in the study area. This is owing to the strong influence of Malay culture and the high mobilization of the Bugis and Madurese as devout Muslims. Meanwhile,

Christians, Buddhists, and Hindus are mostly concentrated in sub-district and district city levels.

The local culture and wisdom of Dayuhan and Intingan is a source of harmony norms between the Banjar, Dayak, Malay, and other tribes, stating that Dayuhan and Intingan are brothers, siblings who, despite having different beliefs, still maintain brotherhood among themselves, causing tolerance. This is always maintained in the order of society in Banjar and Tapin districts with various ethnicities[19].

The mining sector's Gross Regional Domestic Product in Tapin and Banjar districts in Regency continues to grow.

3.1.3 Education

Banjar Regency contains schools ranging from kindergarten to high school. Pengaron District also has educational institutions ranging from Kindergarten to Senior High School. Tables 4 and 5 show the number of educational facilities, teachers, and students in Banjar and Pengaron in 2020.

Banjar Regency has 170 kindergartens, 45 Raudatul Athfal, 371 elementary schools, 104 elementary schools, 73 junior high schools, 58 Sanawiah Madrasas, 21 senior high schools, 13 vocational high schools, and 38 Madrasah Aliyah in 2020/2021.

Table 3. Tapin regency's gross regional domestic product from 2017 to 2021

No	Business/Industry Sector	2017	2018	2019	2020	2021
1	Agriculture, forestry and fisheries	1.625,55	1.642,88	1.777,38	1.716,19	1.712,99
2	Mining and excavation	2.066,27	2.289,03	2.293,86	2.236,35	2.574,05
3	Processing industry	552,24	545,99	574,86	558,47	617,21
4	Procurement of Electricity and Gas	6,84	7,87	8,44	9,06	9,70
5	Water procurement, waste management, waste and recycling	23,41	25,81	27,26	27,28	28,41
6	Construction	420,32	456,46	491,50	491,17	529,37
7	Wholesale and retail trade	732,86	813,70	892,40	906,92	961,51
8	Transportation and Warehousing	237,33	260,08	278,94	278,30	294,75
9	Provision of Accommodation and Meals	171,36	188,92	201,22	204,95	222,95
10	Information and communication	263,65	290,08	312,18	333,83	360,47
11	Financial services and insurance	85,13	94,39	103,73	109,51	114,61
12	Real estate	104,31	112,72	120,23	126,64	134,47
13	Company services	8,63	9,30	10,14	10,15	10,99
14	Government administration, defense, and social security	572,36	617,21	660,84	678,40	709,61
15	Education services	383,56	419,09	445,70	456,45	490,03
16	Health services and social activities	136,52	148,08	158,68	167,43	190,39
17	Other services	70,46	77,55	80,88	82,80	85,80
	Gross Regional Domestic Product	7.430,81	7.999,16	8.438,25	8393,89	9.047,33

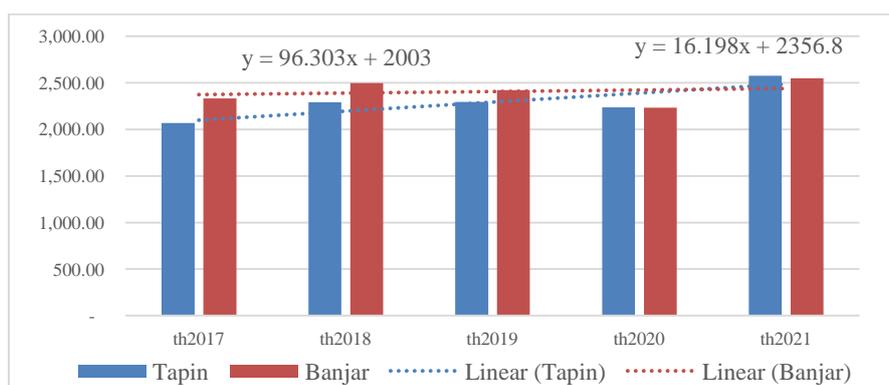


Fig. 3. Regency's gross regional domestic product of the mining sector in tapin and banjar districts

Table 4. Number of schools, teachers and students in banjar regency in 2020/2021

Educational level	School	%	Teacher	%	Student
Kindergarten (TK)	170	31%	545	8%	6857
Raudatul Atfal (RA)	45	20%	228	9%	2473
Elementary School (SD)	371	12%	3064	7%	43287
Madrasah Ibtidaiah (MI)	104	83%	126	1%	15019
Junior High School (SMP)	73	6%	1196	9%	13092
Madrasah Sanawiyah (MTs)	58	6%	1018	11%	9361
Senior High School (SMA)	21	4%	501	7%	7632
Vocational High School (SMK)	13	4%	350	6%	5617
Madrasah Aliah (MA)	38	9%	408	8%	5267
Total	893	19%	7436	7%	108605

Table 5. Number of schools, teachers and students in banjar regency in 2020/2021

Educational level	School	%	Teacher	%	Student
Kindergarten (TK)	5	71%	7	4%	166
Elementary School (SD)	16	14%	114	7%	1577
Madrasah Ibtidaiah (MI)	3	12%	26	12%	217
Junior High School (SMP)	3	9%	32	12%	259
Madrasah Sanawiyah (MTs)	1	6%	16	6%	253
Senior High School (SMA)	1	5%	20	7%	274

Pengaron District has 5 Kindergartens, 16 Elementary Schools, 3 Elementary Madrasahs, 3 Junior High Schools, 1 Sanawiah Madrasah, and 1 Senior High School in 2020/2021.

Based on the number of schools and students in the observation area, the community's potential for basic education schools is good. The government's 9-year learning program is excellent, and should be expanded to cover regional senior secondary schools.

3.1.4 Participation of the community

Coal mining activities at PT. Tanjung Alam Jaya have a favorable impact on the community surrounding the mining region, particularly the administratively adjacent area to the study area. The introduction of employment prospects for local populations is a big positive impact of this mining activity. Tanjung Alam Jaya needs 304 people, 47 (15%) of whom are from the local community. Furthermore, the growth of business opportunities such as traders, stalls and stores, transportation services, house rental, workshops, and other commercial sectors has increased the economy in mining areas. Exploration of coal mines, and mining in general, continues to have a positive impact on labor absorption and economic development in the surrounding area studi.

According to the report on the implementation of Environmental Management and Monitoring

activities, PT. Tanjung Alam Jaya also contributes to the development process in the domains of education, religion, and sports. Every month, PT Tanjung Alam Jaya participates in activities such as: (1) Madrasah teacher honorarium aid for Mangkauk Village, Pengaron District. (2) Assistance with the execution of religious events in the assisted villages dan (3) Sports and youth empowerment activities in Lumpangi Village, Pengaron District.

The Partnership Program and Community Development Program (PKBL) is a government policy mandated by the Minister of State-Owned Enterprises Number: Kep-236/MBU/2003, which requires all State-Owned Enterprises to set aside a portion of their profits for community empowerment via the Corporate Social Responsibility approach, with an emphasis on sustainable community development [20]. Laws and regulations govern the company's Corporate Social Responsibility requirements. The legal basis for Corporate Social Responsibility is scattered among numerous regulations, such as Law Number 40 of 2007 about Limited Liability Companies and Government Regulation Number 47 of 2012 addressing Limited Liability Company Social and Environmental Responsibility [21].

3.1.5 Socio-cultural conditions

The Banjar tribe is the largest tribe in South Kalimantan. According to respondents regarding

the level of compliance with non-formal leaders, there were 35 respondents (48%), while compliance with formal leaders (government) was 38 respondents (52%). Informal leadership or community leaders are still very well known in the Banjar community, therefore problems that arise in the community due to misunderstandings or horizontal conflicts, differences of opinion, can be handled through community leaders [22,23].

According to the results of respondents regarding the occurrence of community conflicts, 8 respondents stated that there had been problems or conflicts, of which 50% of them intersected with the existence of PT. TAJ, 1 respondent stated that the conflict was caused by land boundaries, and 3 respondents stated that the conflict was caused by PT. TAJ's slow response to community suggestions or feedback. Land boundary disputes with the community have been resolved through deliberation for consensus. Even though coal mining operations have been running for more than ten years, only four respondents stated that there were no social difficulties in their environment due to the impact of the addition of coal. However, it requires vigilance to ensure that it doesn't happen again. Types and sources of conflict in society, as follow:

The Banjar tribe is the majority in South Kalimantan. The Banjar people are devout Muslims. Religion and local wisdom based on Islam have a considerable influence on the socio-cultural existence of the Banjar people [24] Because non-formal community leaders (Islamic religious leaders) have a strong influence on the socio-cultural life of the Banjar tribe. The Banjar people are tolerant of immigrants and various ethnic groups, so that difficulties or conflicts that arise in the community are always handled through deliberations to reach a consensus [25].

3.1.6 Community perceptions and attitudes towards information regarding plans to extend coal mining export permits

All respondents know PT. Efforts to extend the Tanjung Alam Jaya coal mining permit in its territory. Respondents knew about the extension of activity permits from various sources, 11 respondents got information directly from PT. TAJ (19%) and others based on other sources. The presence of PT. TAJ in the study area has been involved in the mining sector for more than ten years, so that information regarding PT. TAJ has become commonplace. PT. TAJ regarding activity plans, Community Development and Empowerment Programs (PPM) and other information has become a routine in the community and has become part of everyday life. The mining business will be approved by the community in the study area if it follows management guidelines [26]. The following is a source of information about the existence of PT. TAJ is provided by the respondent.

Based on the results of the poll, the community's response to PT. TAJ is as follows: 49% of respondents gave positive comments, 44% gave negative reactions, and the remaining 7% said they did not know. Even though 44% (Fig 4 b) of respondents stated a negative answer, the community's attitude towards the license extension at PT. TAJ is 70% agree, 10% disagree, and 20% don't know. This shows that even though there are quite a number of people who give negative responses to coal mining activities carried out by PT. TAJ, the majority of the community agrees with the changes to the mining plan which will extend the life of the mine. This quite large unfavorable perception was made possible by changes in environmental conditions that occurred during mining activities, and some respondents did not get the significant benefits that were obtained by the respondents.

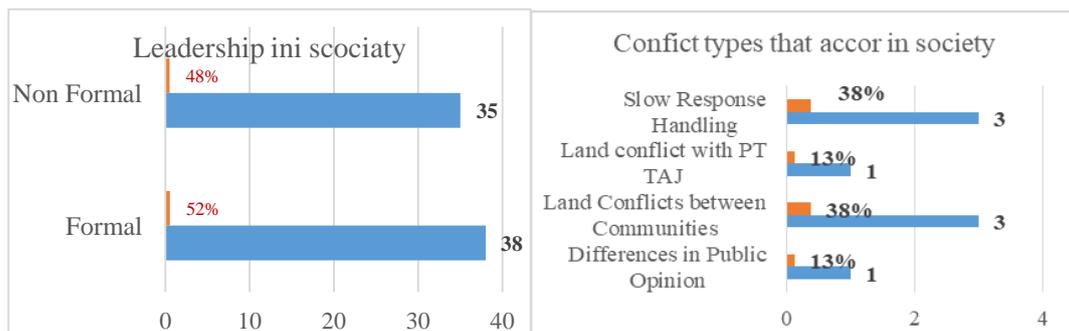


Fig. 4. Leaders who are followed in the community's social life and Conflict types and sources in society

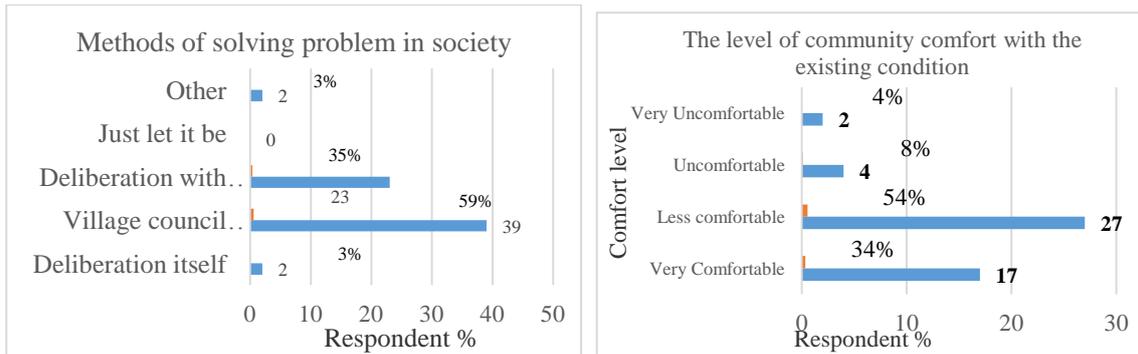


Fig. 5. Respondents' opinions related to the type of settlement efforts in the event of a dispute and respondents' opinions related to the comfort of environmental conditions

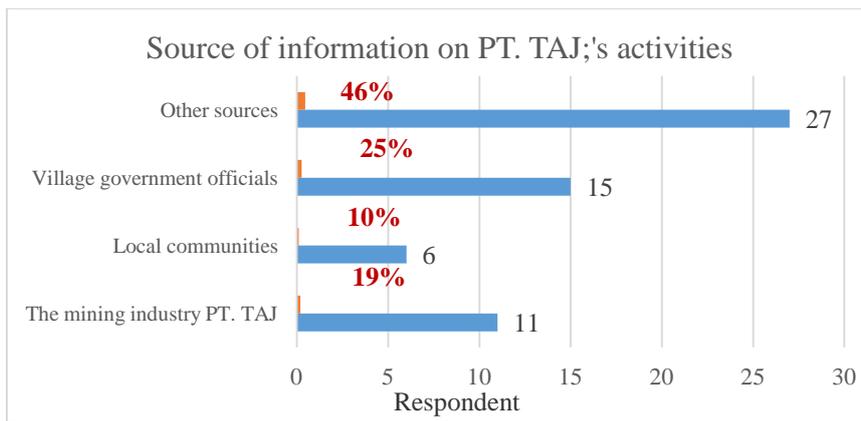


Fig 6. Sources of information related to the mining activities of PT. TAJ

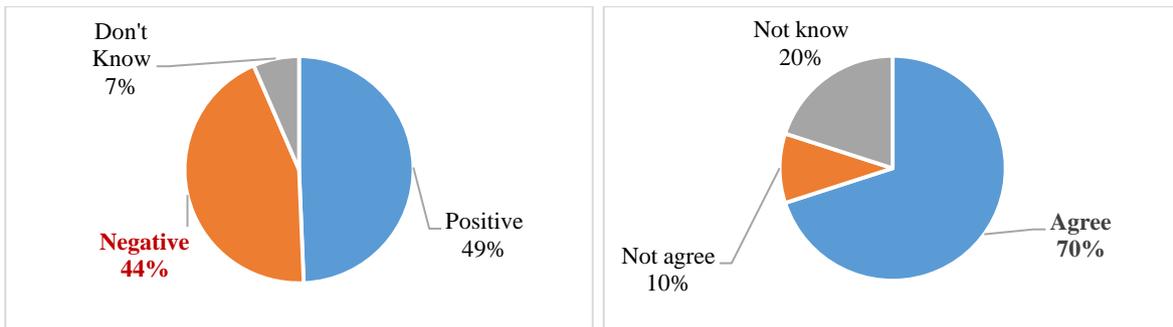


Fig 7. Community perspectives and attitudes concerning PT. TAJ's mining activities

Local people's negative perceptions of the importance of non-market ecosystem services, the impact of mining on ecosystem services, and their ability to participate in the restoration of degraded land due to mining are anticipated by community participation in determining policy environmental services and participating in restoration activities [27].

The results of a survey regarding local community satisfaction with job opportunities at

PT. TAJ are 26% of respondents have families who are employees or involved in the mining of PT. TAJ, where as many as 10% of workers said they were very satisfied, 58% of workers said they were satisfied, 30% of workers said they were dissatisfied, and 2% of workers said they were very dissatisfied with their work . Based on Article 22 paragraph (1) of Regional Government Law Number 23 of 2014 and its explanation. Companies that recruit employees or labor are, of course, bound by restrictions in that area,

where if the area stipulates that employees must be from the local community or workforce, then the company must follow these rules. Each enterprise is required to employ 40% (forty percent) of the local labor force [28].

The survey results regarding respondents' perceptions of environmental impacts due to coal mining activities show that it will cause impacts such as disturbing comfort (80%), disturbing

people's income (74%), disturbing aquatic biota (66%), disturbing land biota (56%), affecting quality river water (78%), disturbing soil fertility (62%), disturbing landscapes (70%), causing soil erosion (62%), disturbing blasting vibrations (78%), disturbing blasting vibrations (78%), disturbing blasting vibrations (78%), disturbing blasting vibrations (78%), disturbing Overall, 68% of those polled were bothered, 26% were not, and 6% abstained.

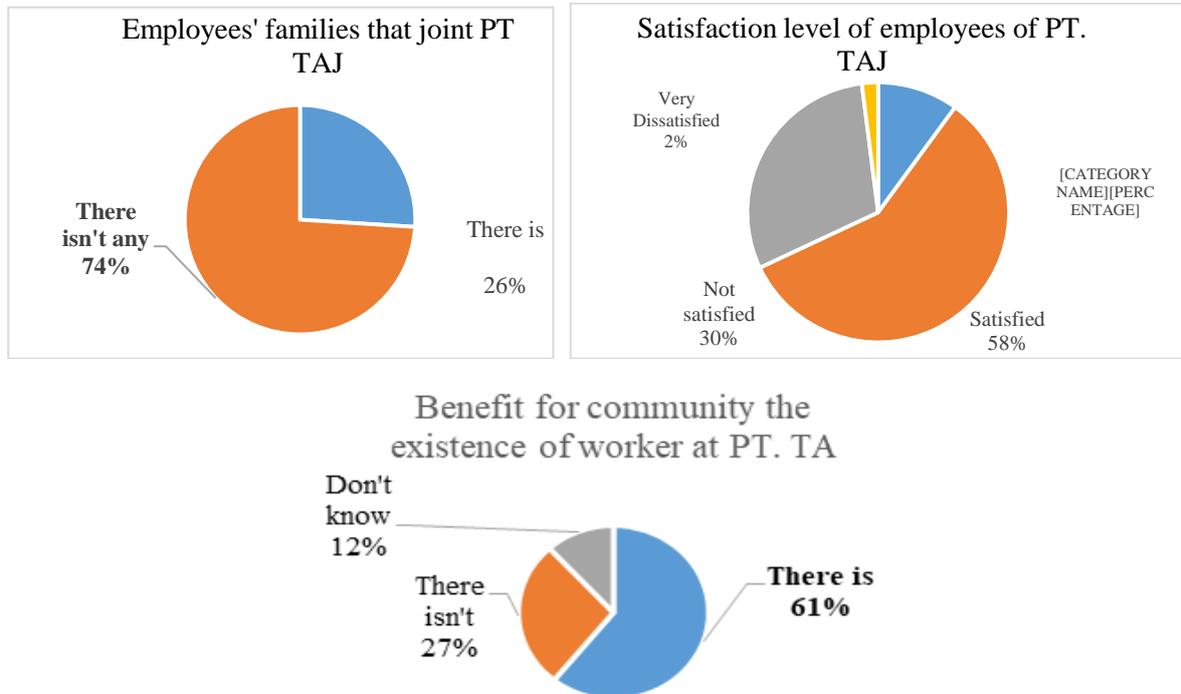


Fig 8. Perceptions of community satisfaction with employment opportunities of PT. TAJ

Table 6. Opinions of respondents on the environmental impact of PT. TAJ's coal mining operations (Impact of blasting and closed layer dumping)

Activity	Yes	No	Don't know
Air temperature	80%	20%	0%
Air quality	64%	36%	0%
As a result of the explosion	78%	22%	0%
Blasting vibration	72%	28%	0%
Soil erosion	62%	38%	0%
Landscaping	70%	30%	0%
Soil fertility	62%	38%	0%
River water quality	78%	22%	0%
Land biota	56%	44%	0%
Aquatic biota	66%	34%	0%
Community income	74%	26%	0%
Disturbing comfort	80%	20%	0%
Trying to reduce distractions	62%	12%	26%
Reducing distractions while mining	34%	6%	60%
Causing a nuisance	80%	20%	0%
Total	68%	26%	6%

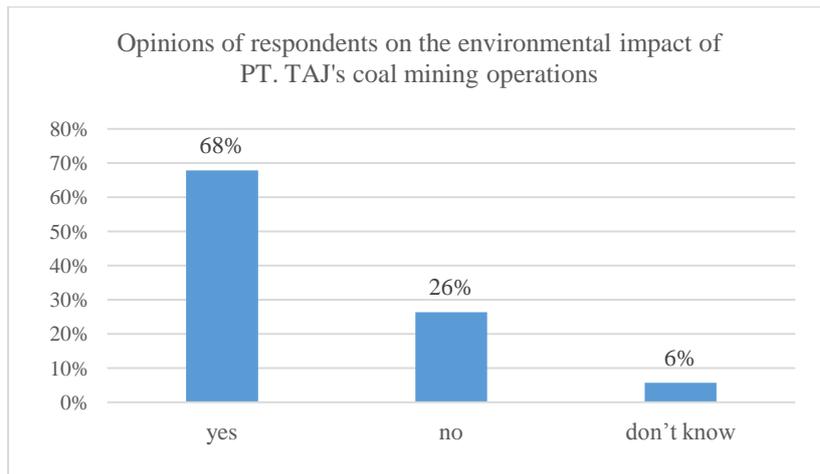


Fig. 9. Opinions of respondents on the environmental impact of PT. TAJ's coal mining operations (Impact of blasting and closed layer dumping)

Table 7. Respondents' perceptions of the environmental impact of coal resizing activities

Impact of coal processing	Yes	No
Air quality	52%	48%
Noise	42%	58%
Sedimentation	46%	54%
Societal disease	16%	84%
Changes in social norms	14%	86%
Health problems	22%	78%
Sum Activity	32%	68%

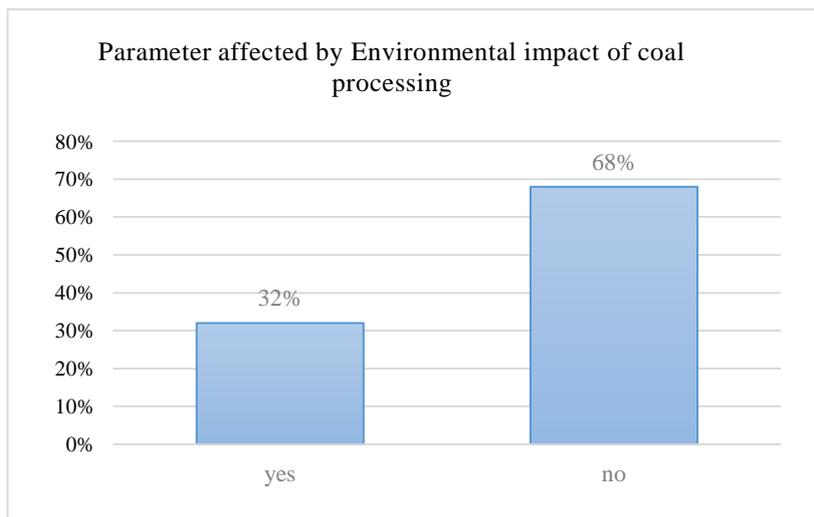


Fig 10. Respondents' perceptions of the environmental impact of coal resizing activities

The process of crushing coal to a certain size at the Coal Crusher Plant (CCP) facility is known as coal resizing. According to respondents, changing the size of coal causes health problems (22%), changes in social norms (14%), community diseases (16%), sedimentation (46%), noise (42%), and air quality (52%).

Coal processing (resize) causes inconvenience to 46% of respondents, while the remaining 54% said it does not cause inconvenience.

Public perception regarding efforts to manage impacts due to mining activities (coal processing) is that 68% of respondents stated that they were

not aware of any efforts to reduce disturbances to coal processing activities, while 12% stated that there were no efforts to reduce disturbances to coal processing activities and 20% stated that there were efforts to reduce disturbances to coal processing activities.

Perceptions regarding the impact of coal transportation, based on survey results of respondents that coal transportation activities cause health problems (52%), have a positive impact (54%), disturb public roads (66%), cause noise (66%), and affect air quality (72%).

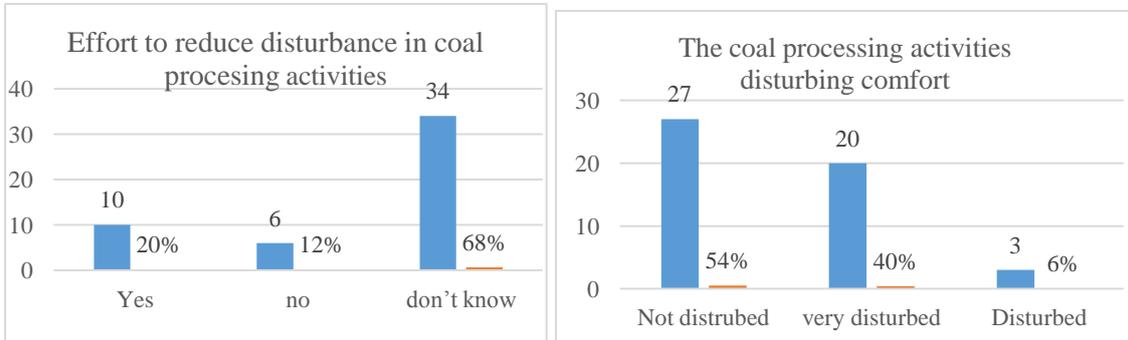


Fig. 11. Respondents' opinions regarding comfort disturbances and management efforts that have been carried out during coal resizing activities

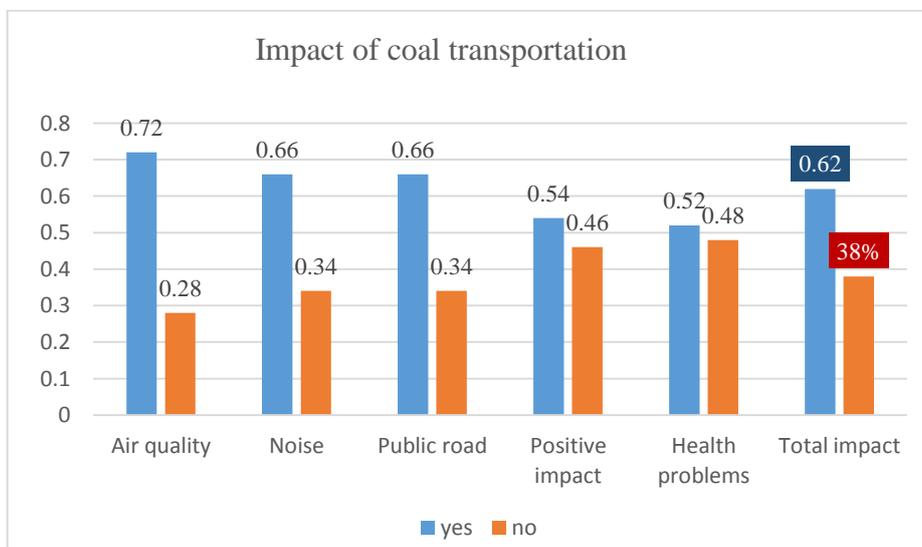


Fig. 12. Public perception of coal transportation activities

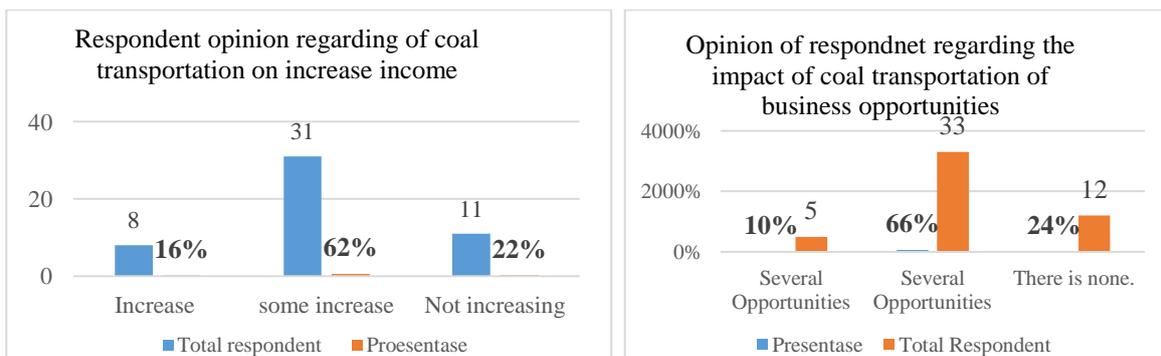


Fig 13. Respondents' opinions related to the positive impact of coal hauling activities on society

According to the results of the survey, 10% of respondents stated that coal hauling activities provided many business opportunities for the community, 66% stated that coal hauling activities provided several business opportunities for the community, and 24% stated that there were no business opportunities. Coal hauling operations resulted in a considerable rise in income for 16% of respondents, a little increase in income for 62%, and no increase in income for 22% of respondents.

According to opinion poll data, 60% of respondents said coal hauling activities caused environmental damage, while the remaining 40% said no and as many as 20% of respondents said there were efforts to reduce disruption from coal hauling activities, 34% said they were unaware of any efforts, and 22% said there was no attempt to reduce the disturbance.

PT. TAJ has conducted an environmental impact analysis, an environmental management plan,

and an environmental monitoring plan as mandatory documents that must be followed in order to manage the negative impacts of coal mining; this document serves as a framework for managing emerging issues and should be carried out by involving stakeholders [29].

According to respondents' opinions of reclamation and revegetation efforts, these activities had an impact on terrestrial and aquatic biota (22%), sedimentation (56%), soil fertility (38%), landscape (52%), soil erosion (80%), and temperature of the air (76%).

Public perception of the mining activities of PT. TAJ is that 57% of respondents stated that there were more positives and the remaining 43% stated that there were more negatives, while 80% of respondents stated that they agreed with the mining activities of PT. TAJ and 20% disagree.

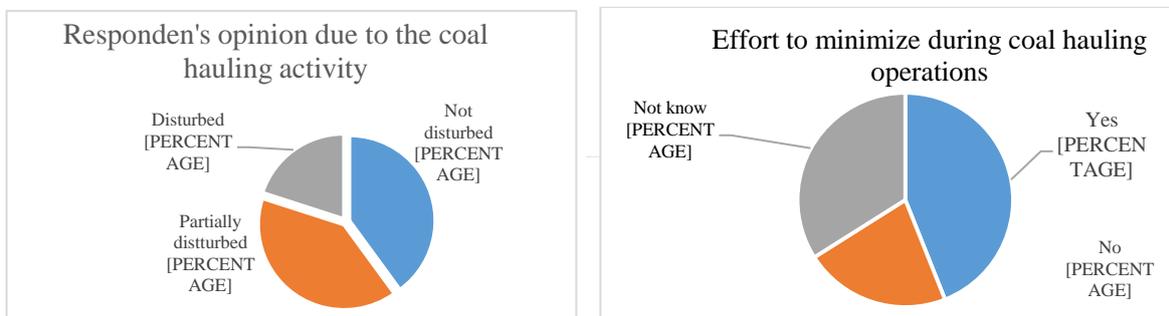


Fig. 14. The respondents' opinions are related to the impact of community comfort and management efforts made during the coal transportation process

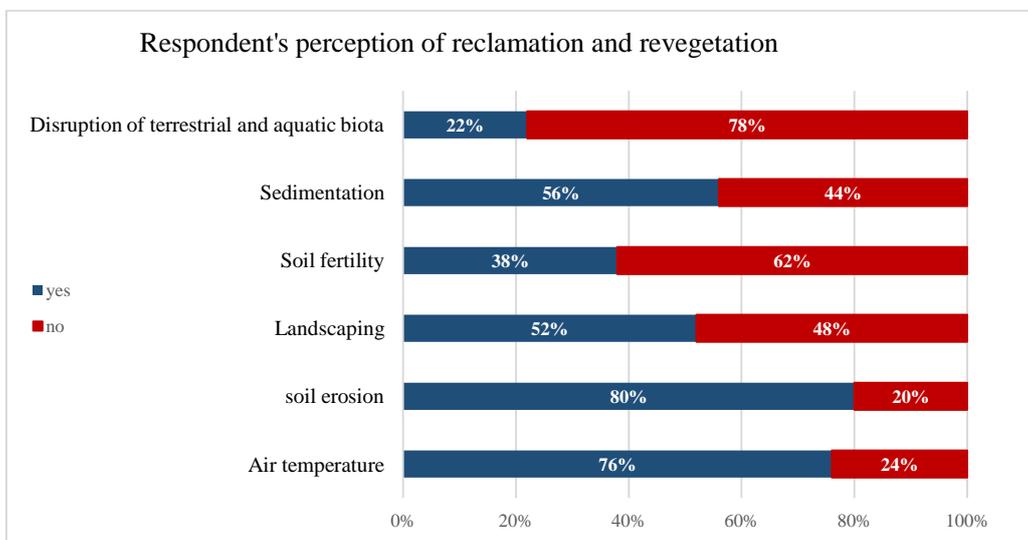


Fig. 15. Respondents' perceptions of reclamation and revegetation activities

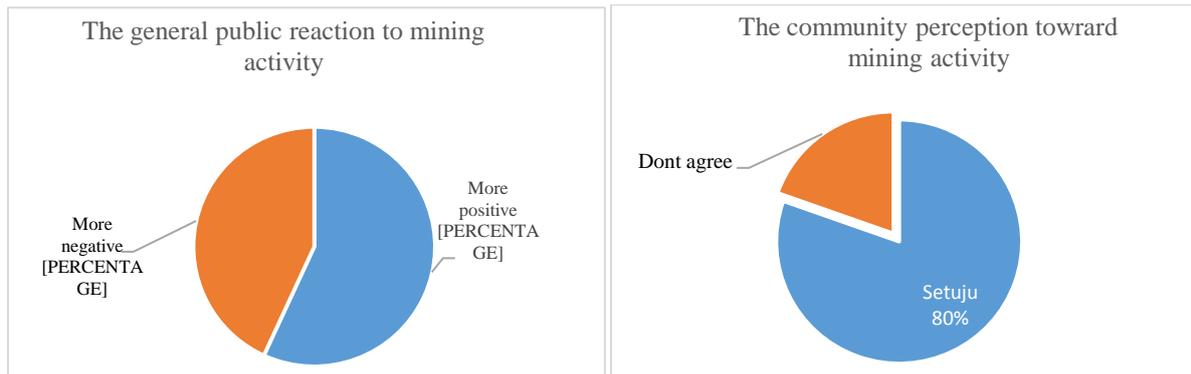


Fig 16. Respondents' opinion regarding the existence of PT. TAJ

The arguments given by respondents who agreed with PT. TAJ's mining activities were that PT. TAJ should consider the environmental impact (25 respondents), raise residents' income (18 respondents), and increase the area's potential (8 respondents). Meanwhile, respondents who disagree disagree because PT. TAJ's mining activities have an impact on the safety of residents' lives and the surrounding environment (5 respondents), respondents' interests have not been accommodated (13 respondents), the community suffers (3 respondents), and other reasons (1 respondent).

The results of a survey of the community, 96% of respondents did not know about PT. TAJ plans to expand production and extend the coal mining period, and only 4% know about PT. TAJ.

Respondents' opinions related to the potential environmental impact due to mining changes proposed by PT. TAJ includes general travel disturbance impacts (58%), sedimentation impacts (78%), affecting soil fertility (74%), affecting landscapes (74%), soil erosion impacts (76%), vibration impacts (68%), impact noise (74%), air quality impact (68%), and changes in air temperature (82%).

The environmental management approach implemented by PT. TAJ is adjusted to the coal mining business and/or activity plan which is included in the environmental impact analysis criteria that must be fulfilled as mandatory, so that people's attitudes change for the better. Perception will be good if the damage is minimized and the community benefits from coal mining operations [30]. The approach technique used is as follows:

Technological approach is install information signs on either side of the mine's main entrance,

Sound the siren in the region where the source of the sound is heard up to a radius of 1 km as a signal of blasting work completion. [31], Perform back filling in the vicinity of mine openings and waste disposal piles, where the land surface is constructed in the shape of bench terraces with a 30° angle, a terrace height of 6 m, and a tillage area width of 30 m, Carry out land reclamation as efficiently as possible in accordance with initial baseline conditions, laying topsoil at least 50 cm thick to give rhizosphere area for plant roots to develop [32], Planting/revegetating in post-mining areas, areas that are open either due to mining openings or other operational activities, using pioneer species such as glirisidae and other cover crops, using intensive silvicultural methods (the concept of land improvement with fertilization inputs, types of plants, and integrated pest management [33], Reforesting post-mining area with *Centrosema pubes cens*, *Peureraria Javanica*, *Colopogonium munu coides*, and woody species like acacia [34], Integral void management via embankment restoration, local ecological enhancement by the planting and buffering of plants with a radius of up to 175 meters, Construct non-level intersections between hauling routes and public roads (arterial and collector).

3.1.7 Socio-economic approach

Socio-economic approach is conduct community outreach in the mine area, Prioritize the acceptance of local communities as employees, workers, or miners, Using a persuasive approach, including the community, and being proactive in efforts to resolve social issues in the neighborhood, Harmonization of social life between the mine's surrounding communities and PT. Tanjung Alam Jaya, such as participation in invitations to religious events, marking festivals, assisting disaster victims [35].

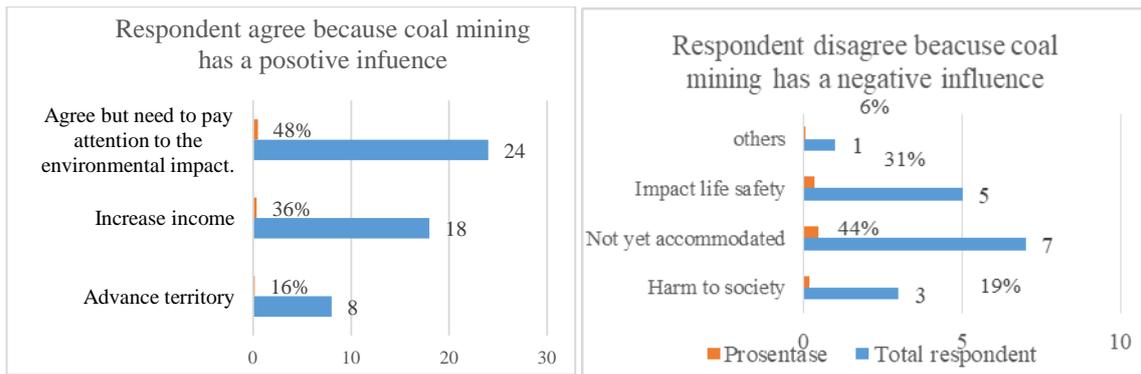


Fig. 17. The respondents' attitudes are influenced by the existence of PT. TAJ

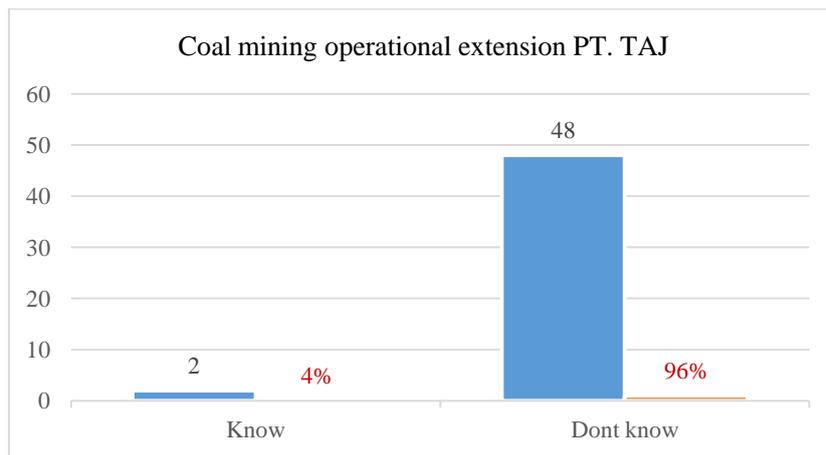


Fig. 18. Respondents' knowledge of PT. TAJ's plans to modify production and extend coal mining time

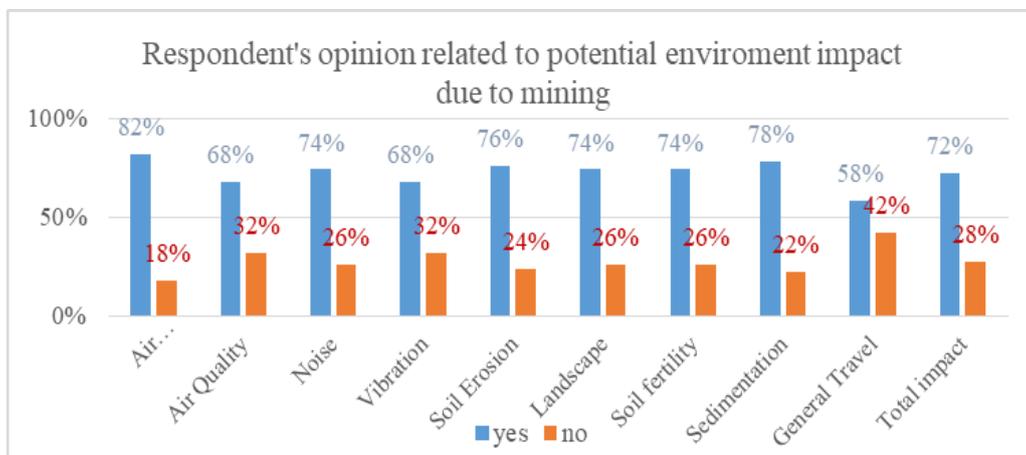


Fig. 19. Respondents' opinion related to the potential environmental impact due to mining changes

Institutional approach is collaboration with local sub-district and/or kelurahan governments, as well as community leaders and community forums, Setting up road security posts and

providing security personnel along the Km-94 coal transport truck in and out route, Provide financial support for community development programs (community-based development) [36].

3.1.8 Management of Social and Economic Aspects Through Community Development and Empowerment Programs

The community development and empowerment program in the mining area is an example of corporate social responsibility to the local community. The primary goal of community development is to enable the community surrounding the mine to build the economy [37]. Through outreach and program proposals, stakeholders from both the local government and the community are involved in the program's development.

Community development and empowerment efforts were carried out in the following villages: a) Storm Village; b) Maniapun Village; c) Fort Village; d) Mangkauk Village; e) Lumpangi Village; f) Batang Banyu Village; g) Pasar Baru Village; and h) Sungai Lurus Village. i) Hatungun Village

The Minister of Energy and Mineral Resources Decree No. 1824.K/30/MEM/2018 concerning Guidelines for Community Development and Empowerment governs the program's implementation [38].

Community development and empowerment efforts were carried out in the following villages: a) Storm Village; b) Maniapun Village; c) Fort Village; d) Mangkauk Village; e) Lumpangi Village; f) Batang Banyu Village; g) Pasar Baru Village; and h) Sungai Lurus Village. i) Hatungun Village.

3.1.9 Education program

The majority of educational facilities in the Banjar and Tapin districts continue to cater to the needs of 9-year basic education, primarily elementary and junior high school facilities. The primary goal of The community development and empowerment program is to promote the role of religion-based educational institutions such as madrasas and Islamic boarding schools in conformity with the Banjar community's religious features. Among the programs that have been implemented are: (a) Integrated Islamic Education Development Program (Madrasah Aliyah and Islamic Boarding Schools); (b) Certification and competency of junior high school/senior high school/equivalent teachers (priority for Madrasah Aliyah); (c) Competency training for educators and education staff; (d) Assistance for educators and education; (e)

Collaboration between schools and tutoring institutions; (f) Vocational Training; (g) Apprenticeship; (h) Management Program and Early Childhood Education Services; and (i) Package A, B and C Study Groups.

3.1.10 Health program

This program aims to expand access to services and raise awareness about healthy living for everyone in order to establish a physically and spiritually healthy community through promotional, preventive, curative, and rehabilitative efforts. The Community Development and Empowerment Program in the realm of health focuses on attempts to raise life expectancy for communities surrounding the mine by providing basic health services and making clean water available to the community, specifically through: (a) The Community-Based Health Business Program includes strengthening Posyandu, Polindes, and the Program for Village Drug Posts and Islamic Boarding School Health Posts; (b) Capacity Building Support for Cadres and Health Workers through collaboration with the district Health Office and other related institutions; and (c) Revitalization of the Program for Provision of Basic Clean Water Facilities through the strengthening of Water User Groups.

3.1.11 Employment Income level program

The Community Development and Empowerment Program in the field of improving real income and employment focuses on measures to increase the absorption of local workers in the mining sector and support the creation of new enterprises outside the mining sector. Several programs have been implemented, including: (a) the Local Manpower Development Program; (b) community partnerships involving Village-Owned Enterprises, Cooperatives, and Micro, Small, and Medium Enterprises; (c) the use of local labor in Community Development and Empowerment Programs; and (d) the Entrepreneurship Program.

3.1.12 Economic Independence Program

The Community Development and Empowerment Program in the field of economic self-sufficiency focuses attention on efforts to increase the supporting capacity of the people's economy, the establishment of economic centers or areas based on regional superior products, agricultural productivity and the development of integrated livestock centers. Several programs

implemented, namely (a) Development of Micro, Small and Medium Enterprises, Cooperatives and Village-Owned Enterprises; (b) Rural Area Development Program (agropolitan, minapolitan, agrotourism and ecotourism); (c) Local Resource-based Regional Product Development Program Support; (d) Sustainable agriculture program; and (e) Livestock cultivation program (chicken, goat, cow etc.) and processed derivative products.

3.1.13 Socio-cultural program

The Community Development and Empowerment Program in the socio-cultural and religious fields focuses on efforts to strengthen PT. TAJ's commitment to fostering religion and interfaith harmony, strengthening local culture and wisdom, and integrating disaster management systems in the implementation of The Community Development and Empowerment. Some of the programs implemented include: (a) support for cross-community cooperation; (b) assistance in the provision of worship infrastructure; (c) arts and culture development program; (d) arts and culture festival; (e) support for the implementation of Indonesian Independence day activities and local (regional) activities; (f) disaster prioritization in the implementation of Community Development and Empowerment Program and (g) emergency response assistance and natural disasters (floods, fires, earthquakes, hurricanes, landslides).

3.1.14 Environment

The Community Development and Empowerment Program in the environmental field focuses on attempts to develop a community-based waste management system

and deal with post-mining crucial land through a community empowerment strategy. Several programs were developed, including: (a) Environmental Awareness and Positive Behavior; (b) Development of a Community-Based Waste Management System; and (c) Utilization of Post-Mining Land.

3.1.15 Community institution establishment Program

The Community Development and Empowerment Program in the field of institutional strengthening focuses on efforts to integrate the social management system of PT. TAJ in a regular mechanism, in which The Community Development and Empowerment Program becomes an integral part of the regional and village development planning and implementation system. Several programs were implemented, including: (a) Alignment of The Community Development and Empowerment Program and Regional and Village Development Plans; (b) Assistance for The Community Development and Empowerment Program; and (c) Advocacy and Networking with professional groups, NGOs, universities.

3.1.16 Infrastructure program

The Community Development and Empowerment Program in the infrastructure industry focuses on efforts to offer social and economic infrastructure as well as support to the community surrounding the mine. Some of the projects that have been executed include: (a) Community Learning Center Development Support; (b) Support for the Provision of Local Economic Development Infrastructure; and (c) Infrastructure Provision Drinking Water Management System.



Fig. 20. Submission of sewing machine support through the community development and empowerment program (Desa Maniapun 2021 and September 2022)



Fig. 21. Handover of Lumpangi Village Koran Kindergarten Building (May 2022)

Appendix 1 depicts the Guidelines Environmental Management strategy Matrix, which is a follow-up strategy to handle severe consequences generated by coal mining activities. Referring to Government Regulation Number 22 of 2021, an environmental management plan is an effort to deal with impacts on the environment resulting from a planned business and/or activity. Summary of environmental management by creating an environmental management matrix

4. CONCLUSION

The impacts of coal mining operations and PT. TAJ's exploration permit extension must be addressed holistically/comprehensively, using the Environmental Impact Analysis study approach, which must be approved and validated by the Republic of Indonesia's Ministry of Environment and Forestry. These instructions are legally binding and must be followed. Noncompliance and violations committed by coal mining exploration companies may result in license revocation and operational suspension, as companies granted exploration permits have been required to conduct environmental impact analysis studies as a condition for extending mining exploration expansion permits in the South Kalimantan area. The issues that arise, particularly with regard to the perception of negative affects from coal mining activities, must be resolved and become standards for implementing socio-cultural impact resolution in coal mining exploratory operations.

DATA AVAILABILITY

All relevant data has been built with supporting file information. This research will assist researchers in identifying critical areas related to

The Public Perception of The Existence of Coal Mines in South Kalimantan Province Indonesia.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Appendix 1. Guidelines environmental management plan matrix

No	Impact Management		Management Type			Institution of Environmental Management			
	Environmentally Managed Impact	Impact Source	Indicators of Environmental Management Success	Environmental Management Efforts	Management Location	Management Period	Executor	Supervisor	Report Recipient
1	Impact from intense vibrations and flying pebbles, as well as the occurrence of transient noise	The activity of removing overburden by means of blasting dan mining activity.	According to Governor of South Kalimantan Regulation Number 53 of 2007, [38] the noise level for residential zones is 55 dB and 70 dB for industrial areas. The shock vibration level of less than 10 mm/s relates to Minister of Environment Decree No.49 of 1996 on Vibration Level Standards, Appendix 1. The positive predictive value (ppv) is adjusted to SNI 7571-2010. [39]	Outreach to the surrounding environment, imparting blasting SOPs to local residents displaying red/green flags in prominent places, Installing informative signs along the main mine entrance, Putting up warning signs, Sirens that sound within a one-kilometer radius of the sound source, with the term "safe distance" referring to the Minister of Energy and Mineral Resources Decree 1827.	Settlements, Mine Factory area, Hauling Road, Stockpile..	During mining operations	PT. Tanjung Alam Jaya	South Kalimantan Provincial Environmental Service Banjar Regency Environmental Service Tapin Regency Environmental Service Department of Energy and Mineral Resources of South Kalimantan Province	South Kalimantan Provincial Environmental Service Banjar Regency Environmental Service Tapin Regency Environmental Service Department of Energy and Mineral Resources of South Kalimantan Province
2	Changes in the level of soil fertility.	Land clearance, topsoil stripping, mechanical excavation of overburden, blasting destruction of overburden, overburden stockpiling, coal mining, and reclamation and revegetation activities	Mining management that adheres to the mining sequence can uncover the impact of declining soil fertility.	Backfill in the region of mine openings and waste dump heaps where the land surface is structured in the shape of bench terraces with a 30° angle, a 6 m terrace height, and 30 m tillage area width. Planting <i>Centrosema pubes cens</i> , <i>Peureraria Javanica</i> , <i>Colopogonium munu coides</i> , and woody plants like acacia mangium on the land.	Mine location. Location of waste dump areas.	During mining operations	PT. Tanjung Alam Jaya	South Kalimantan Provincial Environmental Service Banjar Regency Environmental Service Tapin Regency Environmental Service Department of Energy and Mineral	South Kalimantan Provincial Environmental Service Banjar Regency Environmental Service Tapin Regency Environmental Service Department of Energy and Mineral

No	Impact Management		Management Type			Institution of Environmental Management			
	Environmentally Managed Impact	Impact Source	Indicators of Environmental Management Success	Environmental Management Efforts	Management Location	Management Period	Executor	Supervisor	Report Recipient
								Resources of South Kalimantan Province	Resources of South Kalimantan Province
	Initial Reclamation and Revegetation.	Post-mining reclamation and revegetation activities can restore soil fertility, referring to the standard criteria of the soil research center	Land reclamation should be carried out as efficiently as possible in accordance with the initial baseline conditions, with topsoil at least 50 cm thick to enable rhizosphere area for plant roots to develop. Planting/revegetation in post-mining areas, open areas due to mine openings or operational activities, and others, using pioneer species such as glirisidae and other cover crops, using intensive silvicultural methods (the concept of land improvement with fertilization inputs, plant species improvement, and integrated pest management. Making terraces/buildings for soil erosion management, both physically-mechanically with terracing and biologically by placing plants on the newly created level, at least 3 kg of organic matter should be	Manage location in reclamation and revegetation areas.	During reclamation and revegetation activities until post-mining.	PT. Tanjung Alam Jaya	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of Energy and Mineral Resources of South Kalimantan Province	South Kalimantan Provincial Environmental Service Banjar Regency Environmental Service Tapin Regency Environmental Service Department of Energy and Mineral Resources of South Kalimantan Province	

No	Impact Management		Management Type			Institution of Environmental Management			
	Environmentally Managed Impact	Impact Source	Indicators of Environmental Management Success	Environmental Management Efforts	Management Location	Management Period	Executor	Supervisor	Report Recipient
3	General travel disruption due to coal mining activities	Coal is transported from the mining stockpile location to the processing location and to the port via the PT Hasnur Jaya Utama road and the Rantau Martapura Provincial road.	The intersection of hauling roads with public roads (arterial and collector) is in the form of non-level intersections	placed in each planting hole. Putting up traffic signs along the path of coal transport vehicles' entry and exit. Establishing road security posts and providing security personnel along the Km-94 coal transport truck in and out route. Provide non-level intersections between hauling routes and public highways (arterial and collector). Limiting carried goods with weight distribution per axle based on road class.	At the crossing in and out of PT Tanjung Alam Jaya's coal transport vehicle.	During mining operations	PT.Tanjung Alam Jaya	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of Energy and Mineral Resources of South Kalimantan Province	Ministry of Environment and Forestry South Kalimantan Province Department of the Environment District. Banjar and district. Tapin Department of Energy and Mineral Resources Prov. South Kalimantan
	Changes in people's income as a result of their participation in mining activities like PT Tanjung Alam Jaya workers or employees. Increased community capital as a result of the various effects that have occurred.	Involvement of the community surrounding the mine, beginning with worker recruiting and continuing through all stages of mining operations.	Management of the source of the impact can shift a negative perception of the activity to a neutral or positive perspective of the community on the prospect of socioeconomic progress due to community empowerment. Absorption of local labor, particularly in the villages of the research area, at	Undertake local communities to be accepted as employees, workers or miners. Adopt a persuasive approach, community engagement and be proactive. Harmonization of social life between communities around the mine and PT. Tanjung Alam Jaya such as participating in inviting religious activities, commemorating holidays, providing assistance to disaster victims and so on.	Mangkauk, Sungai Lurus Village, Lumpangi Village, Batang Banyu Village, Maniapun Village, Lada Village, Market Village Baru and Bentang Village, Kec. Pengaron and Kec. Prosperous Connection	During mine operations	PT. Tanjung Alam Jaya	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of Energy and Mineral Resources of South Kalimantan Province	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of Energy and Mineral Resources of South Kalimantan Province

No	Impact Management		Management Type			Institution of Environmental Management			
	Environmentally Managed Impact	Impact Source	Indicators of Environmental Management Success	Environmental Management Efforts	Management Location	Management Period	Executor	Supervisor	Report Recipient
			60%.	Support community development programs (community-based development).					
	Increased regional development capital in general from rural development in particular.	There are royalties, taxes, fees, and other charges, particularly those associated with mining and coal transportation.	Achievement of corporation programs that connect with local government as a form of community social responsibility. In keeping with the operating operations, there is an increase in community income. Local workers, particularly those from the study area villages, were absorbed at a rate of 60%.	Carry out commitments in compliance with applicable regulations, particularly those pertaining to royalties, taxes, and levies. Supporting reform programs created by the local community in the context, substance, and manner of community empowerment development.	Mangkau Village, Sungai Lumpangi Village, Batang Banyu Village, Maniapun Village, Lada Village, Pasar Baru Village and Bentang Village, Pengaron Subdistrict and Kontak Makmur District	During mining operations	PT. Tanjung Alam Jaya	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of Energy and Mineral Resources of South Kalimantan Province	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of Energy and Mineral Resources of South Kalimantan Province
2	Changes in public perception of coal mines' existence.	It is an indirect (derived) influence, resulting from societal envy and the emergence of changes in environmental geophysical-chemical conditions during coal mining	Maintain positive attitudes and perceptions of the community due to coal mining operations by managing impacts to reduce negative consequences and increase positive impacts.	Avoid pollution, including air and river water contamination, and always be consistent in your environmental management. Improving the community's socialization to diverse provisions and job styles. PT. Tanjung Alam Jaya's community development	Desa Mangkau, Desa Sungai Lurus, Desa Lumpangi, Desa Batang Banyu, Desa Maniapun, Desa Lada, Desa Pasar Baru, Desa Bentang, Kec. Pengaron dan Kec. Sambung	During mining operations	PT. Tanjung Alam Jaya	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of	Department of Environment and Forestry South Kalimantan Province Banjar Regency Environment and Forestry Service and Tapin district Department of

No	Impact Management		Management Type			Institution of Environmental Management			
	Environmentally Managed Impact	Impact Source	Indicators of Environmental Management Success	Environmental Management Efforts	Management Location	Management Period	Executor	Supervisor	Report Recipient
		activities.	Public attitudes and views towards PT. The presence of Tanjung Alam Jaya is considered good if 20% disagree and 61% agree.	program activities (community development mechanism) would be improved further.	Makmur			Energy and Mineral Resources of South Kalimantan Province	Energy and Mineral Resources of South Kalimantan Province

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