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Utilization of Natural resources to Improve Community Economy in Pangkep Regency: A Case Study of PT Semen Tonasa

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Abstract: This study aims to analyze the contribution of natural resource utilization by PT Semen Tonasa in improving the community economy in Pangkep Regency. The research focuses on direct and indirect economic contributions, the effectiveness of corporate social responsibility (CSR) programs, as well as the social and environmental impacts perceived by the community. A mixed methods approach with a case study design was employed. A survey was conducted with 100 respondents using a Likert-scale questionnaire, and in-depth interviews were conducted with 15 key informants (local government, community leaders, MSMEs, and company management). The results show that natural resource utilization by PT Semen Tonasa has a significant positive contribution to increasing community income ($\beta = 0.412$; $p < 0.01$), expanding job opportunities, and developing local MSMEs. CSR programs also significantly influence the improvement of local business capacity ($\beta = 0.368$; $p < 0.05$). However, some communities reported environmental impacts such as air pollution and health issues. Qualitative analysis confirms that although the community benefits economically, there is a strong demand for improved environmental governance. In conclusion, PT Semen Tonasa has significantly contributed to the local economy, but more inclusive sustainability strategies are needed to mitigate environmental impacts and enhance long-term community welfare

Keywords: Natural Resources, Local Economy, CSR, Sustainable Development

INTRODUCTION

Pangkajene and Islands Regency (Pangkep) is one of the strategic regions in South Sulawesi, endowed with abundant natural resources, particularly in the mining and cement industry sectors. PT Semen Tonasa, established in 1968 and now part of PT Semen Indonesia (Persero) Tbk, has grown to become the largest cement producer in Eastern Indonesia. The company's presence not only supports national infrastructure development but also serves as a driving force for the local economy by providing employment opportunities, implementing

corporate social responsibility (CSR) programs, and supporting the development of micro, small, and medium enterprises (MSMEs) (PT Semen Tonasa, 2023).

Data from the Central Statistics Agency (BPS) of Pangkajene and Islands Regency show that the contribution of the manufacturing sector, including cement, to the Gross Regional Domestic Product (GRDP) reached more than 32% in 2023, making it the largest sector in the region's economic structure (BPS Pangkep, 2024). In addition, the poverty rate in Pangkep decreased from 11.34% in 2018 to 9.82% in 2023, partly attributed to the positive impact of community empowerment programs implemented by PT Semen Tonasa (BPS Pangkep, 2024). This indicates a tangible contribution of the company to improving local community welfare.

Behind these economic contributions, however, lie several negative impacts on the environment and public health. Residents living around the plant have reported air pollution due to cement dust, operational noise, and the decline in agricultural land quality, which affects farming productivity (Chen et al., 2020; MDPI, 2023). These issues deserve serious attention, as more than 40% of Pangkep's population still depends on agriculture and fisheries as their main sources of income (BPS Pangkep, 2024). Therefore, the sustainability of regional economic development is not solely determined by industrial growth, but also by the ability to balance natural resource utilization and environmental preservation.

Previous research on PT Semen Tonasa has mostly focused on CSR or environmental aspects separately. Some studies emphasize the role of CSR in enhancing corporate image (Purwanto & Puspitasari, 2021), while others highlight CSR's contribution to empowering coastal communities (Wulandari & Santoso, 2021). Nonetheless, critical studies on extractive industries in Indonesia have found that the effectiveness of CSR programs often remains problematic due to the lack of community participation, resulting in suboptimal outcomes in achieving local self-reliance (Kautsar, 2018). There is still a limited number of studies that integratively analyze the relationship among economic contributions, CSR effectiveness, and environmental impacts within the context of sustainable development (Hidayat et al., 2024).

Accordingly, this study aims to fill that gap through a mixed methods approach to analyze the contribution of PT Semen Tonasa to the local economy while simultaneously evaluating the social and environmental impacts it generates. The findings are expected to provide a comprehensive overview of the trade-off between economic benefits and environmental risks**,** and to offer strategic recommendations for optimizing the company's role in supporting inclusive and sustainable regional development in Pangkep Regency.

METHOD

This study employs a mixed methods design with a case study approach**.** This approach was chosen to provide a comprehensive understanding of PT Semen Tonasa's contribution to natural resource utilization for improving community economic welfare while identifying the accompanying social and environmental impacts. According to Creswell and Plano Clark (2018), mixed methods research allows the integration of quantitative data that can be generalized and qualitative data that provide in-depth contextual insights.

The research population comprises residents living around the operational areas of PT Semen Tonasa, specifically in three main sub-districts—Bungoro, Balocci, and Labakkang. These areas were selected due to their geographical proximity to the company's industrial activities, making them the most directly affected communities both economically and environmentally. Based on demographic data from the Central Statistics Agency (BPS) of Pangkep Regency, the total population across the three sub-districts is estimated to exceed 5,000 people.

To determine the sample size, the Slovin formula was applied with a 10% margin of error, resulting in a sample of 100 respondents. The sampling technique used was proportional stratified random sampling, which involved dividing the population into strata based on the villages or urban neighborhoods surrounding the industrial zone, followed by random selection

of respondents according to each stratum's population proportion. This technique was selected to ensure that the research findings adequately represent the social and economic diversity of the local communities.

The research instruments included a questionnaire and an interview guide. The questionnaire utilized a Likert scale (1–5) to measure quantitative variables such as community perceptions of natural resource utilization, CSR effectiveness, economic improvement (indicators: income, employment opportunities, and MSME growth), and perceptions of environmental impacts. Meanwhile, semi-structured interviews were conducted to collect qualitative data regarding community experiences, local leaders' perspectives, the stance of local government authorities, and the company's strategies in implementing social and environmental responsibility programs.

Data collection was carried out through three main techniques. First, a field survey using questionnaires administered to predetermined respondents. Second, in-depth interviews with 15 key informants, consisting of community leaders, MSME actors, local government officials, and representatives of PT Semen Tonasa's management. Third, participatory observation to directly assess the socio-economic conditions of the communities and the environmental impacts surrounding the plant. In addition, secondary data were collected from PT Semen Tonasa's annual reports, CSR documentation, and official data from BPS Pangkep Regency.

Data analysis employed a dual approach. Quantitative data were analyzed using descriptive statistics to describe respondent characteristics and socio-economic conditions, and multiple linear regression to examine the influence of natural resource utilization, CSR implementation, and environmental impact on community economic improvement (Hair et al., 2020). Qualitative data were analyzed using thematic analysis following the framework of Miles et al. (2019), involving data reduction, data display, and conclusion drawing.

To enhance the validity of findings, this study implemented methodological triangulation, comparing results from quantitative data, qualitative interviews, field observations, and secondary sources. As Neuman (2021) notes, triangulation strengthens the credibility of research outcomes by minimizing potential bias arising from reliance on a single data source. Through this design, the study is expected to yield accurate, comprehensive, and evidence-based findings that can inform local policy development in Pangkep Regency.

RESULTS AND DISCUSSION

Quantitative Research Findings

Table 1. Demographic Profile of Respondents (N = 100)

Variable	Category	Frequency	Percentage (%)	Total
Gender	Male	62	62	100
	Female	38	38	
Age	< 25 years	18	18	100
	25–45 years	54	54	
	> 45 years	28	28	
Education	Junior High School	38	38	100
	Senior High/Vocational School	42	42	
	Higher Education	20	20	

Source: processed data (2025)

Based on the findings from 100 respondents, a general picture emerges regarding the demographic profile and the impact of PT Semen Tonasa's presence on the socio-economic conditions of nearby communities. The majority of respondents are male (62%), reflecting the dominance of men in labor-intensive sectors such as construction and factory work. The age distribution is dominated by the productive age group (25–45 years), comprising 54% of respondents, indicating a relatively young and active workforce. Most respondents are employed either formally as factory workers or informally as traders and MSME actors.

In terms of education level, 38% of respondents completed junior high school, 42% finished senior high or vocational school, and only 20% attained higher education. This suggests that the majority of the local workforce comes from individuals with a medium level of education, which aligns with the employment profile of industrial communities. Consequently, the job opportunities provided by PT Semen Tonasa serve as a critical factor in absorbing the local labor force, particularly for those with limited educational attainment.

The data also highlight that PT Semen Tonasa's presence contributes to reducing unemployment and improving household income, especially among residents with moderate education backgrounds. However, the relatively small proportion of respondents with tertiary education implies a need for greater investment in capacity-building programs, such as vocational training and entrepreneurship development. This would help local communities to not only depend on factory employment but also to develop independent economic ventures aligned with the company's CSR initiatives.

Table 2. Economic Impact of PT Semen Tonasa's Presence

Indicator	Respondents' Answers (%)		Total
	Ya	Tidak	
Increase in household income	68	32	100
Creation of new employment opportunities	55	45	100
Increase in MSME turnover	47	53	100

Source: Processed Data (2025)

From an economic perspective, the survey reveals that 68% of respondents reported an increase in household income since PT Semen Tonasa began operating. This improvement is mainly experienced by those directly employed by the company, as well as by individuals running supporting businesses, such as food stalls, transportation services, and rental housing. Moreover, 55% of respondents acknowledged that the company's presence has created new job opportunities, both through formal employment absorption and informal sector activities around the factory area. This finding is consistent with the notion that large-scale industries generate a multiplier effect on local economies (Hidayat et al., 2024).

Among small business owners, approximately 47% of MSME respondents reported an increase in business turnover. This effect is particularly evident in enterprises directly linked to the needs of factory workers—such as food, transport, and housing services—indicating that the company's contribution extends beyond direct employment. PT Semen Tonasa's operations thus provide indirect economic stimulation that fosters local entrepreneurial activity and MSME growth.

Results from the multiple linear regression analysis further support these descriptive findings. The analysis shows that natural resource utilization by the company has a positive and significant effect on improving local economic welfare ($\beta = 0.412$; $p < 0.01$). This indicates that the greater the level of resource utilization, the stronger the company's contribution to local income generation. Similarly, the CSR program also demonstrates a significant positive impact ($\beta = 0.368$; $p < 0.05$), suggesting that initiatives such as MSME training, microfinance support, and public facility development have substantially enhanced community economic capacity.

However, the environmental impact variable shows a significant negative effect ($\beta = -0.221$; $p < 0.05$). This implies that community perceptions of pollution, noise, and declining land quality influence their overall assessment of economic benefits. The findings highlight a clear trade-off between economic gains and environmental degradation experienced by local residents (Chen et al., 2020; MDPI, 2023).

Table 3. Results of Multiple Linear Regression Analysis

Independent Variable	Koefisien β	Sig. (p-value)	Interpretation
Natural Resource Utilization	0,412	< 0,01	Positive and significant
CSR Program	0,368	< 0,05	Positive and significant
Environmental Impact	–0,221	< 0,05	Negative significant
$R^2 = 0,57$			The model explains 57% of

	income variation

Source: Processed Data (2025)

Interview and Observation Findings

In-depth interviews with 15 key informants consisting of community leaders, MSME (Micro, Small, and Medium Enterprises) actors, local government officials, local academics, and representatives of PT Semen Tonasa management provided a more nuanced understanding of community perceptions and experiences regarding the company's presence.

From a socio-economic perspective, most informants acknowledged that the company's various Corporate Social Responsibility (CSR) programs have produced tangible benefits. These initiatives include skills training for MSME actors, scholarship provision for underprivileged yet high-achieving students, the construction of religious facilities, road infrastructure improvement, and the provision of clean water access. Several MSME owners reported that the business management training and working capital assistance provided by PT Semen Tonasa significantly helped them increase productivity, expand market reach, and enhance product quality. Local government officials also appreciated the company's contribution to rural infrastructure development, which has facilitated greater mobility and improved goods distribution efficiency.

However, the issue of CSR benefit distribution remains a major concern. Consistent with previous academic findings, most informants revealed that the implementation of CSR programs is still uneven and often misaligned with the community's actual needs (Kautsar, 2018; Wulandari & Santoso, 2021). Communities living closer to the plant area tend to have greater access to assistance, while those in peripheral villages feel less included in the programs. Some informants also criticized the CSR planning process for being predominantly top-down, resulting in limited accommodation of specific community needs.

From an environmental standpoint, several informants particularly community leaders and local academics highlighted concerns about air pollution from cement dust, noise from factory operations, and the declining quality of agricultural land surrounding the industrial area. Some farmers reported decreased crop yields over the past five years, which they attributed to reduced soil fertility. Public health informants also noted an increase in respiratory illnesses among residents in nearby villages, although no formal medical studies have yet confirmed a direct causal link.

Field observations revealed a paradox between economic gains and environmental degradation. On one hand, economic activity around the industrial zone appeared more dynamic than in areas located farther from the plant, evidenced by the growth of new small businesses such as food stalls, transport services, and boarding houses serving company employees. On the other hand, air quality around the plant visibly deteriorated during peak production hours.

These findings underscore a development dilemma: while the community recognizes the economic benefits generated by PT Semen Tonasa's operations, they simultaneously demand improvements in environmental management. This situation highlights the need for a more inclusive sustainability strategy — one that balances economic, social, and environmental dimensions to ensure long-term development in Pangkep Regency.

Overall, the interview and observation results confirm that PT Semen Tonasa's presence has produced a dual impact on the community: it strengthens the local economy through job creation, MSME development, and infrastructure improvements, yet simultaneously generates socio-environmental risks that require more effective management. These findings align with the broader literature emphasizing the importance of sustainable development approaches that integrate economic, social, and environmental aspects into every industrial activity (Hidayat et al., 2024; World Bank, 2022).

Discussion

The findings of this study reaffirm a clear trade-off between economic benefits and environmental impacts resulting from PT Semen Tonasa's utilization of natural resources. From

an economic perspective, the company's presence has demonstrated a significant positive contribution to household income growth, job creation, and the strengthening of local MSMEs. These results align with literature emphasizing that large-scale industrial activities can generate a multiplier effect on regional economies -directly through employment creation and indirectly through spillover effects on MSMEs, household consumption, and infrastructure investment (Hidayat et al., 2024).

Furthermore, the role of Corporate Social Responsibility (CSR) at PT Semen Tonasa reinforces earlier research findings. For instance, Nustini et al. (2024) argue that CSR not only enhances community business capacity but also strengthens economic self-reliance, particularly among MSMEs that are vulnerable to market fluctuations. In the context of Pangkep, CSR is implemented through skill development programs, business capital assistance, educational scholarships, and the construction of social infrastructure. These initiatives have tangibly improved community welfare and expanded access to economic opportunities. Thus, in the case of PT Semen Tonasa, CSR functions not merely as philanthropic activity but as a strategic instrument for building social legitimacy — a *social license to operate* — and maintaining harmonious relations between the company and the local community.

Nevertheless, this study also highlights the significant environmental drawbacks associated with cement production. Community perceptions of air pollution, noise, and declining land quality reinforce global critiques of the cement industry as a major high-carbon emitter. Scientific analyses indicate that the cement sector contributes approximately 7–8% of total global CO_2 emissions, making it one of the largest industrial sources of greenhouse gases (Salas et al., 2016; Bărbulescu & Hosen, 2025). Beyond carbon emissions, cement manufacturing also releases particulate matter, nitrogen oxides (NO_x), sulfur oxides (SO_x), and cement dust — all of which directly affect community health, particularly by increasing respiratory illnesses. These findings are consistent with international literature underscoring the urgent need for rigorous environmental mitigation strategies within the cement industry, such as the adoption of cleaner technologies, alternative energy sources, and enhanced waste management standards (Ali et al., 2011).

From the perspective of sustainable development theory, this condition reflects a persistent tension between the *pursuit of growth* and *environmental stewardship*. According to the triple bottom line framework, sustainability requires a balanced integration of *people, planet,* and *profit*. The results of this study suggest that while the *profit* (corporate economic gains) and *people* (community welfare improvement) dimensions are relatively strong, the *planet* (environmental sustainability) dimension remains the weakest link. In other words, the economic success experienced by Pangkep residents has not yet been matched by adequate environmental governance.

In theoretical terms, this study contributes by integrating economic, social, and environmental analyses into a single framework. Whereas previous studies have tended to examine CSR from the lens of corporate image (Hartono et al., 2025) or partial community empowerment (Wulandari & Santoso, 2021), this study positions CSR within the framework of sustainable local economic development. It thereby enriches the literature on strategic management and development economics by asserting that CSR can serve as a component of a company's long-term sustainability strategy, rather than a mere compliance-based obligation.

From a practical standpoint, the findings suggest that PT Semen Tonasa should enhance community participation in CSR planning to ensure programs are more responsive to local needs. Meanwhile, local governments play a critical role in strengthening environmental regulations and ensuring that economic contributions do not come at the expense of future quality of life. Consequently, the implementation of sustainable development in Pangkep Regency requires active collaboration among companies, communities, and government institutions.

CONCLUSION

This study demonstrates that the utilization of natural resources by PT Semen Tonasa has made a significant contribution to the economic development of Pangkep Regency. The positive impacts are most evident in the increase in household income, the expansion of employment opportunities, and the growth of local MSMEs, both directly and indirectly supported by the company's presence. The Corporate Social Responsibility (CSR) programs have proven effective in enhancing community capacity through skill training, MSME empowerment, and social infrastructure development, although the distribution of benefits remains uneven across different community groups (Prasetio et al., 2021).

However, the findings also reaffirm that cement industry activities generate negative environmental impacts, particularly in the form of air pollution, noise, and agricultural land degradation. These effects reduce environmental quality, lower agricultural productivity, and contribute to negative public perceptions of industrial operations (Salas et al., 2016). Consequently, the existence of the cement industry creates a trade-off between economic growth and environmental sustainability, which must be carefully managed within the framework of sustainable development.

The study enriches the literature by integrating economic, social, and environmental dimensions into a unified analytical framework, providing a more holistic understanding of the role of the cement industry in regional development. The findings emphasize the importance of an inclusive sustainability strategy that balances the three pillars of the triple bottom line profit, people, and planet.

Recommendations

For the Company (PT Semen Tonasa):

1. Broaden the coverage of CSR programs to ensure equitable distribution across all affected villages and sub-districts.
2. Develop environmentally focused CSR initiatives, such as reforestation, waste management, and the adoption of renewable energy technologies in cement production.
3. Enhance transparency and accountability through annual public CSR reporting and community participation in program evaluation.

For the Local Government:

1. Strengthen environmental governance by updating regulations on pollution control and industrial land use management.
2. Conduct regular environmental audits to monitor emission standards and assess ecological impacts.
3. Facilitate multi-stakeholder collaboration between government, industry, and the community in local development planning to ensure broad-based economic benefits.

For the Community:

1. Actively participate in village development forums (Musrenbang) and CSR oversight mechanisms to ensure programs address real community needs.
2. Leverage training and financial assistance provided by the company to create sustainable business opportunities.
3. Foster collective environmental awareness by developing eco-friendly enterprises, such as circular economy initiatives and household waste management.

In conclusion, industrial-based regional development must be managed through a balanced and sustainable approach, where economic growth aligns with social empowerment and environmental preservation. If implemented consistently, PT Semen Tonasa's operations can evolve from being merely a driver of local economic growth into a catalyst for long-term sustainable development in Pangkep Regency.

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