Sustainability Strategy in The Fiber Cement Industry in Indonesia Using Soft System Methodology

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Abstract

This study aims to develop a strategic framework for Indonesia's fiber cement business, focusing on those elements that have a significant impact on outcomes. Using a soft system methodology for risk analysis, the framework was created. The influence of sustainability performance is examined in this study using a tiered structure. We categorize significant variables as causes or effects and then specify which variables are crucial for enhancing the performance of Indonesia's fiber cement sector. Sustainability strategies continue to be underappreciated in Indonesia, despite the fact that corporate sustainability performance is a vital topic in today's economic climate. In order to aid in the development of a strategic framework for fiber cement sustainability in Indonesia, this study seeks to analyze the complexity. This study will employ a soft system methodology approach that uses a system diagram and multi-actor analysis to clearly comprehend the issue and establish criteria that will aid the sustainability plan framework.

Keywords
Fiber Cement, Sustainability, Soft System Methodology, Risk Analysis and Corporate Sustainability Performance.

1. Introduction
Fiber cement is a type of building material made by mixing cellulose fiber (2%), cement (80%), and water. In 2020, cement production is expected to reach 4.1 billion metric tons, three times that of 1995 (International finance corporation. 2021). Five countries account for nearly three-quarters of world cement production, led by China 57%, India, Vietnam, the United States and India (International finance corporation. 2021). The capacity of Indonesia's cement industry has increased to 114 million tons as of 2019, with 70 million tons of that amount intended for domestic use (Indonesia Cement Sales. 2019).
The cement industry involves air pollution, energy consumption, and CO_2 emissions worldwide, including sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter (PM). The cement producing province of North Sulawesi on Celebes exported 63,000 tons of cement in May 2021. Over the same period, the associated air pollution, energy consumption, and CO_2 emissions increased due to various sustainable development measures being essential to the industry (Wang, et. al, 2021). The companies in the sector must develop performance metrics for sustainability.
The concept of sustainability is currently defined as the correlation between three main principles: economic growth, social justice, and environmental empowerment. To achieve sustainability in the manufacturing industry, it is necessary to adopt an integrated approach which includes multi-dimensional indicators so that it leads to interconnection in the economic, environmental and social aspects (Naderi, et. al, 2017). Sutherland et al. (2016) suggest that a system must meet all sustainability criteria (environmental, economic and social) to be a sustainable system. As such, this indicator provides an important tool for organizational sustainability assessment which is not only helpful in identifying challenges but also important when designing sustainable scenarios. in organizations or

sectors and risk analysis (Gani et al. 2021). In order to change how organization run and generate value for a variety of stakeholders, corporate sustainability performance (CSP) is crucial. A CSP framework must emphasize the qualities that will direct business executives and decision-makers toward sustainable development (Wang, et. al, 2021).

1.1 Objectives

This study's goal is to investigate complexity in order to support Indonesia's strategic growth of sustainability of fiber cement industry. Soft system methodology technique that employs a system diagram and multi-actor analysis to thoroughly understand the problem and set standards that will support the sustainability plan framework.

2. Literature Review

2.1. Sustainability

Sadler (1990) states that the concept of sustainability is often represented as a combination of three dimensions, namely social, economic and environmental. Then Hodge (1997) explored the concept and judged that an activity, process, area or project is said to be sustainable if these factors maintain, support and bring the three dimensions of sustainability in the long term.

The term "triple bottom line" (TBL) was first used by Elkington (1994). It refers to the idea of sustainable performance as shown by a triple line with different interfaces between social, economic, and environmental components. Since then, numerous studies have used the TBL technique to gauge corporate sustainability performance (Wu et al., 2019). The TBL assesses performance using three different metrics: traditional financial or profit indicators, an evaluation of its environmental duties, and public perceptions of a company's social responsibility as demonstrated by its business practices.

2.2. Corporate Sustainability Performance

The pursuit of sustainability at the economic, social, and environmental levels is what is meant by corporate social responsibility, or CSP. According to Lozano et al. (2011), the term also takes into account the firm's partnerships with important stakeholders and operating plans. The idea of CSP as an incentive rather than a necessity has garnered significant support from the corporate community. This has caused a paradigm change in how businesses think about and create value (Maletic, et. al, 2015). It indicates that it is closely related to the TBL concept.

Bhupendra and Sangle (2016) emphasized the significance of implementing cutting-edge technology to reduce waste and pollution caused by production processes. Additionally, Annunziata et al. (2018) contended that improved sustaintability performance was linked to the use of cutting-edge technologies in the manufacturing process. It appears that incorporating technology could help to increase CSP's effectiveness. Furthermore, governments and industry associations' pressure to comply with legislation was underlined by Xia et al. (2020). Hence, we sought to broaden the concept of CSP by including these two elements.

2.3. Risk Analysis

Risk is defined as potential deviations from the norm in a scenario (Fisk, 1997; Suharto, 1995). The ISO 31000 framework, on the other hand, asserts that risk arises as a result of uncertainty, which will have an effect in the form of deviations from targets. According to Tambupolon (2005), risk is a potential danger that could have a detrimental effect on achieving goals. Hazards associated with an activity are sometimes perceived as just having bad things to offer. Risks really offer two options: good impacts, also known as opportunities, and negative risks, often known as threats (Frosdick, 1997). Yet, the notion of this risk is not fully accepted by the general public, who instead tend to view risk negatively since they perceive it as something that would result in losses. (Hedinigrum, 2015)

2.3. Soft System Methodology

Soft Systems Methodology (SSM) is a qualitative research method based on systems thinking and action research (Aryee 2022). To comprehend the problem scenario and the actors' perceptions, judgments, and values, it employs models of human activity. With detailed images, structures like CATWOE (customer, actor, transformation, worldview, owner, environment), and PQR, the problem scenario in SSM is turned into a system framework. Then, conceptual models are created based on actual circumstances. In this article, the conceptual model map of the challenges is developed using the SSM's methods. In order to clarify the perceptions of all the actors participating in the selection process, we have included multi actor analysis to the process.

3. Methods

The four stages of the SSM process are used in this study to comprehend the issue surrounding the choice of CRM software. Stages one and two use a rich image diagram to attempt to understand the issue from all angles. Using CATWOE analysis, step three establishes a root definition of the system, and stage four produces a conceptual model of the system. Both the conceptual model and the root definition are based on actual situations, and they will be contrasted with the current circumstances of the business.

4. Results and Discussion

4.1 Problem Situation and Descriptions

The complexity of CSP and the uncertainty around pertinent qualitative and quantitative data have both been highlighted in numerous studies. The stakeholders have to decided form those criteria to be implemented that is in line with the government regulatory and be cautious while selecting choices, exercise caution to avoid making suboptimal choices that could influence the company's financial, economic, and social conditions as well as lead to poor strategic choices. Based on review of pertinent literature, we took into account the following five aspects of CSP: institutional compliance, economic benefit, social sustainability, and environmental effect.

In this case, the fiber cement industry needs a sustainable framework to be applied and in line with the government regulatory. The selection criteria need to comply with the company's regulation and resources and need to be evaluated based on the regulatory. The result of the evaluation will be a strategic framework criterion that can be applied in the relevant industries especially in fiber cement industry

4.2 Defining System's Problem

The key issue is that the stakeholders require a grading system in order to choose the finest strategy framework. Table 1 displays the CATWOE analysis that was created from the system's root specification.

Table 1. CATWOE Analysis of Sustainability in Fiber Cement Industry

Root Definition	CATWOE	Elements
A system by that fit business needs by defining criteria of sustainability manufacturing and corporate sustainability performance to determine the sustainability framework strategy in fiber cement industry	Customer	Fiber Cement Consumer Government as industrial regulator
	Actors	1. Industry Stakeholder 2. Government
	Transformation	Defining criteria of sustainability that can be implement at the industry and in line with the government policy and regulation
	Worldview	Fiber cement Industry need to implement sustainability due to the external and internal push to sustain
	Owner	Fiber Cement
	Environment	Company's investment capabilities and regulation

Table 2 provides an analysis of the actors' roles in the transformation process. The analysis of the actors involved in making decisions reveals their positions, objectives, interests, causes of the problem(s), and sources of power.

Table 2. The Analysis of Decision-Making Actors

	Actors	
	Industry Stakeholder	**Government**
Problem Perception	Sustainability Strategy	Industry regulation
Objective(s)	Assess the perspective criteria of corporate sustainability performance	control all sustainability-related laws and policies
Interest(s)	The industry sustains	The entire industry complies with the established laws and regulations.
Causes of Problem(s)	The need for finding the best sustainability framework in fiber cement industry	The requirement to address all sustainability viewpoints
Resource(s)	HR-Legal, Sustainability Dept. Manufacturing, Supply chain dept.	Industrial ministry

Position	The policy makers and evaluator for the decision makers	The policy makers

4.3 Conseptual Model of System's Problem

The system diagram in Figure 1 describes the conceptual model of an ideal system based on the CATWOE framework.

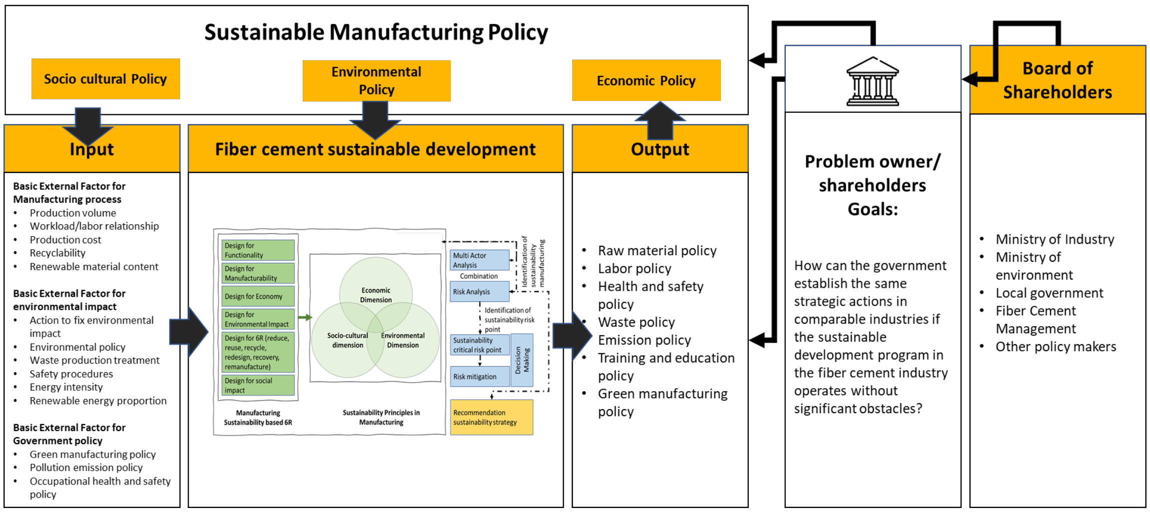

Figure 1. System Diagram in the Sustainable Manufacturing Policy

In the areas of policy intervention such as environmental impact, social sustainability, economic benefit, technological feasibility, and institutional compliance, the stakeholders acting as the problem's owner will determine the strategy. The stakeholder will choose all of the requirements and assess them for implementation in light of sustainable perspectives. From the point criteria, its risk and its impact on the decision-making process and risk management will be scored.

The system's goal is to create a framework for sustainability strategy that best fits Indonesia's fiber cement sector. The manufacturing industry's internal and external factors as well as external factors from the government are inputs into the system. The results include the industry's foundation for sustainability in the fiber cement sector.

6. Conclusion

The criteria decision for the sustainability framework needs to be conducted to help the stakeholders to help them implement the framework. As a result of this study, the stakeholders who require a decision-making process have been identified as stakeholders and the relationships between them. Benefits from the systemic framework analysis employing the SSM were found in this study. Using SSM could make clear the crucial factor that needs to be taken into account when executing a decision-making mechanism after multi-actor mapping and other variables. To find the most appropriate sustainability framework based on corporate sustainability performance in the fiber cement business, future study must employ a multi-criteria decision-making method.

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Biographies

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