

Integrated Corporate Social Innovation for Urban Coastal Resilience: Evidence from the Lawang Cemoro Program in Indonesia

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Abstract.

Coastal areas face a variety of complex challenges, including environmental pollution, limited access to clean water, poor public health, and social and economic vulnerability. These conditions call for a development approach that is not only environmentally focused but also capable of strengthening community capacity in a sustainable manner. This study aims to analyze the implementation of the Lawang Cemoro Program (Gateway of Hope for the People of North Semarang) as a social innovation by PT Pertamina Patra Niaga Integrated Terminal Semarang in building coastal resilience through a sustainable development approach. The study employs a qualitative method using a case study approach. Data were collected through observation, interviews, documentation, and literature review, and were then analyzed descriptively using a sustainable development framework. The research findings show that the Lawang Cemoro Program is implemented through four main pillars: *Manfaati Sampah*, *Tirto Migunani*, *Sehat Jiwa Raga*, and *Pasinaon*. The “*Manfaati Sampah*” pillar successfully promotes the circular economy through the management of economically valuable waste; “*Tirto Migunani*” enhances water resilience through the use of solar-powered, environmentally friendly water filtration technology (SITIRTA); “*Sehat Jiwa Raga*” strengthens social resilience through preventive health services and protection for vulnerable groups; and “*Pasinaon*” builds community capacity through education, training, and economic empowerment. The implementation of these four pillars has had a positive impact on improving the quality of the environment, health, social capacity, and the economic self-reliance of coastal communities. Research findings indicate that collaboration between companies, the government, and the community through social innovations based on local needs can strengthen the resilience of coastal areas while supporting the achievement of the Sustainable Development Goals (SDGs).

Keywords: Social innovation, coastal resilience, sustainable development, community empowerment, Lawang Cemoro and circular economy.

I. INTRODUCTION

Urban coastal areas are among the regions most vulnerable to environmental, social, and economic pressures resulting from rapid urbanization, climate change, environmental degradation, and increasing population density [1]. In many developing countries, coastal areas face not only environmental pollution and a lack of basic infrastructure, but also high poverty rates, social vulnerability, poor public health, and limited access to public services [2]. These complexities make building urban coastal resilience a key priority in achieving the Sustainable Development Goals (SDGs), particularly Goal 1 (No Poverty), Goal 3 (Good Health and Well-being), Goal 5 (Gender Equality), Goal 6 (Clean Water and Sanitation), Goal 11 (Sustainable Cities and Communities), Goal 13 (Climate Action), and Goal 17 (Partnerships for the Goals) [3].

Indonesia faces increasingly complex challenges in coastal development due to rapid urbanization that is not matched by adequate infrastructure and basic services [4]. Coastal cities face a variety of interrelated problems, such as slum areas, high levels of waste generation, limited access to clean water, poor sanitation, damage to coastal ecosystems, and increasing social vulnerability among communities [5]. These conditions indicate that problems in coastal areas cannot be resolved through standalone sectoral approaches but require an integrated approach that combines environmental, social, economic, and health aspects with collaborative governance[6].

One of the areas facing these complex issues is Tanjung Mas Village, North Semarang Subdistrict, Semarang City. According to Semarang Mayor’s Regulation No. 19 of 2023 on the Plan for the Prevention and Improvement of the Quality of Slum Housing and Settlements for 2022–2026, slum areas in Semarang City cover 431.54 hectares, with Semarang Utara Subdistrict having the highest level of slum density [2]. In Tanjung Mas Village alone, there is a slum area spanning 17.34 hectares spread across 30 neighborhood

units (RTs). The high population density—which stands at approximately 27,200 people—has led to an increase in waste volume to about 24 metric tons per day, while 335 households have not yet received waste collection services and 253 households still have limited access to clean water.

These environmental issues have a direct impact on the health and well-being of the community. According to 2024 data from the Semarang City Health Department, this area recorded 79 malnourished toddlers and 68 at-risk pregnant women, a situation exacerbated by limited access to clean water and sanitation [7]. From an economic perspective, the 2025 National Social and Economic Single Data (DTSEN) indicates that 4,235 people fall into the categories of poor and extremely poor. Meanwhile, social vulnerability remains high, as evidenced by 91 cases of domestic violence in the North Semarang area and at least 25 cases of violence against women and children that were successfully assisted in Tanjung Mas Village during the 2022–2025 period. These conditions indicate that the problems faced by the community are multidimensional, thus requiring an integrated and sustainable approach to addressing them [7].

The complexity of these issues demonstrates that a Corporate Social Responsibility (CSR) approach based on philanthropy and focused on short-term aid is no longer sufficient. Companies are called upon to develop a Corporate Social Innovation (CSI) approach capable of driving systemic change through multi-stakeholder collaboration, community empowerment, the strengthening of local institutions, and the creation of shared value [8]. This approach is expected not only to address social and environmental issues but also to enhance communities' capacity to sustainably manage various socio-ecological risks.

As part of its Social and Environmental Responsibility (TJSL) initiatives, PT Pertamina Patra Niaga Integrated Terminal Semarang has developed the LAWANG CEMORO Program (Gateway to Hope for the People of North Semarang) as a model of social innovation that integrates four main pillars: community-based waste management (Manfaati Sampah), clean water supply and food security through SITIRTA technology (Tirto Migunani), protection of women and children through the Pertamina Healthy Home (Sehat Jiwa Raga), and strengthening family education (Pasinaon). This program also promotes women's economic empowerment through Women Farmers' Groups (KWT), fosters local leadership (local heroes), and facilitates collaboration with the government, health institutions, community organizations, and various other stakeholders [9].

The implementation of the LAWANG CEMORO Program has had a multidimensional impact. This program has increased community income through the development of circular economy-based businesses, generated an innovation that converts waste into alternative fuel (Petasol), reduced the cost of clean water supply through SITIRTA technology, strengthened community institutions, increased community satisfaction to 86.43%, and generated a Social Return on Investment (SROI) of 1:1.27. These achievements demonstrate that corporate social innovation can simultaneously generate environmental, social, economic, and institutional benefits [9].

Research on the transformation of CSR toward an Integrated Corporate Social Innovation model to support the resilience of urban coastal areas remains relatively limited, particularly in developing countries [10]. Most previous studies have focused on the impact of CSR on corporate sustainability or the creation of economic value, whereas studies that integrate corporate social innovation, coastal resilience, multi-stakeholder collaboration, and the achievement of the Sustainable Development Goals (SDGs) within a single analytical framework remain very few. Therefore, this study aims to analyze how the LAWANG CEMORO Program exemplifies the transformation of CSR into an Integrated Corporate Social Innovation model to strengthen urban coastal resilience, while also evaluating its contribution to reducing socio-ecological vulnerabilities, strengthening multi-stakeholder collaboration, and achieving the Sustainable Development Goals [9]. The results of this study are expected to provide an empirical contribution to the development of Corporate Social Innovation theory and serve as a replicable model for coastal area development in various developing countries.

II. METHODS

This study employs a case study approach using a qualitative descriptive method [11]. The subject of the study is the LAWANG CEMORO Program (Gateway to Hope for the People of North Semarang),

implemented by PT Pertamina Patra Niaga Integrated Terminal Semarang in Tanjung Mas Village, North Semarang District, Semarang City. Data collection was conducted through the triangulation of various sources, including field observations, in-depth interviews with key stakeholders (the company, local government, community groups, and beneficiaries), Focus Group Discussions (FGDs), a review of documentation, as well as an analysis of program implementation reports, Social Return on Investment (SROI) reports, monitoring and evaluation data, and local government policy documents. This approach was used to gain a comprehensive understanding of the process of transforming Corporate Social Responsibility (CSR) into Integrated Corporate Social Innovation (ICSI).

The analysis was conducted in stages through the identification of socio-ecological issues in coastal areas, the mapping of interventions under the LAWANG CEMORO Program, the evaluation of the implementation of the program's four pillars (Manfaati Sampah, Tirta Migunani, Sehat Jiwa Raga, and Pasinaon), and an analysis of the impacts on environmental, social, economic, and institutional dimensions. Furthermore, the implementation results were analyzed based on the frameworks of Corporate Social Innovation and Urban Coastal Resilience, as well as their contribution to achieving the Sustainable Development Goals (SDGs). Data validity was strengthened through triangulation of sources, methods, and documents, resulting in a credible interpretation of the program's effectiveness as an integrated corporate social innovation model [12].

The overall research process is illustrated in Figure 1 below:

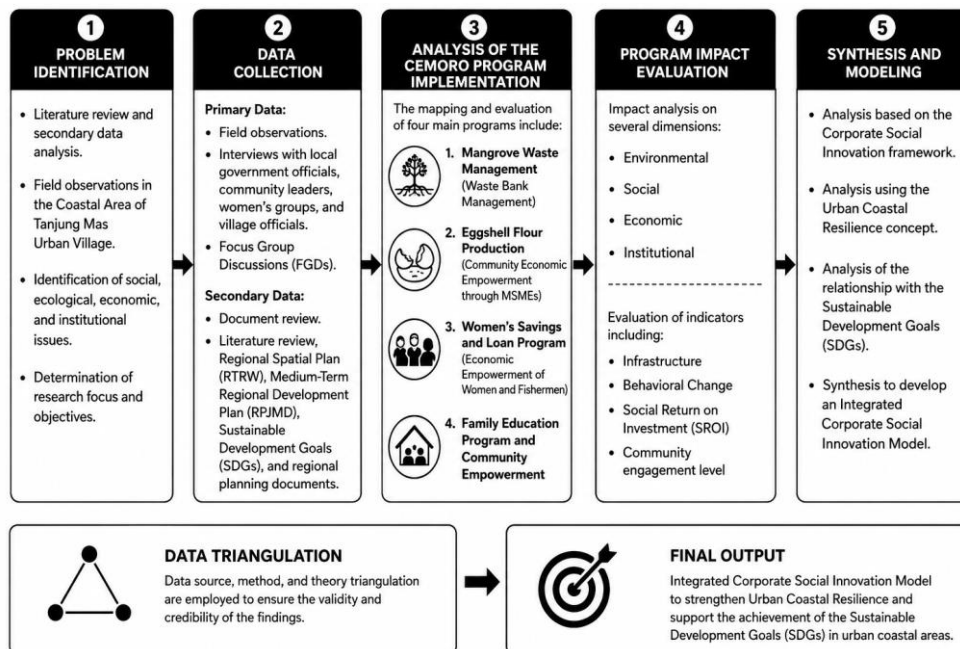


Fig. 1. Flowchart of the Research Methodology for the LAWANG CEMORO Program

III. RESULT AND DISCUSSION

3.1 The Transformation of Corporate Social Responsibility Toward Integrated Corporate Social Innovation in Strengthening Urban Coastal Resilience

Research findings indicate that the LAWANG CEMORO Program (Gateway to Hope for the People of North Semarang) represents a paradigm shift in Corporate Social Responsibility (CSR) toward an Integrated Corporate Social Innovation (ICSI) approach in addressing the complexities of urban coastal issues [9]. This program is no longer viewed as a form of corporate social responsibility that is compensatory or based on short-term aid, but has evolved into a social innovation strategy that drives systemic change through the integration of corporate resources, community capacity, technology, and multi-stakeholder collaboration.

Conventional CSR approaches are generally still oriented toward delivering benefits to communities through programs that are piecemeal and limited to addressing specific problems [13]. However, the nature

of the challenges facing urban coastal areas indicates that such approaches are no longer sufficient. Issues such as slum areas, increasing waste volumes, limited access to clean water, poor health conditions, poverty, and the vulnerability of women and children are interrelated problems that require cross-sectoral solutions [5].

The LAWANG CEMORO program exhibits the characteristics of social innovation because the company not only provides resources but also acts as a facilitator of change by creating a new system that enables the community to become the primary actors in the development process. This is evident in the program's strategy, which integrates environmental, social, economic, health, and institutional interventions within a single framework of community empowerment. This finding reinforces the concept of Corporate Social Innovation, which posits that companies can generate shared value when they are able to align business interests with the resolution of social issues [14]. The value created by the LAWANG CEMORO initiative extends beyond benefits for the community; it also fosters environmental innovation, strengthens the company's relationships with stakeholders, and enhances the sustainability of the company's social programs. From the perspective of urban coastal resilience, this integrative approach is crucial because the resilience of coastal areas is determined not only by the environment's ability to withstand ecological pressures but also by the community's social capacity to adapt to change [15]. The LAWANG CEMORO program demonstrates that building coastal resilience requires a combination of environmental innovation, community capacity building, and local institutional strengthening [9].

3.2 Integration of the Four Pillars of LAWANG CEMORO as a Strategy for Reducing Socio-Ecological Vulnerability

One of the key characteristics of the LAWANG CEMORO Program is its intervention design, which is based on the integration of four main pillars: Manfaat Sampah, Tirta Migunani, Sehat Jiwa Raga, and Pasiaon. These four pillars demonstrate that the program does not view the challenges faced by coastal communities as isolated issues, but rather as an interconnected system of problems [9].

3.2.1 Waste Utilization: Transforming Waste into a Source of Value through the Circular Economy

The "Waste Utilization" pillar reflects a paradigm shift in waste management from an end-of-pipe approach to a circular economy approach. Before the program was implemented, waste was viewed as an environmental burden that contributed to coastal pollution. However, through the social innovation of LAWANG CEMORO, waste has been transformed into a resource with economic value.

The initial stage of waste management involves the community sorting household solid waste (Figure 2). This activity serves as the foundation for implementing a circular economy because it allows waste to be separated by type so that it can be reused as raw material in various processing operations.



Fig. 2. Household solid waste sorting by the community as the first step in circular economy-based waste management.

Next, the sorted plastic waste is further processed using various innovations developed by community groups. One such innovation is the POJA-PETA (Poros Jari Pengganti Tangan) plastic waste dryer, designed to improve the efficiency of the waste drying process before it is processed in the next stage (Figure 3). The use of this machine not only boosts the productivity of the Kemijen Bahagia Waste Bank group but also reduces manual labor, making waste processing faster, more effective, and safer.



Fig. 3: POJA-PETA Plastic Waste Drying Machine

After undergoing sorting and drying, plastic waste is utilized as raw material for the production of Petasol, an alternative fuel produced through pyrolysis technology. This innovation demonstrates a shift in perspective toward waste—from something that must be discarded to a resource with economic value and environmental benefits. The LAWANG CEMORO program not only improves the existing waste management system but also creates a new model that links the resolution of environmental problems with community economic empowerment. As a result, the waste problem—which previously posed a threat to coastal areas—has been successfully transformed into an opportunity for innovation, increased community income, and the strengthening of circular economy practices that support sustainable development [16].

3.2.2 Tirto Migunani: Water Security Innovation through the Utilization of Local Resources

The Tirto Migunani pillar demonstrates how social innovation can address the issue of clean water scarcity through a technology-based approach tailored to community needs. Coastal areas such as the Tanjung Mas neighborhood are highly vulnerable to water-related issues due to environmental conditions, high population density, and the threat of tidal flooding.



Fig. 4. Environmentally Friendly Water Filtration System (SITIRTA) with Solar Panels

The implementation of SITIRTA reflects the principles of sustainable development through the efficient reuse of water resources and the use of renewable energy in its treatment processes. This innovation not only provides a solution to the limited availability of water for non-potable uses but also helps reduce the community's reliance on groundwater. Furthermore, the existence of SITIRTA enhances the adaptive capacity of coastal communities in facing environmental pressures caused by climate change and ecosystem degradation. Thus, the Tirto Migunani Pillar serves as a tangible manifestation of sustainable water resource management through collaboration between technology, environmental conservation, and community empowerment.



Fig. 5: Stakeholder Collaboration in the Tirto Migunani Program

3.2.3 Mental and Physical Health: Strengthening Social Resilience through Health Protection and Support for Vulnerable Groups

The Mental and Physical Health pillar highlights that the resilience of coastal regions is not only related to environmental aspects but also to the quality of public health and social protection. Issues such as

malnutrition, health risks to mothers and children, and violence against women and children demonstrate that coastal communities face complex social vulnerabilities. Through the Pertamina Healthy Home program, the initiative takes a preventive approach through health education, community mentoring, and the strengthening of social protection networks. This approach demonstrates that building community resilience requires interventions that strengthen communities' ability to prevent and cope with social risks.



Fig. 6. Pertamina Healthy Home Activities in Support of Coastal Community Health

The implementation of the “Healthy Mind and Body” pillar demonstrates that investment in public health is a vital component of building sustainable social resilience. Communities that enjoy good health, supported by a robust social protection system, will be better able to adapt to various social, economic, and environmental pressures. Thus, this pillar not only improves the quality of life for coastal communities but also strengthens community resilience as the cornerstone of inclusive and sustainable coastal development [17].

3.2.4 Pasinaon: Education as a Tool for Sustainable Behavioral Change

The Pasinaon pillar plays a role in building community capacity through family education and the strengthening of social knowledge. Education is a key factor because the success of social innovation depends heavily on the community's ability to understand, accept, and sustain change.



Fig. 7. Parenting Class

Through a continuous learning process, the community not only gains technical knowledge but also develops an awareness of the importance of environmental management, family health, and program sustainability.

3.3 Strengthening Individual Capital, Social Capital, and Intellectual Capital as the Foundation for Program Sustainability

The success of the LAWANG CEMORO Program is evident not only in changes to the physical environment but also in the transformation of community capacity through the strengthening of human and social capital.

3.3.1 Individual Capital: Enhancing the Capacity of Community Members

The LAWANG CEMORO program successfully enhanced the individual capital of vulnerable groups through training, mentoring, and community skills development. The organizational management training provided to the SAPA group, the Tunas Bahagia Women's Group (KWT), and the Kemijen Bahagia Waste Bank served as a key tool in improving the community's ability to manage organizations.



Fig. 8. Capacity-building training for SAPA and L-SAPA volunteers

These changes demonstrate that the program does not merely provide facilities but builds community capacity so that they can manage resources independently. As a result, the community has shifted from being aid recipients to becoming key agents of development.

3.3.2 Social Capital: Institutional Development and Community Networks

In terms of social capital, LAWANG CEMORO has successfully built local institutions through the formation of community groups such as SAPA and KWT Tunas Bahagia. These groups serve as platforms for fostering trust, cooperation, and solidarity within the community. Strengthening local institutions is a key factor in the program's sustainability because it enables the community to have internal mechanisms to maintain the innovations that have been developed.



Figure 9. Program replication and training for community groups

This demonstrates that successful social innovation not only brings about individual change but also strengthens social bonds within the community

3.3.3 Intellectual Capital: Knowledge Creation and Local Innovation

The LAWANG CEMORO program has also led to an increase in the community's intellectual capital through the creation of new innovations. One example is the development of a plastic waste dryer using the POJA-PETA (Finger-Driven Replacement for Hands) method by the Kemijen Bahagia Waste Bank group. This innovation demonstrates that the community not only utilizes the provided technology but is also capable of developing new solutions based on local experiences and needs.



Fig. 10. The process of drying plastic waste using petasol and through pyrolysis

This illustrates that corporate social innovation can foster a process of co-creation between the company and the community.

3.4 Multi-Stakeholder Collaboration in Building Coastal Resilience

Research findings indicate that the success of LAWANG CEMORO is heavily influenced by mechanisms of multi-stakeholder collaboration. This program involves companies, local governments, community groups, health institutions, social organizations, and community leaders. This collaboration fosters the pooling of resources, knowledge, authority, and legitimacy from various parties [18].

In the context of urban coastal areas, collaboration is a critical factor because the issues that arise cannot be resolved by a single institution alone. A collaborative approach fosters the creation of a stronger social adaptation system. The presence of "local heroes" is also a key element, as they serve as liaisons

between companies and the community [19]. By empowering local actors, the sustainability of the program is better ensured because the community takes ownership of the change process.

3.5 The Program's Impact on Environmental, Social, Economic, and Institutional Dimensions

An evaluation of the implementation of the LAWANG CEMORO Program shows that the program has produced multidimensional impacts. In the environmental dimension, the program contributes through waste reduction, waste utilization, and the development of resource management technologies. In the social dimension, the program improves the quality of life for the community by increasing access to healthcare, protecting vulnerable groups, and strengthening family capacity. In the economic dimension, the circular economy approach creates opportunities for increased community income by converting waste into products with economic value.

On the institutional dimension, an SROI value of 1:1.27 indicates that the social investment made has generated social benefits greater than the amount invested. A community satisfaction rate of 86.43% also demonstrates that the program has delivered benefits relevant to the community's needs.

3.6 The LAWANG CEMORO Program's Contribution to the Sustainable Development Goals (SDGs)

The LAWANG CEMORO Program is closely linked to various Sustainable Development Goals (SDGs) through an approach that integrates environmental, social, economic, and institutional aspects. The "Manfaati Sampah" (Waste Utilization) pillar contributes to SDG 11, SDG 12, and SDG 13 through community-based waste management, the application of circular economy principles, and efforts to reduce environmental impacts. The "Tirto Migunani" pillar supports SDG 6 through innovations in the sustainable provision and use of clean water.

Furthermore, the "Sehat Jiwa Raga" pillar contributes to SDGs 3 and 5 by improving public health and strengthening the protection of women and children. The "Pasinaon" pillar supports SDG 4 by enhancing community knowledge and capacity. Moreover, collaboration between companies, the government, and the community strengthens the achievement of SDG 17 through multi-stakeholder partnerships. Thus, the LAWANG CEMORO Program demonstrates that corporate social innovation can serve as a strategic instrument in supporting sustainable development, particularly in urban coastal areas with high levels of socio-ecological vulnerability.

3.7 Theoretical and Practical Implication

Theoretically, this study contributes to the development of research on Corporate Social Innovation by demonstrating that corporate social innovation can serve as a mechanism for building resilience in urban coastal areas. This study expands the understanding that the success of CSR is not only measured by program outputs but also by the program's ability to bring about systemic transformation, enhance community capacity, and generate shared value [20].

Practically, the LAWANG CEMORO Program can serve as a model for other companies in developing TJSL programs based on social innovation. The program's success demonstrates that coastal community development requires an approach that integrates technological innovation, community empowerment, the circular economy, and multi-stakeholder collaboration. Thus, LAWANG CEMORO can be positioned as a model of Integrated Corporate Social Innovation capable of transforming socio-ecological challenges into opportunities for sustainable development through a collaborative, innovative, and community-based approach.

IV. CONCLUSION

This study shows that the LAWANG CEMORO Program represents a transformation of Corporate Social Responsibility (CSR) toward an Integrated Corporate Social Innovation (ICSI) model aimed at strengthening urban coastal resilience. This program does not merely focus on social assistance but integrates technological innovation, community empowerment, institutional strengthening, and multi-stakeholder collaboration to address socio-ecological challenges.

The implementation of the program's four pillars—Manfaati Sampah, Tirto Migunani, Sehat Jiwa Raga, and Pasinaon—demonstrates that an integrated approach can yield positive impacts in environmental, social, economic, and institutional spheres. The program has also succeeded in strengthening the

community's individual, social, and intellectual capital through capacity building, the formation of local groups, and the development of community-based innovations.

The success of the LAWANG CEMORO Program is supported by collaboration among companies, the government, the community, and other stakeholders. A community satisfaction rate of 86.43% and an SROI of 1:1.27 demonstrate that the program is capable of creating shared value and contributing to the achievement of various SDG goals. Thus, the LAWANG CEMORO Program can serve as a model for Integrated Corporate Social Innovation, demonstrating that corporate social innovation can be an effective strategy for building coastal communities that are more adaptive, self-reliant, and sustainable.

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