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Challenges and Opportunities in Implementing Sustainable Solid Waste Management

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Abstract— *This study explores the challenges and opportunities in implementing sustainable solid waste management in Barangay Washington, Surigao City. Through the lived experiences of residents, barangay officials, and waste workers, the research aims to generate practical insights that can improve local waste practices, promote community participation, and support more inclusive policymaking. Using a qualitative research design, data were gathered through semi-structured interviews with 10 purposively selected informants. Thematic analysis, based on Braun and Clarke's (2006) framework, was used to interpret the data. Findings reveal that sustainable waste management efforts are hindered by systemic issues such as irregular collection and weak enforcement. However, opportunities also exist in areas such as youth involvement, behavior change, and institutional support. The study highlights the importance of education, empowerment, and collaborative governance in building a cleaner and more sustainable community.*

Keywords— *Sustainable Solid Waste Management; Brgy. Washington; Challenges; Opportunties.*

I. Introduction

Solid waste management has become one of the most pressing environmental issues faced by many communities today, especially in growing urban areas. In the Philippines, improper disposal of waste continues to threaten public health, pollute waterways, and degrade the environment. According to the National Solid Waste Management Commission (NSWMC), the country generates approximately 61,000 tons of solid waste daily, with a significant portion coming from urban households [10]. Despite the passage of Republic Act 9003 or the Ecological Solid Waste Management Act of 2000, many barangays still struggle to adopt and maintain sustainable waste management practices at the grassroots level (Department of Environment and Natural Resources [4]. This study focuses on Barangay Washington in Surigao City, a densely populated area that reflects both the challenges and potential of implementing sustainable solid waste management in a local setting.

Although numerous programs have been introduced by the city government and non-governmental organizations, significant gaps remain—particularly in community participation, waste segregation, and consistent enforcement of local ordinances. Studies have shown that the success of solid waste management systems depends heavily on the active involvement of the community and the proper implementation of policies [1][6]. While there are individuals and groups in Brgy. Washington who take initiative in proper waste disposal, many residents are either unaware of existing policies or lack the means to follow them. Furthermore, there is limited documentation on the specific challenges faced by the barangay and the opportunities that could support sustainable waste practices moving forward. This lack of localized data hinders the improvement of current systems and the development of tailored solutions.

The primary objective of this study is to identify and analyze the challenges and opportunities in implementing sustainable solid waste management in Barangay Washington, Surigao City.

II. Materials and Methods

This study used a qualitative research design to explore the challenges and opportunities in sustainable solid waste management in Barangay Washington, Surigao City. The purposive sampling method was employed to select 10 key informants, including barangay officials, waste workers, and residents, based on their involvement and relevance to the topic.

Data were collected through semi-structured interviews using an interview-guide questionnaire to ensure consistency while allowing open responses. The responses were analyzed using thematic and content analysis based on Braun and Clarke's (2006) six-phase framework, which involved identifying patterns and themes relevant to the study objectives.

III. Results and Discussion

3.1 Challenges in Implementing Sustainable Solid Waste Management

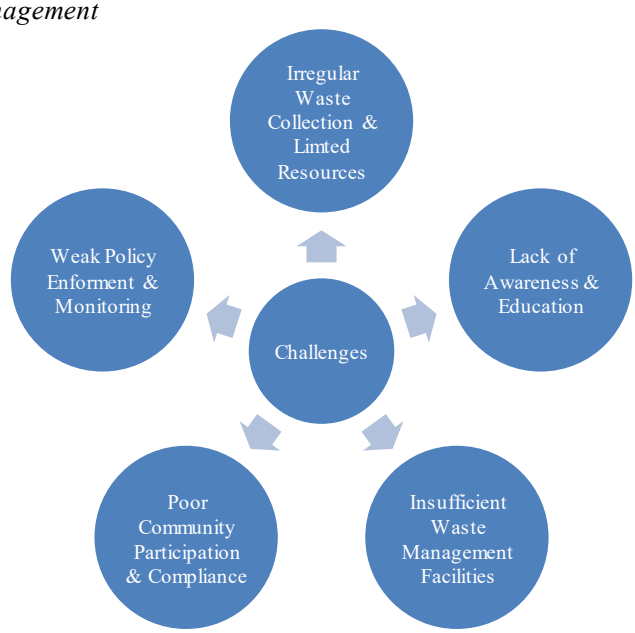

Figure 1. Emerging Themes on the Challenges in Implementing Sustainable SWM

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Irregular Waste Collection and Limited Resources

The challenge of inconsistent garbage collection and lack of logistics was evident in the responses of Informants 1 and 5. Informant 1 stated, *"Lisud kay way permanente nga schedule sa pangolekta sa basura"* (It's difficult because there's no fixed schedule for garbage collection), while Informant 5 shared, *"Gamay ra among sakyanan nga magamit sa pagpangolekta, dili makaya tanan balay"* (We only have a few vehicles for garbage collection; we can't cover all the houses). These statements reveal the barangay's struggle with a disorganized waste collection system and insufficient collection vehicles.

This finding reflects a broader issue in many developing areas, where local governments often operate with limited budgets and logistical support. According to Vergara and Tchobanoglous, poor collection efficiency due to inadequate equipment and workforce leads to the accumulation of waste in urban neighborhoods [103] . When waste is not collected regularly, it not only affects sanitation but also fosters illegal dumping, environmental degradation, and public health concerns [8].

Lack of Awareness and Education

Several informants pointed to low levels of knowledge about proper waste management practices. Informant 2 mentioned, *"Ang uban residente dili kabalo musiparar sa biodegradable ug dili"* (Some residents don't know how to separate biodegradable from non-biodegradable waste), and Informant 6 noted, *"Lisod isabtan sa uban ang mga patakaran, labi na sa mga tigulang"* (Some people find the policies hard to understand, especially the elderly). Likewise, Informant 9 observed, *"Wala silay insakto nga training kabahin sa pagdumala sa basura"* (They don't have proper training on how to manage waste).

These responses underscore the pressing need for sustained education and capacity-building programs. Without proper knowledge, residents cannot be expected to fully participate in waste segregation or disposal. Awareness is a critical factor that influences people's attitudes and behaviors towards waste management [3]. Educational interventions, particularly those tailored to different age and literacy levels, can play a transformative role in encouraging sustainable practices [9].

Insufficient Waste Management Facilities

The inadequacy of physical infrastructure was also cited as a major concern. Informant 3 stated, *"Way klaro nga garbage bins sa matag sitio, maong bisan asa lang isalibay ang basura"* (There are no clear garbage bins in each area, so people just throw trash anywhere). This indicates the lack of designated dumping areas or containers, which forces residents to improperly dispose of their waste.

Infrastructural gaps, such as insufficient bins, transfer stations, or materials recovery facilities, severely hinder proper waste disposal and segregation. Medina emphasizes that without basic infrastructure, even the most well-intentioned policies will fail [7] . The availability of localized drop-off points, for instance, has been shown to increase waste segregation rates and minimize illegal dumping[17] .

Poor Community Participation and Compliance

The low level of community involvement and rule-following was another recurring concern. Informant 4 said, *"Dili mutuman ang uban residente maski sige'g pahimangno"* (Some residents don't follow the rules even if they are reminded repeatedly), while Informant 8 observed, *"Usahay, ang basura sa kanal ra itambog kay way disiplina ang uban"* (Sometimes, people just throw garbage into the canals because they lack discipline). These highlight behavioral barriers among the residents that hamper proper waste management.

Community engagement is a vital aspect of sustainable solid waste management. Without genuine community participation, programs tend to become ineffective or short-lived [2]. Apathy, lack of ownership, and disregard for local ordinances lead to persistent waste issues. Effective community involvement, especially through participatory planning and decision-making, fosters responsibility and encourages long-term behavioral change [5].

Weak Policy Enforcement and Monitoring

Poor implementation of policies was evident in the responses of Informants 7 and 10. Informant 7 said, *"Walay klaro nga monitoring sa mga naglabay og basura bisan asa"* (There's no clear monitoring of people who throw garbage anywhere), while Informant 10 commented, *"Kung walay hulga o multa, dili mutuman ang uban tawo"* (If there's no threat or fine, some people won't follow the rules). These insights point to the lack of strict monitoring and penalties, leading to widespread non-compliance.

Enforcement is a key pillar of any regulatory framework. Without proper supervision or consequences, waste management rules are often ignored. Countries with strong enforcement mechanisms tend to have higher compliance rates in both residential and commercial sectors [14]. The absence of monitoring also prevents authorities from identifying repeat violators or evaluating the effectiveness of their strategies [9].

3.2 Opportunities in Implementing Sustainable Solid Waste Management

Figure 2. Emerging Themes on the Opportunities in Implementing Sustainable SWM

Organized Waste Segregation System

Informant 1 expressed, *"Kung ma-organize lang ug maayo, mas sayon na ang pagsegregate sa basura"* (If it's well organized, segregating waste would be easier). This statement

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highlights the need for a structured waste management system to make segregation practical and habitual within the community.

An organized segregation system is fundamental to the success of SSWM. Systematic segregation at the source significantly improves recycling efficiency and reduces the volume of waste ending up in landfills [11]. When bins are properly labeled and color-coded, and segregation guidelines are clearly communicated, households are more likely to participate [17]. This opportunity presents a foundational starting point that, once established, facilitates all other SSWM components.

Community Education and Awareness Programs

Informant 2 recommended, *"Pwede maghimo og seminar para matudluan ang mga tawo unsaon paglabay og sakto"* (We could hold seminars to teach people how to dispose of waste properly), while Informant 9 added, *"Ang pagbutang og mga klarong signages makatabang para mahibalo ang mga tawo"* (Putting clear signages would help people know what to do).

Education and awareness programs are critical in bridging knowledge gaps and shaping positive environmental behavior. The lack of awareness is a significant barrier to sustainable practices [3]. Interactive approaches—such as barangay-level trainings, community seminars, and visual tools like posters and signages—encourage inclusive learning, especially for those with low literacy levels [9]. Continuous and culturally sensitive educational efforts can cultivate a mindset of responsibility and proactive waste behavior across generations.

Recycling and Income-Generating Activities

Two informants stressed the economic potential of recycling. Informant 3 shared, *"Makabenepisyo ang barangay kung mag-recycle ta, labi na sa mga plastic og papel"* (The barangay can benefit if we recycle, especially plastics and paper), and Informant 7 said, *"Ang mga junkshop dali ra modawat og recyclable materials, makakwarta pa mi"* (Junkshops easily accept recyclable materials, and we can earn money).

Recycling provides possibilities for employment in addition to its environmental advantages. Integrating informal waste pickers and junkshop networks into municipal solid waste systems fosters both economic empowerment and resource recovery [14]. Community-level material recovery facilities (MRFs) can serve as income-generating centers while simultaneously reducing environmental footprints. In developing countries, incentivizing recycling significantly improves participation and sustainability outcomes [7].

Government Support and Funding

Informant 4 commented, *"Kung adunay suportang pondo gikan sa gobyerno, mas daghan tag magamit nga gamit"* (If there is funding from the government, we could have more equipment to use). This underscores the critical role of governmental investment in enhancing solid waste infrastructure.

Financial and logistical support from local or national governments can accelerate the rollout of sustainable waste management systems. Effective municipal waste systems require a strong fiscal backbone [12]. From providing waste collection vehicles to constructing MRFs, funding unlocks the potential of community efforts. Further, grants or subsidies to local government units can be channeled into training, equipment, and regular clean-up drives [5].

Youth and Community Involvement

Informant 5 emphasized, "*Daghan na karon og interesado motabang labi na ang mga youth volunteers"* (Many are now interested in helping, especially the youth volunteers). This reflects a growing enthusiasm and awareness among the younger population in environmental matters.

Youth participation plays a vital role in sustaining long-term environmental programs. They frequently spearhead community projects with enthusiasm and creativity. Community-based approaches, particularly those that tap into youth networks, enhance collective ownership and expand outreach [2]. Environmental clubs in schools and volunteer corps in barangays can act as sustainability ambassadors, promoting active citizenship and lifelong environmental stewardship.

Effective Policy Implementation and Partnerships

Informant 10 shared, *"Kung mapatuman og tarong ang polisiya, mas disiplina ang katawhan"* (If the policies are properly implemented, people will be more disciplined), and Informant 8 suggested, *"Kung makigpartner ang barangay sa private sector, mas paspas ang aksyon"* (If the barangay partners with the private sector, action will be faster).

Policy enforcement and strategic partnerships are integral in scaling up sustainable waste practices. Strong legal frameworks, coupled with community engagement, result in higher compliance and effective service delivery [5]. Moreover, public-private partnerships (PPPs) help bridge resource gaps, enhance technical expertise, and speed up implementation [14]. By aligning municipal objectives with the interests of private recyclers or waste contractors, barangays can benefit from shared responsibilities and accelerated service delivery.

IV. Conclusions

In Brgy. Washington, sustainable solid waste management is held back by issues like irregular collection and poor policy enforcement. These challenges are connected and call for a community-driven solution. Still, there are clear opportunities—engaging the youth, changing behaviors, and strengthening institutions. With the right mix of education, support, and inclusive policies, building a cleaner and more sustainable waste system is within reach.

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Competing Interest

The researcher declares that there are no competing interests or conflicts of interest related to the conduct and findings of this study.

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