

Policy recommendations for community empowerment in climate change adaptation: a study of the Go Green Pandawara Group campaign in Support of SDG 13 Climate Action

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Abstract. This research aims to formulate policy recommendations for community empowerment in facing climate change through a case study of the Go Green campaign conducted by the Pandawara Group in alignment with SDG 13: Climate Action. This campaign focuses on raising public awareness about the importance of climate change adaptation efforts through concrete actions such as reforestation, waste management, and carbon footprint reduction. The method used in this research is a qualitative approach with case study analysis. Data were collected through interviews, observations, and documentation of campaign activities. The study results show that the Go Green campaign by the Pandawara Group successfully encouraged active community participation in various environmentally friendly programs. However, there are challenges to the program's sustainability, particularly related to long-term commitment and more robust policy support from the government. Therefore, this research provides several policy recommendations, including strengthening collaboration between the government, communities, non-governmental organisations, and the private sector and integrating climate change adaptation programs into regional development plans. Implementing these policies is expected to strengthen the community's capacity to face the impacts of climate change.

1 Introduction

In the last century, industrialisation has rapidly expanded, significantly raising the standard of living through various services and is widely recognised for its numerous benefits [1]. However, this aggressive exploitation of natural resources exacerbates global pollution levels, posing a significant environmental risk. Widespread deforestation, air and water pollution, and climate change threaten ecological sustainability, undermining the goals of SDG 13: Climate Action [2]. The environmental consequences of unchecked industrialisation directly impact the natural ecosystems, highlighting the urgent need for sustainable development practices that balance economic growth with ecological preservation.

Environmental issues are not solely linked to nature but also influenced by human activities [3]. Numerous studies have explored the negative impacts of human activities on the environment, such as air pollution and the exploitation of natural resources resulting from industrialisation [4], [5]. Human activities are increasing and appear to have worsening effects on the environment. Society is becoming more indifferent to the surrounding environment [6]. Various human activities impact the environment, necessitating a comprehensive examination of the relationship between humans and the physical environment [5]. Human activities produce toxic compounds in solid, liquid, or gas forms, negatively impacting ecosystems [7].

Waste is one of the problems and complexities faced by developing and developed

countries. Waste is a general problem and has become a universal phenomenon in various countries [8]. For example, based on a study from [9], online shopping causes an improvement in waste in Singapore. With a population of 5.6 million and an area of only 729.6 km², they need land for place disposal end (TPA). Realising the limitations of its land, Singapore has developed a system of management trash that does not use vast landfill areas. They use incineration as a method of waste management. Waste processing is carried out on the island isolated through incineration and smoke filtration. Furthermore, in waste processing, all waste is collected and then transported to an incinerator facility for burning. At the facility, waste is burned at temperatures exceeding 1,000 degrees Celsius. Most of the waste burnt, only leaving a little ash. This ash is transported to a freshwater body, ensuring it is not contaminated by seawater. In Singapore, the management of waste and waste danger is under the scope of the Ministry of Environment and implemented by the National Environment Agency (NEA), which is responsible for the design, development, and administration of initiatives for waste management. NEA involves lots company for collecting, transporting, and separating waste before entering the facility burning waste. In 2002, Singapore operated a four-facility burning waste in Ulu Pandan, Senko, Tuas, and Tuas Selatan.

The Indonesian government has implemented several regulations related to the national waste management strategy, based on Presidential Regulation Number 97 of 2017 concerning the National Policy and Strategy for

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Household Waste Management and Similar Waste. Article 4 of this regulation emphasises strengthening public involvement through communication, information, and education and enhancing business sector involvement through partnerships with the Central Government. In this context, public participation in waste management must be executed, as studies by [10] indicate that effective and sustainable household waste management requires a combination of various methods and strategies. Applying the 3R (Reduce, Reuse, Recycle) principles and the concept of Circular Economy can offer solutions to minimise waste and create a sustainable waste management system. Much of the focus is on recycling plastic waste. According to a study by [11], synergy among all stakeholders is crucial to achieving successful waste management, with cooperation between corporations and the government playing a pivotal role.

Indonesia has significant potential for zero waste management, and one notable example is the Banyumas Regency. According to [12], Banyumas has implemented various sustainable waste management solutions. Key measures include public education and raising awareness about the importance of effective waste management. Local governments and environmental institutions have launched numerous programs, such as providing trash bins, reducing plastic use, and training on organic waste processing. Additionally, Banyumas has established adequate waste management infrastructure. This includes developing modern landfills (TPA) with proper sanitation and sorting and recycling facilities. Sustainable technologies have also been adopted, including renewable energy utilisation in waste management. Such comprehensive waste management practices have yielded satisfactory results [13].

The implementation of waste management policies in various regions of Indonesia has not yet resulted in significant outcomes or changes in behaviour. While many policies are adopted, they are often executed superficially. Several obstacles impede efforts to enhance public health, including a lack of public awareness, inadequate organisation toward developing smart cities, and a general lack of understanding about the importance of healthy living. Additionally, the funding for public health initiatives is minimal, which limits their effectiveness [14].

Actual outcomes and changes resulting from implementing or modifying policies, often impacting social, economic, and environmental aspects, are called "policy consequences" [15]. When a policy is enacted, its consequences can shape behaviour, allocate resources, and broadly shift priorities, affecting both the public and private sectors [16]. For instance, an environmental policy that enforces stricter regulations on emissions can

lead to cleaner air and water. Still, it may also raise industry operational costs, impacting economic growth and job dynamics [17]. Similarly, social policies aimed at improving equity and access can result in better health and education outcomes, but they might also require increased government spending or budget reallocations [18]. Thus, policy consequences serve as a critical measure of a policy's effectiveness, reflecting its broader impact on society and highlighting the importance of thorough impact assessments during policymaking [19].

Table 1. The Pandawara Group Campaign

Achievement	Impact
1. Cleaned over 80 spots, including Labuan Beach in Pandeglang and Sukaraja Beach in Bandar Lampung	1. Increasing public knowledge about environmental cleanliness
2. Collaborated with creators from Vietnam and Malaysia to organise environmental activities, such as discussion forums and clean-up actions	2. Raising public awareness that waste is a shared responsibility
3. Created content on YouTube and shared their activities on various social media platforms such as TikTok, Instagram, Facebook, and X	3. Encouraging the public to maintain cleanliness
4. Inspired young people to protect the environment	4. Inviting the public to collaborate in protecting the environment
5. Promoting environmental cleanliness in schools	5. Encouraging the public to take actual actions, such as cleaning beaches
6. Collaborating with local communities, influencers, and government agencies	
7. Conducting open recruitment for environmental cleanliness volunteers	

The viral presence of the Pandawara Group, an environmentally-conscious community, has brought positive energy through their social media campaigns, encouraging society to be more environmentally aware [20]. The Pandawara Group, a youth organisation from Bandung consisting of Gilang, Ikhsan, Rifqi, Rafly, and Agung, is known for cleaning up rivers and beaches. They engage the local community and environmental activists in

these clean-up activities, which they then share on TikTok, captivating netizens. As of October 2023, the Pandawara Group has 8.4 million followers and has successfully cleaned 620 tons of waste from 187 locations across Indonesia [21]. Their Go Green campaign has been widely recognised, earning them the title Changemaker's of the Year from TikTok and The Best Green Communication award from the Indonesia Green Awards 2023.

The campaign led by Pandawara Group has inspired not only Indonesian society but also audiences overseas, including influencers with large followings on social media. These campaigns are designed to spread information, raise awareness, and encourage behavioural change among their target audience [22]. Campaigns can be manifested in various forms, such as television programs, billboards, banners, or direct involvement that can be observed by the wider community [23]. A study by Kathryn Buchanan of the University of Essex and Gillian M. Sandstrom of the University of Sussex tested the effects of positive and negative social media content on 1,800 respondents. This study highlighted that positive content can inspire feelings of goodwill. When individuals witness positive content, they perceive good actions from others and reflect on what might be lacking in themselves. They may also feel embarrassed because they are indirectly being helped. These feelings can motivate someone to become a volunteer.

On the other hand, studies on waste management policies and their implementation in developing countries, including Indonesia, indicate that they are not yet fully effective. The implementation of waste management policies, as outlined in Presidential Regulation Number 97 of 2017, still faces challenges regarding public and business involvement [10][11]. Meanwhile, some developed countries like Singapore have successfully adopted modern technologies such as incineration for effective waste management, but this strategy has not yet been fully adapted in Indonesia. Additionally, the lack of awareness and inadequate facilities at the local level also pose obstacles to achieving sustainable waste management in Indonesia [14]. Although there are efforts in areas like Banyumas to implement sustainable waste management, significant challenges remain in policy implementation at the regional level in Indonesia [12].

In this context, there is still a lack of community-focused social research like the Pandawara Group's efforts to raise public awareness about the environment through digital media campaigns. Digital media has enabled the environmental movement to overcome conventional activism's geographical and temporal obstacles through rapid information dissemination. This is particularly apparent in "cross-platform usage," where information is disseminated via "horizontal

networks interconnected across various platforms" [24]. Digital media fosters the speed and the reach of environmental advocacy, allowing movements to transcend traditional boundaries of influence [25]. This cross-platform approach enables activists to create a consistent message that resonates across diverse audiences, enhancing awareness and engagement [26]. Through interconnected horizontal networks, campaigns can leverage different formats of videos, articles, infographics, and real-time updates, making complex issues more accessible [27]. This connectivity empowers communities to participate actively, share localised experiences, and adapt global messages to regional contexts, thus amplifying the environmental movement's impact and encouraging collaborative solutions worldwide [28].

This study offers a new contribution by highlighting the role of social campaigns pioneered by the Pandawara Group in raising public awareness about waste management in Indonesia. The uniqueness of this study lies in its approach, which combines community-based social movements with the effectiveness of social media campaigns to drive social behaviour change. This approach has not been widely explored in Indonesia's waste management context. By showcasing the success of the Pandawara Group in using digital platforms for environmental campaigns, this research introduces different community engagement models, which could provide solutions to overcome the limitations of traditional waste management policies in developing countries. This study also strengthens the argument that a collaborative approach between the government, society, and social communities can create more effective synergy in fostering a cleaner and more sustainable environment.

This study examines the effectiveness of environmental campaigns conducted by the Pandawara Group in raising public awareness and participation in waste management. By analysing the impact of the campaigns carried out by the Pandawara Group, this study aims to provide policy recommendations to the government and other relevant stakeholders on how community-based social movements and social media can be strategically integrated into waste management policies in Indonesia. These recommendations are expected to help strengthen the involvement of the community, non-governmental organisations, and the business sector and create synergy between the government and social movements in implementing a sustainable waste management system in line with national policies.

2 Method

This study uses an inductive qualitative methodology. The qualitative approach is characterised by subjective, non-statistical, or non-mathematical evaluation. In this study, measurements are not represented numerically but by classification of marks or quality through a descriptive qualitative design with a post-positivistic paradigm [29].

The data collection in this study employs a structured yet adaptable methodology, commencing with an interview protocol that fosters comprehensive discussions using semi-structured, open-ended questions, enabling participants to convey diverse viewpoints. Informants are chosen through purposive sampling to guarantee they have pertinent experience and knowledge, enhancing the study with diverse ideas. Furthermore, observations are performed to document contextual behaviours and non-verbal signals, which are recorded through comprehensive field notes to enhance interview data. Document analysis enhances this process by comprehensively examining pertinent documents and records to furnish a historical and contextual backdrop. Collectively, these methodologies generate a complete data set that corresponds with the post-positivistic paradigm's focus on comprehending intricate realities through diverse perspectives.

This research, which investigates policy recommendations for community empowerment in climate change adaptation via the Go Green Pandawara Group initiative, significantly aligns with the post-positivistic paradigm. This framework enables the investigation of varied individual views of climate change and adaption techniques, acknowledging that community people, stakeholders, and policymakers may possess distinct interpretations of environmental challenges and empowering mechanisms. Post-positivism's critical realism is congruent with this study, recognising that although an objective reality exists regarding climatic challenges, interpretations and responses to these difficulties are subjective and shaped by individual experiences and social contexts. This methodology allows for a comprehensive analysis of the Go Green Pandawara Group campaign's effects. It facilitates the formulation of policy proposals that address the varied needs and perceptions within the community.

3 Results

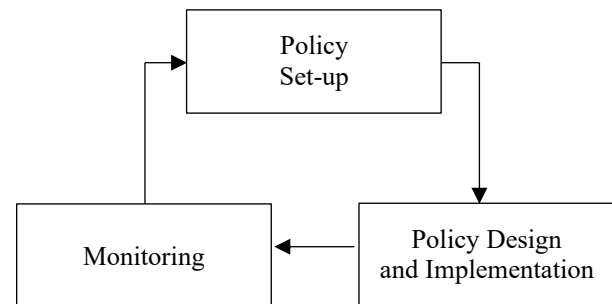


Fig. 1. Phases in adaptive policy: policy development management process

Based on research using the theory (30), adaptation policy creation can be applied in three main stages: policy compilation, design and implementation, and sustainable monitoring and evaluation.

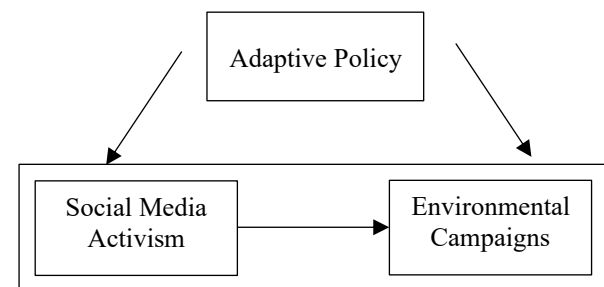


Fig. 2. Theoretical Framework:

This study's context on waste management in Indonesia focuses on the Go Green campaign by the Pandawara Group about Presidential Regulation Number 97 of 2017, especially Article 4, Paragraph (2), Letters (f) and (i), which cover two essential aspects:

3.1 Strengthening Community Engagement through Communication, Information, and Education

In the context of waste management policy, reinforcing public involvement is crucial for successfully implementing the policy. (30) describes an adaptive policy cycle, where communication, information, and education are parts of the policy compilation stage that allows active public participation. Society needs to be involved as the main actors in waste management through a structured and sustainable approach. These three elements must work simultaneously and support each other in efforts to raise awareness and change social behaviour. Here's a detailed explanation of the sub-aspects, including communication, information, and education.

3.1.1 Communication

Communication is essential in spreading policy messages and fostering active community participation. An effective communication campaign strengthens the connection between the government and society, creating two-way dialogue channels and facilitating sustainable behavioural change.

- a. **Social Media Campaign:** The Pandawara Group has increased public involvement through social media campaigns. Social media can reach a broad audience quickly and effectively, leveraging popular platforms such as Instagram, Facebook, and TikTok.
- b. **Face-to-Face Communication:** Despite the rapid growth of digital communication, face-to-face meetings remain essential for establishing direct connections between the government and the community. Environmental meetings, public discussions, and local-level socialisation can enhance public understanding of waste management policies.
- c. **Community-Based Communication:** Engaging community leaders, local figures, and social groups in conveying waste management policy messages is more readily accepted as it involves figures known and trusted by the local public.

3.1.2 Information

Providing clear, accurate, and easily understandable information to the community is crucial for them to take appropriate action. Information dissemination should focus on a deep understanding of the impact of waste and how individual actions can influence the environment.

- a. **Data Management Transparency:** The government must present transparent data on waste management conditions, such as the amount of waste produced, recycling levels, and progress in waste reduction. This transparency helps the public understand the current situation and contribute to improvement efforts.
- b. **Information Distribution Through Conventional and Digital Media:** Print media, television, and radio can convey important information about waste management. Additionally, digital applications can make it easier for the public to access information on waste management, recycling locations, and waste collection schedules.
- c. **Use of Infographics and Educational Videos:** Technical information related to waste management should be presented in an engaging and easily understood format, such as infographics or short videos. This aims to increase public appeal and understanding of the conveyed information.

3.1.3 Education

Public education aims to enhance knowledge and skills in waste management. Continuous education allows the public to understand the importance of effective waste management and take actual actions in their daily lives.

- a. **Environmental Education Programs in Schools:** Waste management education should be integrated into school curriculums. Children and teenagers should be taught concepts like reduce, reuse, recycle (3R) and other practical methods to reduce waste production.
- b. **Waste Management Training for the Community:** The government can organise community-level training on household waste management methods, such as separating organic and non-organic waste and recycling. This training can also cover using simple technologies to support waste reduction efforts.
- c. **Action-Based Education:** Encourage the public to participate in actual activities such as environmental clean-ups, recycling programs, or zero-waste movements. These activities provide practical knowledge and build collective awareness about protecting the environment.

3.2 Strengthening Community, Non-Governmental Organizations (NGOs), and Business Involvement through Partnerships with the Government

To achieve sustainability in waste management and environmental conservation, the involvement of various external parties beyond the government becomes essential. One key strategy is strengthening partnerships between the business sector, local communities, and non-governmental organisations (NGOs). Based on the adaptive policy cycle described by (30), this partnership aligns with the stages of policy implementation and monitoring, where each stakeholder plays a role in effectively supporting policy implementation and evaluation. Here is a further explanation of the sub-aspects that include the involvement of communities, non-governmental organisations (NGOs), the business sector, and industries.

3.2.1 Community Involvement

Engaging local communities is a crucial foundation in efforts toward sustainable waste management. Local communities are the closest group to environmental problems, so they must be given active roles at every policy stage. Local society becomes the policy object through community involvement and contributes to achieving environmental policy targets.

- a. **Formation of Environmental Action Groups:** Local communities can be organised into action-

- focused groups, such as recycling or environmental cleanliness groups. Successful examples of this approach include communities like the Pandawara Group, which actively invites residents to participate in environmental clean-ups. These groups can be supported with technical training from the government or related NGOs in practical waste management technology.
- b. **Economic Empowerment through Waste Management:** Communities can be encouraged to utilise waste as a source of income, for example, through recycling or upcycling programs. These programs not only help reduce the amount of waste but also provide economic benefits for society. Local governments can provide support through training and capital assistance to develop small businesses related to recycling.
 - c. **Youth and School Engagement:** Engaging young children and schools in environmental activities can increase awareness early on about the importance of waste management. Programs such as school trash banks, where students are taught to sort waste and exchange it for goods or money, can increase youth's active participation in protecting the environment.

3.2.2 NGOs Involvement

Non-governmental organisations (NGOs) play a significant role in bridging communication between the government and society, providing technical assistance and advocating for environmental policies. NGOs often act as facilitators supporting communities in running ecological programs.

- a. **Facilitating Education and Environmental Awareness Programs:** NGOs can organise educational programs and environmental awareness campaigns for the community. They can collaborate with the government to conduct training on waste management techniques, such as recycling, composting, and organic waste management. These programs can accelerate the adoption of waste management policies at the local level.
- b. **Advocating for Sustainable Policies:** NGOs can act as advocates, encouraging the government to implement more progressive waste management policies. They can also oversee policy implementation to ensure it aligns with set goals. In this role, NGOs often serve as intermediaries between local communities and policymakers, voicing public needs to the government.
- c. **Funding and Pilot Projects:** Many international NGOs have access to broader financial resources and can support pilot projects related to waste management at the local level. For example, NGOs can fund community recycling projects or provide advanced technology for waste

processing. The government or other communities can adopt these pilot projects.

3.2.3 Involvement of the Business and Industry Sector (DUDI):

The business sector, including large industries, is crucial in creating a sustainable business environment. By involving the business sector, the government can leverage their resources and technology to accelerate the implementation of more effective waste management policies. Partnerships with the business sector should extend beyond financial donations to include contributions in the form of innovation, technology, and capacity development for the public.

- a. **Public-Private Partnership (PPP):** The business sector can be involved in waste management through public-private partnership schemes. In this model, the private sector collaborates with the government to develop waste management infrastructure, such as recycling facilities or modern incineration systems. A successful example is Singapore, where the private sector collaborates with the government to build efficient incineration facilities.
- b. **Corporate Social Responsibility (CSR):** Many large companies have Corporate Social Responsibility (CSR) programs that can be directed towards waste management. Companies can fund environmental projects through CSR programs, such as supporting community waste banks or building recycling facilities. These initiatives not only have a positive environmental impact but also enhance the company's image in the eyes of the public.
- c. **Development of Environmental Technology and Innovation:** The business world, especially technology companies and waste processing industries, can develop innovative technologies that support waste management. For example, companies can invest in environmentally friendly waste processing technologies or promote more accessible recycled products. With such innovations, the business sector can help reduce the volume of waste going to landfills and maximise recycling processes.
- d. **Partnership with the Local Industrial Sector:** Engaging local industries in waste management is essential for creating a circular economy. Small industries can be encouraged to utilise waste as an alternative raw material in their production processes. In this way, the industrial sector can become part of the waste reduction solution, not just a contributor to waste generators.

4 Discussion

Based on the study results about waste management in Indonesia, referencing Presidential Regulation Number 97 of 2017, as well as (30) theory on adaptive policy cycles, two critical points support the successful implementation of waste management policies: Strengthening Community Engagement through Communication, Information, and Education, also Strengthening Business Sector Involvement through Partnership with the Central Government.

4.1 Strengthening Community Engagement through Communication, Information, and Education

Public involvement in waste management is a crucial component determining the success of an environmental policy. This research shows that communication, information, and education are essential pillars in increasing societal participation, which aligns with [30], emphasising the importance of public involvement in the policy compilation stage. This study aligns with previous research by [31], indicating that effective communication through social media and local communities can drive behaviour change related to waste management. Campaigns by groups like the Pandawara Group demonstrate that active public involvement can be achieved through digital and face-to-face communication. The research also supports [32], who found that transparent information about waste management and action-based education can increase public awareness and commitment to protecting the environment. Thus, a structured and sustainable approach to communication, information, and education can form the basis for the public to play a more active role in waste management. The community is not just a policy recipient but also an active actor directly responsible for policy implementation.

4.2 Strengthening Community, Non-Governmental Organizations (NGOs), and Business Involvement through Partnerships with the Government

Apart from public involvement, this study also emphasises the importance of partnerships between the business world and the government in waste management. The business sector, especially the industrial sector, has resources and technology that can support the development of more effective waste management infrastructure. This aligns with findings by [33], which show that public-private partnerships (PPP) can accelerate the development of waste management infrastructure in some regions in Indonesia. The research results also strengthen the argument [34] that Corporate Social Responsibility

(CSR) programs from the business sector can support local waste management programs, such as waste banks or recycling facilities. Whether through CSR funding or technological innovations, business sector contributions can substantially mitigate the government's burden in handling waste management responsibilities. Additionally, this research aligns with [35], who suggests that local industries can be encouraged to use waste as an alternative raw material, creating a circular economy that supports the reduction of waste volume in final disposal sites (TPA).

5 Conclusion

In conclusion, community involvement through structured communication, information, and education is essential for successful waste management. Communities must play an active role from the policy-making stage, supported by effective campaigns and information transparency to increase environmental awareness. In addition, partnerships between the government and the business sector through Public-Private Partnership (PPP) and Corporate Social Responsibility (CSR) programs can strengthen waste management infrastructure. Business contributions to technological innovation and community capacity support reduce the burden on the government in handling waste more efficiently and sustainably.

Policy Recommendations to the Government and Other Stakeholders in Waste Management in Indonesia Through Strategically Integrated Community-Based Social Movements and Social Media: First, Strengthening Community Engagement through Communication, Information, and Education in the three main stages of policy adaptation creation: policy formulation, policy design and implementation, and continuous monitoring and evaluation. Second, Strengthening Community, Non-Governmental Organizations (NGOs), and Business Involvement through Partnerships with the Government. These recommendations are expected to help strengthen the involvement of the community, NGOs, and the business sector and create synergy between the government and social movements in realising a sustainable waste management system in line with national policies.

Acknowledgments to LPPM Unsoed for the Basic Research grant provided so that this research can be carried out well.

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