

Managing the Environmental and Societal Life as Part of the Cement-Padang Manufacturing's Contribution in West Sumatra amid the COVID-19 Pandemic

Dewi Permatasari¹, Musytaqim Nasra², Andria Delfa², and Firdaus²

¹Institut Teknologi Bandung, Ganesha Street 10th, Bandung 40132, West Java, Indonesia

²PT Semen Padang, Indarung Factory, Padang 25237, West Sumatera, Indonesia

Abstract. This paper will explore Semen Padang's various contributions to nationwide COVID-19 impact mitigation efforts, bringing together the company's operational aspects while still paying close attention to the conservation of its surrounding areas, as well as the empowerment of local communities devastated by the pandemic. In its environmental management aspects, the company has shifted from using non-renewable fuel to renewable ones by utilizing agro-industrial waste. In the social aspects, the company still goes ahead with its development of an ecotourism ecosystem to make sure community to sustain their welfare. From all the efforts mentioned above, the company has been able to manage COVID-19-related waste, while boosting energy efficiency, reducing its toxic and hazardous waste, utilizing filter bags containing its toxic and hazardous waste, reducing its particulate emission, boosting water use efficiency in its Indarung factory, conserving the germ plasm of the Bilih fish species, as well as the empowerment of communities living in the vicinity of ecotourism area, in the Lambung Bukit area. When the COVID-19 pandemic escalated in Indonesia, Semen Padang was at the forefront of medical waste management from pandemic-spreading activities while also maintaining cement production operations for the needs of sustainable national development.

1 Introduction

Indonesia belongs to the developing country category, which has been expanding its industrial economy impressively, to cater to local and export demands alike, within the last few years. The cement manufacturing industry, one of the highlighted sectors essential for national infrastructure development efforts, is among Indonesia's thriving industrial sectors. When the COVID-19 pandemic first broke out in Indonesia, many industries faced problems in implementing health protocols, of which the patterns and impacts on operational activities were unknown. In this case, the cement production process at Semen Padang faced problems not only due to the increasing number of cases of the spread of the pandemic but also had an obligation to manage medical waste in all health facilities in Sumatra island. For this reason, in maintaining the operational balance of the cement production process, including energy

* Corresponding e-mail: dewi16permatasari@gmail.com

and environmental management that supports sustainability, Semen Padang also implements non-natural disaster responses for the surrounding community. This is a big challenge for the industry, especially for Semen Padang, which is the oldest cement producer in Indonesia. They have undergone ups and downs in facing production challenges from time to time for more than a century.

The paper will emphasize more on the various aspects to mitigate the adverse environmental impacts of natural resources utilization by striving for energy and water use efficiency, bringing down emission, as well as reducing toxic and hazardous waste and other types of industrial waste. The focus of this paper is the discussion of Semen Padang's role in maintaining operational and economic continuity, social and environmental sustainability in the midst of the COVID-19 pandemic, which is a challenge in emergency response and non-natural disasters. This paper focuses on a successful program that has been implemented in the midst of the COVID-19 pandemic, especially in the early days of the pandemic outbreak in Sumatra island and particularly Padang. It has a broad impact, not only on the management of the production process but also on the surrounding community who have lost their livelihoods, not to mention the health condition due to virus transmission and continuing impact. Meanwhile, efforts on conserving endemic species in West Sumatra have also become a part of environmental sustainability program. Speaking of the social aspect of the corporate responsibility initiative, the company is also organizing various economic programs equipped with trainings to boost the local people's hard- and soft-skills so that they can thrive in the labor market and improve their economic welfare that way. The programs are expected to seek to help these people attain economic independence in the future.

2 Overview of Semen Padang's Business and Its Contribution to National Pandemic Management Efforts

This paper measures the contribution of Semen Padang both to energy management and the operational environment during the pandemic, and also to the management of medical waste from various health facilities in Sumatra island to prevent environmental pollution and the spread of advanced diseases. In addition, there is also support for community empowerment in facing the COVID-19 pandemic to help individuals in surviving these difficult times. Semen Padang, has an operational base in Padang, the capital city of West Sumatra (see Fig. 1), established in 1910 as the first cement factory in Southeast Asia [1].



Fig. 1. Semen Padang's factory is the oldest cement factory in Indonesia since 1910

Semen Padang’s contributions to the cause include sorting out COVID-19-related medical waste in various regions across Indonesia, especially in the Sumatra island, in adherence to the terms and conditions which come with the government permit. Furthermore, it also provides assistance to local communities in the vicinity of its operations which have been impacted by the pandemic. As per May 2020, Semen Padang’s cumulative support to the national pandemic mitigation efforts [2] can be seen in Table 1.

Table 1. Semen Padang’s cumulative support to the pandemic mitigation efforts (the support consists of medical devices, medicines, and food. The quantity describes the number of beneficiaries in each area)

No	Location	Qty Support of Basic Needs
1	Forum Nagari - Batu Gadang	384
2	Forum Nagari - Bandar Buek	594
3	Forum Nagari - Baringin	235
4	Forum Nagari - Tarantang	263
5	Forum Nagari - Padang Besi	336
6	Forum Nagari - Koto Lalang	527
7	Forum Nagari - Indarung	362
8	Forum Nagari - Limau Manis Selatan	686
9	Forum Nagari - Limau Manis	441
10	Forum Nagari - Koto Lua	331
11	Forum Nagari - Lambung Bukit	459
12	Forum Nagari - Pampangan	587
	Cumulative Support on May	5205

3 Energy Efficiency Initiative: Substituting Coals with Industrial Waste from Palm Oil Manufacturing Activities to Power Industrial Operations

This program substitutes coal with industrial waste from palm oil manufacturing activities to power its industrial operations; has been part of the global industry’s efforts of discovering and utilizing alternative fuels to achieve energy efficiency. By making use of palm oil waste, which belongs to the oleochemical fuel category and spent bleaching earth waste type classified as hazardous, while utilizing alternative energy, it also manages its waste. Based on the Spent Bleaching Earth (SBE) testing results, palm oil waste has a caloric energy value between 2,100 and 2,600 kg, thus rendering them suitable for alternative energy utilization [3]. The program could boost energy efficiency by 136,645 GJ in 2020 when the pandemic began to spread in Sumatra island.

4 Emission Reduction: The Installation of Jet Pulse Filters in the Clinker Silo Indarung IV Factory Intermediate

One of the innovations in this category is launching a Jet Pulse Filter to reduce emission branching in its Clinker Silo Indarung IV factory intermediate. The company has implemented this program out of its concern of the high volume of fugitive dust emission of its operations (seen in Fig. 2).

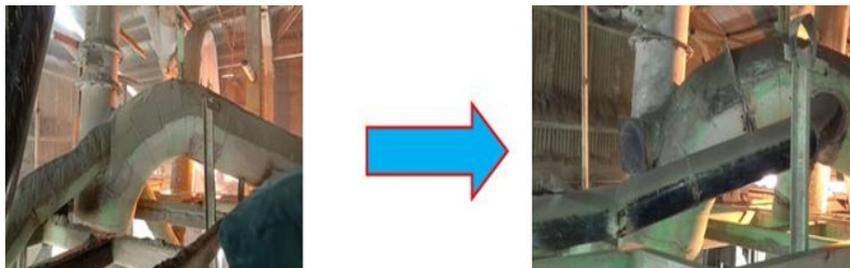


Fig. 2. Documentation of the company equipment's condition before and after the Semen Padang implements the Jet Pulse Filter in the Intermediate Clinker Silo Indarung IV

The company can boost the performance of its dust particulate vacuum cleaner, thereby reducing the maintenance time of the company's equipment while controlling dust emission worth 250 tons per year during 24 hours operation per day based on our estimated time in the field. To date, the innovation has succeeded in utilizing 90% of the total used filter cloth [4].

5 Hazardous Waste Management: Replacing Equipment Seal to Prevent Oil Spill in the Indarung VI System

When we talk about hazardous waste, we need to be concerned about the oil spill [8] which happens in the Vertical Mill Roller 6R1M01 equipment. Oil spill could potentially trigger further waste management spillovers in the Raw Mill equipment located in the Indarung VI, which is mainly caused by a non-durable seal that is used to cover over the equipment. Therefore, the company needs to modify the equipment's seal, from using the Chesterton Seal to shifting to using the Split-type oil seal, which is more durable and stronger, thus could prevent spillovers (seen in Fig. 3).



Fig. 3. Oil spill in the raw mill area before and after the installation of the Split-type oil seal

The program turns out to be efficacious in preventing oil spills in the area, resulting in the oil consumption reduction in the Roller area worth nine to 38 liter per day [5]. This is very helpful to manage and utilize its toxic and hazardous waste-based resources.

6 Solid Waste Management: Utilization of Used Cloth Filter Bags to Replace the Use of Single-Use Accordion Shield Cloth in the Indarung Plant's Packaging Activities

Accordion is a part of the flux-filling, equipment that the company uses to load bulk cement into wagon trucks or trains. The company utilizes used cloth filter bags to replace the accordion's shield. The operation of the accordion is shown in Fig. 4.

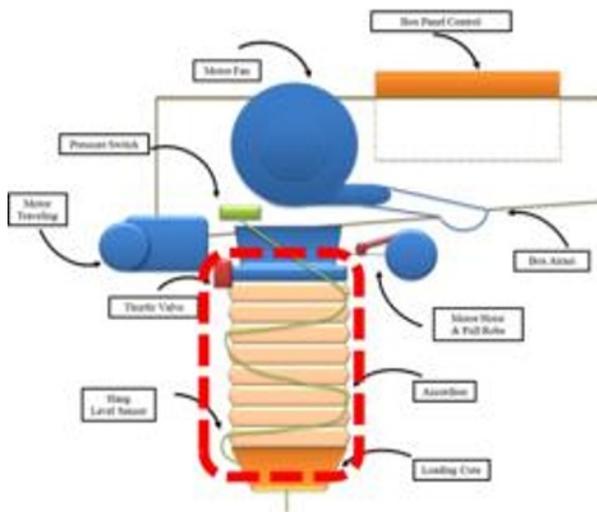


Fig. 4. Work diagram of accordions

The program has been successful in mitigating damages in its equipment as well as bringing down its spare part costs and minimizing disruptions of cement delivery process to its customers, therefore shortening the delivery time by 30 percent on average. Up until now, the innovation has used up about 430 kilograms (kg) of used cloth filter bags that the company has also used to shield the accordions of its train carriages, its cement silo and packing plant as well as its clinker [6].

7 Water Efficiency: Increasing Overflow Volume in Its GCT Tank to Fill the Tanks with Lower Elevation while Closing the Valve of Idle Equipment in the 2/3 Indarung Factory

The company conducts its water efficiency program by flowing water through the force of gravitation from a high place (the Gas Conditioning Tower - GCT tank) to a low place. The company has also been optimizing its water efficiency programs by shutting the valve of its idle (non-active) equipment in its Indarung 2/3 factory (Fig. 5).



Fig. 5. Changes brought by the water efficiency program before (left) and after (right) the valve has been closed in the Indarung 2/3 factory water channel

The program has been shown to boost water efficiency to 50 percent [7]. Currently, the company is still assessing the overall effectiveness of the inspections of water utilization in the field.

8 Biodiversity Conservation: Redesigning Breeding Area for Endemic Fish Species for Re-Conservation Purposes in the Singkarak Lake

The *Mystacoleucus padangensis* Blkr. Fish, called the *ikan bilih* using the local language, is a fish species endemic to the Singkarak lake. Entering this decade of the 2000s, the endemic fish population has started to decline due to non-selective catchment activities utilizing destructive catchment tools, which has caused more harm to the fish population. Semen Padang also attempts to conserve the endangered fish species by breeding the species ex-situ in a different habitat, before returning to their original habitat (see Fig. 6).



Fig. 6. A modified pool for *ikan bilih* breeding purposes in the Semen Padang compound

The conservation program's initial goal is to help these fishes survive and reproduce naturally in the conservation area, using at least 10 percent additional germ plasm from the fish species that will be disseminated in the pool [9].

9 Community Shared Value: Empowerment of Local People by Setting up a Heritage-Based Ecotourism Site in the Lambung Bukit Area

Semen Padang company is attempting to involve locals in its corporate social responsibility programs, based upon the shared value principle, which can benefit both people as well as their surrounding environment. The Lambung Bukit community's ecotourism program is done by maximizing the potentials of the Batu Busuk natural panorama, which features crystal-clear, blue-colored rivers, supported by beautiful surroundings (see Fig. 7).



Fig. 7. The ecotourism activities of the Lambung Bukit community

Semen Padang was employing about 15 people to manage the area, since then the site has attracted more or less 3,600 tourists [10]. It has also planted about 1,000 trees around the

area. The program, lasted for about a year, has boosted the income level of economically vulnerable residents by 10 percent. The calculation is based on the social mapping baseline conducted at Semen Padang and collaboration to the support of local stakeholders which include, among others, the Tourism Agency, the Social Welfare Agency, the Andalas University, as well as the Youths Concerned about Tourism non-profit organization.

10 Conclusions and Recommendations

Until now, Semen Padang has always maintained a balance in the environmentally sound production process and prepared in mitigating and facing the COVID-19 pandemic, both for their workers and surrounding West Sumatra community. In disposing medical waste, SP contributes to environmental management and suppresses the impact of the Pandemic, they also benefit from obtaining alternative cement raw materials. The aspects of energy conservation and waste utilization from cement production activities also contribute to controlling the resulting impact while increasing the competitive advantage of the product. In protecting biodiversity and empowering communities, both of them contribute to the local wisdom of West Sumatra, thus supporting the sustainability factor. We conclude that contemporary business processes in the manufacturing realm can no longer concern themselves solely to economic functions; it is also obliged to pay attention to environmental preservation and the welfare of its surrounding communities.

We wish enhance our gratitude to Board of Director & team of Semen Padang for their continuous support to all stakeholders in achieving the best effort for environmental preservation and sustainability especially for Sumatera Island.

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