Private sector’s approach model to community resilience

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Abstract. Natural disaster that climate-related has been increased in the last decades, there were 281 events recorded and affected over 60 million people across the world in 2018 only. Vulnerable communities, who are the most impacted, deserve financial and technical support so they can build resilience. Tackling climate change and its impact needs a collaborative action, private sector is a suitable counterpart for government. Since, it has a strong capabilities in terms of capital, knowledge and influence. Solusi Bangun Indonesia (SBI) as cement industry, which allegedly one of the biggest CO₂ emitters, is taking part of empowering their surrounding community to develop their ability in adapting to climate change. Commitment on climate change adaptation and mitigation have been incorporated in SBI’s sustainability strategy as an integral part of its business risk strategy. It approaches for community resilience is through empowering and education, from 2015 to 2018 approximately 2 million people benefitted. This approach aligns with Sustainable Development Goal 13 and UN Development Program for Climate Adaption.

1. Introduction
Scientific community has been widely agreed that extreme weather events may occurred due to climate change and will worsening over the coming decades [1]. The increased of surface temperature will likely to increase possibility of more drought and higher intensity of storm [2]. Fatalities on people in low and middle-income countries due to natural disaster are seven times probability than those in developed nations. Within 20 years, 90 per cent of all disasters were floods, storms, droughts and other extreme weather events related with climate [3]. The inconvenient truth is people in low incomes is the most vulnerable and least capability on tackling and adapt the impact [1,2]. Community resilience is a term that commonly used to show the sustained ability of people to withstand and mitigate the stress of a disaster [4].

Industrial sector is contributing 21% of Greenhouse Gas (GHG) emission globally [5], while approximately 7-8% of it was generated from cement industry [6,7]. Thus, responsible to mitigate impact of climate change due to GHG emission shall be borne also by industrial sector which represents of private sectors. Action and strategy related with reducing emissions and its direct impact have been discussed a lot. But only few has a strategy to mitigate impact that improving their community resilience. Most of community resilience’s research focused on policy and the role of national or government, rarely focusing on private sector contribution. However, tacking climate change needs collaborative action and contribution. It cannot be solely depend on Government. Private sector would be a suitable
partner, with their strong capabilities in terms of capital, knowledge and influence. This paper aims to contribute to the approach of strengthening community resilience to climate change in a private sector’s role.

2. **Overview of cement industry**

Cement is a powder formed material that is a hydraulic binding agent. It means that cement needs water to bind with other ingredients such as concrete, sand and aggregates. The most widely used construction material and the second largest after water [6]. Carbon dioxide (CO$_2$) is unavoidable generated during cement process, because their chemical reaction transforming calcium carbonate into calcium oxide and combustion in high temperature [7]. Although a few cement manufacturer are claiming their cement is zero CO$_2$ emission but needs further verification. See detailed explanation regarding cement process and emission on section 2.1.

2.1. **Cement process**

In general, typically cement is made from limestone, and clay or shale, few of them also required silica. We can simplify describe cement process into 6 steps; 1). raw material extraction, 2). crushing, 3). milling into fine powder, 4). heating in a rotary kiln with temperature range between 1400°C up to 1500°C, the rotary kiln is a tube up to 200 metres long and perhaps 6 metres in diameter, with a long flame at one end, at this stage the product called clinker, 5). clinker is ground and blended with correctors material such as gypsum or limestone or fly ash and final step 6). bagging and ready to deliver [8].

The cement-making process can be divided into two basic steps [9]:

a. Clinkerization is first made in a kiln with gas up to 2000°C. At this stage, raw material consist of limestone and other small quantities of materials (e.g. clay, silica) is heating up to 1450°C. It is also known as calcination process because during this process calcium carbonate is chemically reacted, with help of high temperature, transforming into calcium oxide. Product of this process called clinker, as the main constituent of cement. Due to high temperature the form of clinker is liquid resemble to lava, by end of the tube (of kiln) a sudden drop temperature range between 100-200°C is occurred, transforming clinker into small gravel.

b. Cement making process where clinker is then ground with gypsum and other correction materials (e.g. limestone, fly ash)

![Figure 1. Cement making process](image-url)
2.2. Cement and climate change
How would manufacture of cement affected climate change? It is unavoidable that cement making process emitted CO₂ emissions. It is emitted both process which is during calcination process, transforming calcium carbonate in high temperature in rotary kiln from a series of complex chemical reactions and combustion process using fossil fuels (e.g. coal). The simple proportion is 60% of emission generated during calcination and 40% of emission generated from combustion [5,9].

CO₂ is occurred in the upper, cooler end of the kiln, or a pre-calciner, at temperatures of 600-900°C. The simplified stoichiometric relationship is as follows [10].

\[ \text{CaCO}_3 + \text{Heat} \rightarrow \text{CaO} + \text{CO}_2 \]  

(1)

Figure 2. Global Greenhouse Gas by economic sector

Figure 3. Indonesia Greenhouse Gas Emission Profile 2017

The cement sector is the third-largest industrial energy consumer in the world, responsible for 7% of industrial energy use, and the second industrial CO₂ emitter, with about 7% of global CO₂ emissions [11].

Rapid development in emerging countries will need large scale of infrastructures. Based on prediction of United Nations, by 2050 three quarter of world population is living in city. Whereas in Indonesia, by 2025 based on the projection of population growth, 65.8 percent people lives in urban area [12]. Economic growth required infrastructures that lead to the increased demand of cement and concrete [7]. Three quarter people living in the city by 2050 created projection of cement production growth by 12 to 23%, if business as usual, will contribute direct carbon emissions increased by 4% globally [11]. In 2018, emission generated from cement industry globally were 1.50 ± 0.12 Gt CO₂, equivalent approximately 4% of emissions from fossil fuels. In order to meet Paris Agreement, cement industry shall reduce its direct carbon dioxide emissions by 24% below current levels by 2050 according to a new report by the International Energy Agency (IEA) and the Cement Sustainability Initiative (CSI)) or 16% by 2030 [7,11].

3. Sustainability Strategy
The simple understanding of sustainable development is development that meets the needs of the present without compromising the needs of future generations [13]. Best practice of sustainable development is triple bottom line concept, where sustainable development is the intersection of profit, planet and people.
Evaluation of performance triple bottom line concept has broaden social aspect into social and governance. Thus, rating to assess company’s sustainability performance based on its environmental, social and governance (ESG) [14]. Company which has good rating of ESG will be more attractive in investor point of view. It means that it has lesser risk and higher opportunity to survive.

Solusi Bangun Indonesia (SBI) believes that sustainability is one of our core values. By embracing a sustainable approach to every aspect of our operations we are enabled to and committed play a role in realising positive change toward economic progress, responsible resource management and social development. SBI has developed and launched its sustainability strategy since 2015, in order to keep global warming below 2°C by 2050 and creating shared value to 500,000 lives touched. Sustainable development is a collaborative effort between individuals, companies, communities, government and all related stakeholders. SBI acknowledges that sustainability can only be achieved through cooperation, engagement and collaboration with our internal and external stakeholders. Therefore, SBI continues to foster ongoing partnerships with external stakeholders, in order to have an implementation environmental and social sustainability programs that include direct participation from various parties.

SBI’s sustainability strategy includes a number of aspirations and targets to help address five focus areas; sustainable solutions, climate, circular economy, water & nature and people & community.

Figure 4. Solusi Bangun Indonesia 2030 Sustainable Development Ambitions

Solusi Bangun Indonesia committed to play significant roles on sustainable development issues because we are part of solutions. Our commitment are described into five pillar as follows:

1. **Solutions:** Providing solutions (innovative products & services) to address urban problems (waste, floods, poor air quality, climate).
2. **Climate:** Being the most CO2- efficient global business in our sector and aim to support its customer avoiding CO2 emissions released from buildings and infrastructure within their whole lifecycle.
3. **Circular Economy:** Reducing our dependency on natural resources and fossil fuels by transforming waste into resources for all our production processes.
4. **Water and Nature:** Reducing our freshwater withdrawal and deploy professional biodiversity management practices and rehabilitation/restoration practices to demonstrate an overall net positive change to ecosystems and biodiversity through partnership.
5. **People & Community:** Helping people thrive through:
   a. Putting health and safety at the centre of everything we do. Health and safety is our overarching value.
b. Promoting and deploying responsible and sustainable business practices throughout our value chain (good governance)

c. Further developing and deploying social investment program, targeting at the base of the social pyramid

4. Community resilience approach

There are many definition explaining about community resilience in context of climate change. Community resilience is the ability of communities to reduce exposure to, prepare for, cope with, recover better from, adapt and transform as needed to, the direct and indirect effects of climate change, here these effects can be both shocks and stresses [15]. Other definitions stated community resilience is the capacity building to the people or to the community will reflect the ability of the people coping hazards and disasters [4]. This paper define community resilience as an ability to respond and recover form climate change impact. Whereas community at the bottom of pyramid is the most vulnerable, hence they need an external assistance to help them gain ability to respond and recover from climate change’s risk. Tackling climate change impact is not sectoral action but it is crucial to engage key stakeholders which are Government, Districts Authorities, Universities and NGOs. Other than prosperity, in order to make our planet more secure and safe, we have to embrace other through partnership and cooperation [16].

4.1. Case Study Cibadak Integrated Post Mining management

Mostly, post mining management focusing on environment conservation by rehabilitated degraded land into forest without set up program for community. It is usual to witness after mining operation ended, economic activities on that area also ended. The loss of income due to post mining will threatened the effectiveness of land rehabilitation. Community seldom cut off trees, disturbed growing trees and used it as farming in order to gain income from it. It is important to involve community to maintain economic, environmental and social cycle and prepared them to be independent from company’s assistance.

Based on that fact, SBI developed a new benchmark for rehabilitation Cibadak Ex-Silica quarry, in Kabupaten Sukabumi, West Java. It is called Cibadak Integrated Post Mining management. It aims to be a sustainable forestry program that able to self-financing and contribute on the local economic growth particularly for surrounding community. By this approach SBI expect community plays a role as a safeguarding environmental. The program is divided into two period of time; first period is from 2011-2016 and second period is from 2019 – 2023. Three main objectives are:

1. Total rehabilitation of quarry into centre for educational forest.
   Started in 2011 for land preparation and rehabilitated soil. Currently, Cibadak has succeed become research centre for forestry and geologist study internationally. Although, has not been an educational forest but it is on the right track.

2. Integrated farming to provide community income.
   Set up program for community is has been started by giving agro technology, sustainable farming training and pilot experiments. In 2019, SBI re–strengthening and renew assistance program. Integrated farming is an approach towards environmental safe guarding community.

3. Self-funding management through ECO tourism.
   Once educational forest and integrated farming established, we are planning to broaden into ECO tourism. This program will be run by partnership scheme with other parties.

Condition of Cibadak after mining is ended was full of large silica boulders resulted from blasting. It was also found several evidence of acid mine drainage, looking by the colour of settling ponds water. Rehabilitation work was started in early 2011, firstly by restore landscape and soil condition, crushing boulders and backfilling large areas with top soil, before a ground cover crop was planted to add soil fertility and prevent erosion and also to tackling acid mine drainage. Post mining is not mainly about physical attributes but also improving socio-economic surrounding neighbour. By the partnership with IPB University (Bogor Agricultural Institute), SBI built community recreational facilities and a centre
education for forestry research. Apart from an academic purpose it was also aim to support incomes of local forest communities living in the area. At the moment, Cibadak is a lush and green protected area which helps sustain local communities, is visited by tourists, and is studied by academics and schoolchildren. Several researchers and members of SBI’s environment and Community Relations team are working together with the Bogor Agricultural Institute to have the park ready for the public.

Community involvement on Cibadak project has started since planning stage together with experts from university. They are an inherent part of this project thus expected act as agents of change. To build community awareness, SBI sets a lot of consultative advisory panels together with socio-economic expert from university and sociopreneurship organisation.

![Cibadak Post Mining Integrated Project](image)

**Figure 5.** Cibadak Post Mining Integrated Project

Community is an important element on sustainability environmental management, therefore to educate people to have awareness of them is significant. They involvement should be conducted at the early stage. Community is involved during issues identification related with Cibadak quarry and its relevance to their well-being. Together with SBI, set up planning program to prepare them as an environmental safeguard.

This approach is aligned with SBI’s Community Social Responsibility (CSR) policy. SBI believes that community involvement is key element on program development and implementation, so that program would be suitable with community needs and their potential. Therefore, identification analysis and community dialog via community advisory panel is crucial. Besides community SBI’s also involving other relevant stakeholder. SBI’s CSR policy concept in detail can be seen on Figure 5.
Community awareness is executed through socialization, engagement approach, both soft skill and technical training. Community is engaged to realize the importance of forest and it’s beneficial for them, so that they voluntarily involved in re-greening and its maintenance. At the moment, they preparing community group development instead of working individually. Group approach is selected because social investment program would perform effectively on a group so that responsibility is borne collectively among them.

That approach is started to show good progress, since community has already aware that reforestation is beneficial for them. They are voluntarily guarding Cibadak forest project and utilize its forest’s environment services systematically among their groups. For instance, community groups conducted forest patrol to minimize forest fires, illegal logging, and keep natural water sources. They also started to perform organic farming.

5. Conclusion
Our biggest challenges are to change community mind set, that earth or forest specifically will continue to provide natural resources for good and not going to be extinct. In addition community has always perceived company responsibility is mainly to give monetary compensation to them instantly. Therefore, basic education on the important of preserving forest and the earth needs to be performed gradually and continuously, together with government and academic society. Participatory action with corporation in defining program is effective to shift their mind set from instant compensation into sustainable program.

Various stakeholders also a contributor set back for us to run this project. Mine closure procedures involves several local government agency which has different target and requirements. It took long period of time to complete different kind of administrative requirements. The length of this handling is often become the reason many corporation reluctant to proceed. We expect there is an integrated body or task force in a future that responsible for mine closure to simplify procedures and administration requirements.

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