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by Eko Teguh Paripurno

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Tirilolo village community vulnerability and perceptions of the cement industry planning in Baucau District, Timor Leste

J Pereira, G Mahojwala, ET Paripurno*, and MI Effendi

Master of Disaster Management, Faculty of Mineral Technology, University of Pembangunan Nasional Veteran Yogyakarta, Indonesia.

*Email: paripurno@upnyk.ac.id

Abstract. The cement industry investment in Baucau Regency is agreed to be the key to economic growth, creating new jobs, and reducing poverty. To support this investment in the cement industry sector, the government of Timor Leste issued Government Resolution no. 14/2016 regarding the Special Investment Agreement submitted by the Company TL Cement, Lda. Baucau Regency area has a good stretch of karst for the supply of the main raw material for cement production, thus chosen as an investment location. Tirilolo village as well as the surrounding community, where they plan to establish a limestone factory and mine is planned – will receive both benefits and risks from the investment planning. This study uses a mixed-method with a survey approach, interviews, and questionnaires, with socio-economic risk assessment at the local level in the cement industry investment plan sector. This study uses secondary data analysis and field observations. The data obtained will be analyzed descriptively and using a scoring technique on each indicator. Some of the research results obtained indicate a basic vulnerability, that the population density in Tirilolo Village is 52 people/ha, with female household heads 5%, people with disabilities 7%, vulnerable age population 26%. In the education sector, 68.75% of the population did not go to school, while only 17% graduated from elementary school, 5.2% graduated from junior high school, and 8.3% graduated from high school. The average community income is less than \$100 per month. The results of structured interviews and focus group discussions show that even though factories and mines carry risks, people look forward to jobs that will emerge to make changes in their lives.

1. Introduction

Investment is agreed to be the key to economic growth, creating new jobs, and reducing poverty. The cement investment in Timor Leste expected by the government to be able to improve the regional economic development process, create jobs and increase people's income. To support this investment in the cement industry sector, the government of Timor Leste, issued Government Resolution number 14/2016, dated 5 May 2016 regarding the approval of the Special Investment Agreement, which was submitted by the TL Cement Company, Lda through Government Resolution No. 14/2016 with an investment cost of 400 million US Dollars, for investment in the cement industry located in Baucau district, the second-largest city after the capital city of Dili. The selection of Baucau Regency as an investment location because the area has a good karst stretch for the supply of the main raw material for cement production, namely limestone, which is based on the initial feasibility study by the postal company in 2014-2015. Following the master plan, this cement industry investment will produce around 1.65 million tons per year of Portland cement clinker with cement refining facilities with a capacity of 5,000 tons per day (TPD) and 100 tons of cement per hour [1]. The main objective of this



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cement industry investment is to reform the Government's economy, increase private investment, promote economic diversification, sustainable employment, and reduce dependence on cement imports. In the investment plan for the cement industry in the pre-construction and construction stages, the company will employ 3000 people in the pre-construction and construction phase and 1000 people in the production phase, in addition to providing education and training to local communities around the company's location [2]. However, the investment in the cement industry in Baucau Regency, Tirilolo Village, has a potential negative impact on the surrounding community. The researcher conduct a research to find out Tirilolo village community social vulnerability and their perceptions on the risks of the cement industry. Research want to know how the community perceive and their awareness on risk of cement industry.

1.1. Negative Impact of Cement Industry

The negative impact of the cement industry is seen from the social aspect according to the social and economic consequences arising from a development activity or the implementation of a policy and program [3]. Changes in land use, where what used to be agricultural land turned into an industrial area, changed community structures, and social conflicts [4][5][6]. In the aspect of public health, it causes several types of diseases in the respiratory tract such as ARI and lungs [7][8]. On the environmental aspect, including environmental degradation, air, soil, and water pollution, and contributors to emissions to global warming [9][10][11].

1.2. Positive Impact of Cement Industry

The positive impact of the cement industry investment plan brings a million hopes, where the presence of this cement factory will be able to increase the standard of living through employment and business opportunities, increase income, support the emergence of multiplier effects from other sectors [3][12]. Several studies have shown that the presence of the cement industry can improve the socio-economic life of the community around the industrial location are better than those who work in the non-mining sector [12].

1.3. Disaster Risk

Disaster risk is the potential loss caused by a disaster in an area/region within a certain period which can be in the form of death, injury, illness, threatened life, loss of sense of security, evacuation, damage or loss of property, and disturbance activities [13]. Risk is an unavoidable part of life and affects human life everywhere, rich or poor, male or female, adults or small children [14]. Villagran defines risk as a probability of a certain loss which is supported by a certain set of elements as a result of a certain level of danger which can consist of a predictable number of victims, damage, and losses [15]. Risk is the "probability of harmful consequences, or expected losses (death, injury, property, livelihoods, disrupted economic activity and/or environmental damage) resulting from interactions between natural or human-induced hazards and vulnerable conditions."

4. Social Vulnerability

Social vulnerability is a multidimensional concept that helps identify the characteristics and experiences of individuals that enable them to respond and recover from harm [16]. Social vulnerability is the potential loss/loss in social groups, for example, groups of the poor, pregnant and lactating women, children, and the elderly further that social vulnerability includes: perceptions of risk and people's views of life related to culture, religion, ethnicity, social interaction, age, gender, and poverty [17][18]. Social vulnerability is related to the level of welfare of individuals, communities, and society, education level, access to human rights, security, traditional values, customs and beliefs, organizational structure, ideology, and social cohesion [19]. The vulnerability of social groups include; position, ethnicity and race, gender, age, education level, disability, health, and household and family. Furthermore, the composition of households with dependents, aged less than 18 years and over 65 years and their single-family head is also vulnerable to disaster hazards [20]. The risk of social

vulnerability to the impact of natural hazards is simplified into 4 namely Household level (related to personal attributes), Community (related to how we interact with the people around us), Regional / Geographic (related to how far from the service center) and Administration/Institutional (related to disaster funding and mitigation studies) [21].

1.5. Economic Vulnerability

Economic vulnerability is the potential loss of assets and economic activities, for example, the disruption of buying and selling activities due to a damaged market, rice fields that cannot be planted due to changes in land function, Economic vulnerability (economic vulnerability) describes a condition of the level of economic fragility in facing hazards (hazards) which include: direct losses such as income, investment, potential loss of goods/related [22][23]. Economic Vulnerability is the economic ability of an individual or a community, which greatly determines the level of vulnerability to hazard threats. In general, poor or underprivileged communities or areas are more vulnerable to hazards, because they do not have the adequate financial capacity to carry out disaster prevention or mitigation efforts [24]. Vulnerability is highly dependent on the status of the condition of individuals, communities, and nations. such as the poor, women, age, and income groups. economic vulnerability also includes the economic level of individuals, communities, access to resources such as loans/credits, insurance, and economic support facilities; transportation and road market [18]. Economic status such as income, poverty, employment, and education where the poor will be very vulnerable to disaster hazards as well as low levels of education and uncertain income [20].

2. Methods

The method that will be used in this study is the mixed method with a survey approach, interviews, and filling out questionnaires. The population in this study is the entire/total community with a population of 7769 and 1699 heads of families (based on village office records, 2016 to September 2019) and the number of hamlets in the research location is 4 hamlets out of a total of 6 hamlets. This study will focus on four hamlets in the location of the industrial investment plan (factory) with a population as shown in table 1.

The sample is part of the population and the type of sample taken must reflect the population. The findings of the information obtained in the sample are findings also in the population so that conclusions drawn from the generalized sample observations will also lead to the population. This means that the sample taken for research can represent the existing population [25]. The sample that will be used in this study is the population at the location of the Cement Industrial Investment Plan (Factory). To get the sample size in this study, the researcher will use the Solving formula [25][26]. In this study, the researcher will use an error tolerance of 10% (0.1) with a confidence level of 90%, so there are 96 respondents.

Table 1. Total population of four hamlets in the study site [27].

No	Hamlet	Male	Female	Total	Household
1	Caisido	389	388	777	188
2	Parlemnto	256	223	479	132
3	Lialaileso	325	275	590	146
4	Osso-Ua	293	306	599	149
	Total	1263	1192	2445	615

3. Results and Discussions

The results of the study using a survey showed that almost all hamlets in the Tirilolo Village have persons with disabilities and female-headed households, as detailed by Table 2.

Table 2. Community Population Vulnerability

No.	Hamlet	Total Respondent	Gender		Vulnerable Age	Disability	Female-headed Household
			Male	Female			
1.	Parlamento	19	12	7	4	1	2
2.	Caisido	30	17	13	9	2	3
3.	Lialailesu	23	15	8	7	1	2
4	Osso-ua	23	16	7	5	-	-
Total		96	60	35	25	5	7

All community members in Tirilolo Village have a monthly income of below \$100 per month, which means below the Timor Leste minimum wage of \$120 per month based on Timor Leste Law No. 4 of 2012. Majority of the person in Tirilolo Village are not going to school. In this case, researcher decide to use term of 'not going to school' as a term to differentiate with 'uneducated', because the role of the education is on their own family. In Caisido and Lialailesu Hamlet, the number of person that not going to school is twenty times greater than person that take elementary school. In The rank followed by elementary school, junior high school, and senior high school, respectively.

Table 3. Community Education and Income

No.	Hamlet	Total Respondent	Income/Household	Education				Economy Asset
				A	B	C	D	
1	Parlamento	19		6	3	2	8	9
2	Caisido	30	< \$100/months	2	1	-	27	13
3	Lialailesu	23		1	-	2	20	3
4	Osso-ua	23		8	-	4	11	5
total		96		17	4	8	66	30

A. Elementary School
 B. Junior High School
 C. Senior High School
 D. Not Going to School

Table 4. Land and Cattle Ownership

No.	Hamlet	Total Respondent	Land	Cattle
1.	parlamento	19	Average on 1 ha/household	Cow, Sheep, Goat, Buffalo, Chicken, and Pig
2	Caisido	30		
3	Lialailesu	23		
4	Osso-Ua	23		

Tabel 5. Diversity of Livelihood

No.	Hamlet	Total Respondent	Livelihood		
			Civil Servant	Military/Police	Farmer & Fisherman
1.	Parlemento	19	2	-	17
2	Caisido	30	3	5	22
3	Lialaleso	23	^	2	21
4	Osso-ua	23	4	1	16

As coastal village with dry lands, the profession in Tirilolo Village dominated by farmer and fisherman, with a small number of person working as civil servant, military, and police. The majority of the community stated that they accepted and agreed to the cement investment in their village. In general, the community has the perception that this investment will create employment opportunities for the younger generation in the village, increasing their income, by which they can open kiosks and stalls around the factory site. Farmers in the village are residents who hope for a mine, to improve family livelihoods.

"Farmers in this village are dryland farmers, planting in the rainy season. The dry season here is approximately six months (April-November) and during the dry season, we have nothing to rely on except selling goats, each of which costs 40 dollars. Our income from agriculture is less than \$100/month, and sometimes when it's tough we can only get 15 dollars, which is only enough to buy 25 kg of rice. So, we hope that the cement factory can increase the income of residents in the village." (Farmer, 56 years old, Causido Hamlet)

For fishermen, the situation is better than for farmers but it tends to be based on fish season and weather.

"The income of fishermen depends on the weather. If the weather is good at sea, we can earn 30-40 dollars per day. If the weather is not good they are less than a hundred dollars a day. We agreed with the construction of the mine because later there would be a dock built, our village would automatically be crowded and we could sell grilled fish. Selling fish directly is more profitable because we can make 40% more profit than selling to collectors." (Fisherman, 40 years old, Osso-Ua Hamlet).

Indigenous leaders and veterans as community leaders also agreed with the existence of this mine. The reason is that the economic improvement will be comprehensive, and residents can open stalls and shops around the highway. From conversations with several respondents that the income per person per day is approximately \$ 0.50 cent - \$ 1.00. with an expense of more than US\$100. This is in line with the cement industry's investment plan, which will create jobs for 3000 people in the construction phase and 1000 people in the operation phase.

"There must be a commitment from entrepreneurs to take risk reduction actions. What if after the mine, what will be done to the former excavation. This has to be agreed with the government and the company." (Head of Disaster Management Office of Timor Leste)

Contrary to public perception, local NGOs feel that factories will pose environmental risks. Bridging this situation, the government of Timor Leste stated that development conditions must be supported by efforts to reduce risks so that they do not have an impact on society and the environment.

4. Conclusion

From the statement of the community in Tirilolo Village, it could be seen that the community more consider the economical benefit from the cement industry, and not considering the risk that could arise. The condition of the economic vulnerability of the people in Tirilolo Village is below the Timor Leste minimum wage, and the level of formal education is still low, with the majority not attending formal schools. This condition of vulnerability is the reason why the community's perception supports the existence of a cement factory, solely for economic reasons, and to create an increase in income for residents in Tirilolo Village. Full support for the cement business must be a special concern to keep in mind the risks that may arise outside of the economic and social aspects. Further research could be conducted to assess the ecological vulnerability and emerging risks to springs and post-mining recovery strategies.

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