



Benefits and Barriers of Waste Segregation in Selected Educational Institutions within the Krobo Municipalities of Ghana

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Abstract

Effective waste management remains a significant challenge in developing countries, where inadequate waste disposal practices pose substantial environmental and health risks. In response, waste segregation and recycling have emerged as promising strategies for mitigating these issues. This study investigated the effectiveness of waste segregation and recycling initiatives, focusing on the University of Environment and Sustainable Development and neighbouring educational institutions within the Krobo Municipalities of Ghana. The study employed a mixed-methods approach. Descriptive statistics (frequency and percentages) were used to describe the quantitative data, while the mathematical analysis was used to interpret the qualitative data. The findings indicated that the implementation of a waste segregation strategy on campus resulted in a 50% reduction in waste management costs within six months, alongside additional benefits including the enhancement of the university's natural environment and improvements in the environmental behavior of students and staff. Furthermore, the initiative fostered environmental awareness and education among surrounding educational institutions, which subsequently adopted waste segregation practices and began to realize benefits, thereby highlighting the positive impact of environmentally responsible actions. The study's results demonstrate the viability of waste segregation in educational institutions, highlighting its potential to promote sustainable waste management practices and environmental stewardship.

Subject Areas

Environmental Sciences

Keywords

Environment, Waste Segregation, Recycling, Educational Institutions, Sustainable Waste Management

1. Introduction

The proliferation of waste generated by human activities poses a significant threat to environmental sustainability, ecosystem balance and human health [1] [2]. In 2023, the world generated about 2.1 billion tonnes (5.5 million tonnes per day) of municipal solid waste (MSW), which is predicted to increase to 3.8 billion tonnes per annum by the year 2050 [3]. Approximately one-third of that amount remains mismanaged and ends up in the environment [3]. Africa contributes a relatively small proportion to global waste generation, accounting for approximately 5% of the total [4]. However, the continent is witnessing a rapid escalation in waste production, primarily driven by accelerating urbanization and increasing consumption patterns. According to World Bank estimates, Africa generates around 125 million tonnes of waste annually, with a projected annual growth rate of 3.5%, the highest globally [5].

Notwithstanding the significant waste generation, the region's waste management infrastructure remains underdeveloped, resulting in inadequate waste treatment and disposal practices. Less than 10% of the waste generated is properly recycled, while the majority (approximately 90%) is either disposed of in open dumps or illegally incinerated, leading to severe environmental consequences, including air and soil pollution [3] [6]. In Ghana, the picture is more concrete. Over 7 million tonnes of MSW were produced in 2024 [7]. The national per-capita generation rate stands at about 0.47 kg per day, which translates to approximately 12,710 tonnes of waste generated daily across the country [7].

Effective waste management, encompassing the systematic collection, transportation, processing and disposal of waste materials, is crucial for mitigating these adverse impacts [8]. However, in Ghana and other developing countries, waste management is a significant challenge due to inadequate infrastructure, limited resources and lack of effective waste management policies [9]. For instance, in Ghana, despite concerted efforts by various institutions, organizations and local government authorities, including Metropolitan, Municipal and District Assemblies (MMDAs), to monitor and regulate waste management practices within their jurisdictions, the issue of waste pollution persists [10].

The accumulation of waste in ecosystems can have devastating consequences, including environmental degradation, loss of biodiversity and adverse impacts on human health [8]. For example, poor sanitation and inadequate waste management have been linked to the spread of various human illnesses, including water-borne and vector-borne diseases [8].

Addressing the issue of waste management requires a multi-faceted approach

that involves government agencies (including educational institutions), private sector stakeholders and local communities in the development and implementation of effective and sustainable waste management strategies. Effective waste management is vital for maintaining public health and environmental sustainability. Proper waste management plays a critical role in maintaining public health, preventing environmental pollution and promoting sustainable development [11]. Additionally, as waste accumulation affects diverse settings, including residential, commercial and industrial areas, it is imperative to develop and implement sustainable waste management strategies that prioritize environmental protection, public health and resource conservation.

In Ghana, the implementation of strategies, such as waste reduction, reuse and recycling, as well as the adoption of environmentally friendly technologies and practices, has been identified as key strategies to address waste pollution [12]. Similarly, [13] identified strategies, such as provision of refuse collection services, supplying refuse bins and designating collection points, establishing regular collection schedules and identifying suitable dump sites, to prevent unauthorized dumping and environmental pollution. Furthermore, enhancing public education and awareness, as well as promoting community participation and engagement in waste management initiatives, are crucial for mitigating the environmental and health impacts of waste pollution [14]-[16].

According to [17], the ineffectiveness of traditional waste management strategies (such as having a dump site and burning of waste) has led to a growing interest in alternative solutions, such as waste segregation and recycling. Waste segregation and recycling have been identified as crucial components of sustainable waste management, offering numerous environmental, economic and social benefits [13] [15] [18] [19]. By separating waste into distinct categories, such as organic, inorganic and recyclable materials, it becomes possible to manage waste more effectively, reduce the amount of waste sent to landfills and promote the recovery of valuable resources [20]. Examples of successful recycling initiatives in Ghana include the conversion of pure water sachets into plastic products such as footwear, belts, buckets and bowls [15]. Additionally, paper waste can be recycled into cardboard, boxes and other paper-based products [21]. These examples demonstrate the potential of recycling to reduce waste, conserve natural resources and promote sustainable development.

In the context of educational institutions, implementing waste segregation and recycling programmes can serve as a valuable teaching tool, promoting environmental awareness and sustainability among students, staff and the broader community [19]. In Ghana, the practice of waste segregation and recycling is still emerging, and existing studies have focused mainly on household waste segregation [22]-[25]. The study of six educational institutions in the Krobo Municipalities presents a unique case study for exploring the viability of waste segregation in educational institutions. This study aims to examine the benefits and challenges of implementing waste segregation in educational institutions in Ghana using six

educational institutions in the Krobo Municipalities in the Eastern Region of Ghana as case study.

2. Materials and Methods

2.1. Research Design and Sampling Procedure

This study employed a mixed-methods research design to investigate the benefits and obstacles of implementing a waste segregation and recycling programme at the University of Environment and Sustainable Development (UESD). Furthermore, it evaluated the programme's effectiveness in five other educational institutions that were exposed to the initiative, as evidenced by quantitative data on their recyclable materials collection. A quantitative analysis was conducted to assess the economic implications of implementing a waste segregation and recycling programme on campus. Additionally, the study utilized a semi structured interview guide to collect qualitative data on the benefits and barriers of the programme. The study population consisted of students enrolled at UESD in 2023. As of 2023, the total student population at UESD was 612, with the institution having commenced operations in August 2020 [26]. A sample of 20 students was interviewed which is considered appropriate for thematic or phenomenological studies according to studies by [27] [28] and the sampling technique used was the convenient sampling based on the availability of the students at school.

2.2. Study Setting

This study was conducted in six educational institutions in the Krobo Municipalities. The educational institutions were the University of Environment and Sustainable Development (UESD), Krobo Girls' Senior High School (KROGISS), Manya Krobo Senior High School (MAKROSEC), Yilo Krobo Senior High School (YIKROSEC), Somanya Technical School (SOTECH), and Mount Mary College of Education (MMCE).

UESD was established in 2020. As a young institution dedicated to environmental sustainability, the university plays a vital role in promoting green practices and sustainability principles within its campus community and beyond. The Eastern Region of Ghana, specifically the Krobo area, is home to several notable educational institutions. Krobo Girls Senior High School, an all-girls institution, is situated in Odumase Krobo, within the Lower Manya Krobo Municipal District. The school's lush green surroundings create a serene environment conducive to academic pursuits.

In close proximity, Manya Krobo Senior High School (MAKROSEC), a mixed boarding institution, is also located in Odumase-Krobo. Further afield, in Somanya, Yilo Krobo Senior High School and Somanya Technical Senior High School offer educational programmes as mixed day and boarding institutions within the Yilo Krobo Municipality.

Additionally, Mount Mary College of Education, situated on a hill overlooking Somanya and Odumase townships in the Yilo Krobo Municipal District, provides

a tranquil learning environment. These institutions collectively contribute to the region's educational landscape, offering a range of academic programs tailored to the local population's needs.

2.3. Data Collection

Measurement of variables

The methodology employed a multi-step approach to collect and verify waste data from UESD and the five neighboring institutions (KROGISS, MAKROSEC, YIKROSEC, SOTECH, and MMCE). The study measured the weight of recyclable materials, specifically paper and plastic waste, collected from designated recycling stations strategically located across the campus of UESD. Once the waste bins at these stations were full, trained janitorial staff collected the materials, transported them to a designated storage location and recycling agents were notified for pickup. The materials were weighed in the presence of students' representatives. Payment was made to the institution based on a predetermined rate schedule, allowing for the quantification of recyclable waste generated on campus and providing insight into the economic benefits of the recycling programme.

A similar protocol was implemented at the neighboring institutions, where representatives received training on data collection procedures. Standardized data sheets were provided to record the type and weight of recyclables, and identical recycling stations were established with clear labeling and guidelines for waste segregation. Scheduled pickups were conducted and data were verified through regular site visits to ensure accuracy and adherence to the protocol.

Prior to data collection, educational and awareness programmes were implemented at the participating institutions to promote waste segregation practices. These programmes included workshops, seminars and poster campaigns, aiming to educate students and staff on proper waste segregation techniques. The initiative sought to assess the effectiveness of these programmes in promoting waste segregation practices and reducing waste generation at the participating institutions.

The interview guide comprised open-ended questions, facilitating in-depth exploration of participants' perspectives and experiences. This qualitative approach enabled the collection detailed insights from students at UESD. The interview was structured to gather data on perceptions regarding the economic, environmental and social benefits of waste segregation within the school environments. Additionally, it sought to identify the obstacles that hinder the implementation of sustainable waste management practices in educational institutions in Ghana.

2.4. Data Analysis

A quantitative cost estimation approach was employed to assess the costs associated with engaging a waste management service provider over a six-month period. This involved analyzing data on the costs incurred per waste bin, which is directly related to the number of bins utilized on campus for collecting unsegregated

waste. The aggregate cost is subsequently remitted monthly to the contracted waste management company.

A comparative quantitative assessment was subsequently conducted to evaluate the potential reduction in waste management costs on campus resulting from the implementation of the waste segregation and recycling programme. This assessment involved a comparative analysis of the estimated costs of waste management services with and without the programme in place. Thematic analysis was used to analyze the interview data, identifying patterns, themes and insights into students' perceptions on the benefits and barriers with waste segregation and recycling on campus.

The findings of this study provide valuable insights into the economic implications of implementing a waste segregation and recycling programme and inform decision-making regarding the adoption of sustainable waste management practices.

3. Results

Table 1 below presents the weight of paper waste collected over a 6-month period, from January to June 2023, with collections made on March 20, 2023, and June 1, 2023. The total weight of paper waste collected during this period was 591 kilograms.

Table 1. Paper waste collected within 6 months at UESD.

Collection Period	Weight (Kg)
January to March (Collection date: 20/03/2023)	246
March to June (Collection date: 01/06/2023)	345
Total	591

Table 2 presents the weight of plastic waste collected over a 6-month period, from January to June 2023, with collections made on March 20, 2023, and June 5, 2023. The total weight of plastic waste collected during this period was 1023 kilograms.

Table 2. Plastic waste collected within 6 months at UESD.

Collection Period	Weight (Kg)
January to March (Collection date: 20/03/2023)	744
March to June (Collection date: 5/06/2023)	279
Total	1023

3.1. Waste Collection on the University Campus

Trial period of 6 months:

Table 3 presents a comparative cost analysis of waste management practices

before and after the implementation of waste segregation on the university campus over a six-month trial period. Prior to segregation, waste management relied entirely on unsegregated waste collection, requiring 40 bins per month at a unit cost of GH¢70. This resulted in a monthly expenditure of GH¢2800 and a total cost of GH¢16,800 over the six-month period.

Following the introduction of waste segregation, the quantity of waste requiring disposal by the service provider was reduced from 40 to 20 bins per month. This reduction was directly attributable to the diversion of recyclable materials from the general waste stream, as quantified by monthly weight measurements. Consequently, monthly waste collection costs declined to GH¢1400, amounting to GH¢8400 over six months. This represents a direct cost saving of GH¢1400 per month and GH¢8400 across the trial period.

In addition to cost savings, the segregation initiative generated revenue through the sale of recyclable materials. On average, 269 kg of recyclable waste was recovered monthly. Using a standard 240-litre bin capacity, this diverted mass corresponds to approximately 20 bins of waste volume that no longer required collection by the service provider, thereby justifying the observed reduction in bin usage. An average of 269 kg of recyclable waste was sold monthly at GH¢1 per kilogram, yielding GH¢269 per month and a cumulative revenue of GH¢1614 over six months. When combined with the reduced waste collection expenditure, the university achieved a total financial benefit of GH¢1669 per month, equivalent to GH¢10,014 over the six-month trial period.

Overall, the implementation of waste segregation resulted in a 50% reduction in waste disposal costs. Importantly, this reduction was empirically linked to the measured quantity of recyclable materials diverted from the waste stream, rather than being assumed solely on the basis of bin counts.

Table 3. Comparative cost analysis of waste management before and after segregation (6-month trial period).

Cost/Revenue Component	Description	Monthly Amount (GH¢)	6-Month Total (GH¢)
Baseline Scenario (No Segregation)			
Waste collection cost (unsegregated)	40 bins × GH¢70 per bin	2800	16,800
Revenue from recyclables	Not applicable	0	0
Total baseline cost		2800	16,800
Segregation Scenario			
Waste collection cost (residual waste)	20 bins × GH¢70 per bin	1400	8400
Cost savings from reduced collection	Reduction from baseline	1400	8400
Revenue from sale of recyclables	269 kg × GH¢1 per kg	269	1614
Total financial benefit	Savings + recyclable sales	1669	10,014
Net Effect			
Net gain compared to baseline	Baseline cost – actual cost + sales revenue	1669	10,014

Note: All monetary values are expressed in Ghana Cedis (GH¢). Calculations are based on a six-month pilot period with constant unit costs.

3.2. Six Month Recyclable Waste Collection from Neighbour Institutions within Krobo Municipalities

Figure 1 presents plastic waste collection data from five educational institutions within the Krobo municipalities: Krobo Girls' Senior High School (KROGISS), Manya Krobo Senior High School (MAKROSEC), Yilo Krobo Senior High School (YIKROSEC), Somanya Technical School (SOTECH) and Mount Mary College of Education (MMCE). KROGISS and MAKROSEC show notable increases in plastic weight collection.

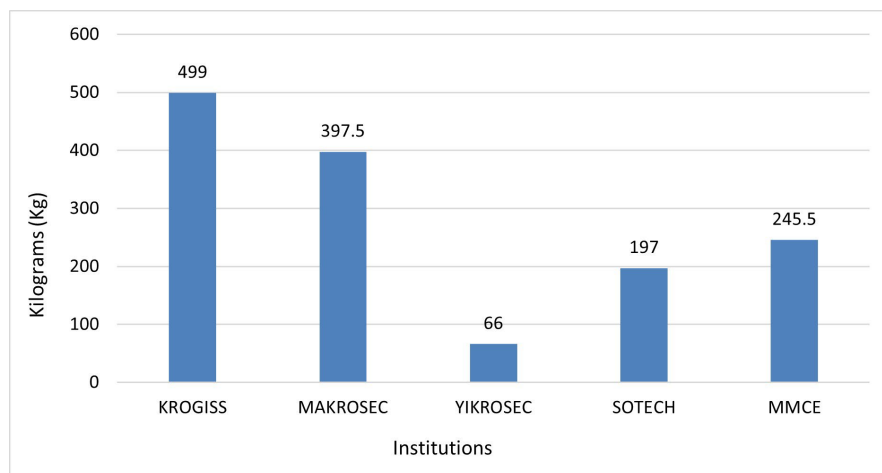


Figure 1. Recyclable Plastics salvaged for six months (January-June, 2023) from neighbouring institutions within the Krobo municipalities.

Figure 2 below presents paper waste collection data from the five educational institutions in the Krobo municipalities: KROGISS, MAKROSEC, YIKROSEC, SOTECH and MMCE. The paper waste collection data from the five institutions reveals distinct patterns and trends. KROGISS stands out with the highest total collection of 82 kilograms. MAKROSEC follows closely, with 80 kilograms.

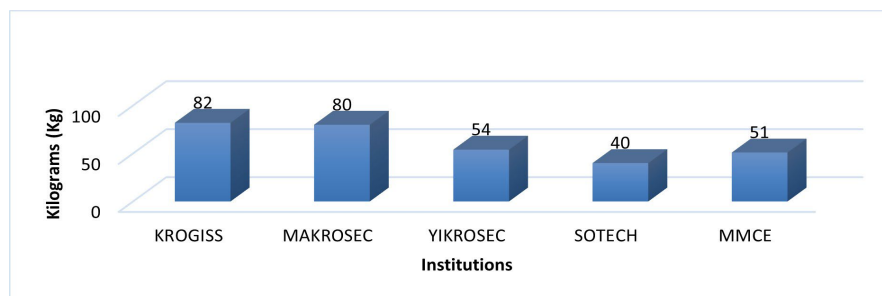


Figure 2. Recyclable Paper salvaged for six months (January-June, 2023) from neighbouring institutions within the Krobo municipalities.

3.3. Students' Perceptions of Benefits of Waste Segregation and Recycling Programme

The comments provided by selected students on the waste segregation pro-

gramme reveal a range of perspectives and benefits associated with implementing such initiatives. The analysis of these statements was categorized into three themes:

Environmental Benefits

- **Reducing waste and environmental degradation:** Students noted that the programme would “*reduce waste in the community*” and “*reduce environment degradation*”, highlighting the potential environmental benefits of waste segregation.

Effective waste segregation and recycling practices are critical components of sustainable waste management, playing a pivotal role in reducing environmental degradation. By separating waste into distinct categories, such as paper, plastic and organic materials, communities can significantly increase the proportion of recyclable materials diverted from landfills. This approach not only conserves natural resources by reducing the need for raw materials extraction but also decreases greenhouse gas emissions associated with production processes.

Moreover, waste segregation at the source minimizes contamination of recyclable materials, enhancing their market value and potential for reuse. Implementing comprehensive recycling programmes can substantially reduce the environmental footprint of waste disposal, decrease pollution and promote a culture of sustainability within communities.

- **Protecting the environment and water resources:** One student mentioned that the programme would “*protect the environment and water resources*”, emphasizing the importance of preserving natural resources.

Proper waste segregation and recycling play a crucial role in protecting the environment and conserving water resources. By separating waste into recyclable and non-recyclable materials, communities can significantly reduce the amount of waste that ends up in landfills and waterways. This helps prevent pollution, protects aquatic life and conserves water resources.

Recycling reduces the need for extracting, processing and transporting raw materials, which in turn decreases energy consumption and greenhouse gas emissions. Additionally, recycling helps to conserve water by reducing the amount needed for production processes. For example, recycling paper products saves trees and reduces water usage in pulp production.

Economic Benefits

- **Job creation and income generation:** Students observed that the programme would “*create employment opportunity for other people*” and “*generate income*”, suggesting that waste segregation can have positive economic impacts.

Waste segregation and recycling initiatives can create employment opportunities and generate income for individuals and communities. By establishing efficient waste collection and recycling systems, jobs are created for waste collectors, sorters and recyclers. Additionally, recycling facilities and industries that rely on recyclable materials can stimulate local economies and provide employment opportunities.

The sale of recyclable materials, such as paper, plastic and metal, can also gen-

erate income for individuals and communities. This can be particularly beneficial for marginalized groups, such as waste pickers or informal collectors, who can earn a steady income by collecting and selling recyclable materials.

Furthermore, waste segregation and recycling can reduce waste management costs for municipalities and businesses, allowing them to allocate resources more efficiently. The revenue generated from recycling can also be used to fund community development projects, improving overall quality of life.

- **Cost savings:** One student mentioned that the programme would “*reduce the cost of waste management*”, highlighting the potential economic benefits of efficient waste management.

Social Benefits

- **Community engagement and contribution:** Students expressed a sense of purpose, stating that the programme would allow them to “*contribute to solving waste problems*” and “*help to get some amount of money*”.

By engaging in waste segregation and recycling, communities can collectively address waste management issues, promote environmental sustainability and foster a culture of responsibility and ownership. This collaborative effort can lead to tangible improvements in environmental quality, public health and overall quality of life.

- **Improved environment and safety:** One student noted that the programme “*makes the environment clean and safe*”, emphasizing the importance of a well-managed environment for community well-being.

Effective waste segregation and recycling practices are instrumental in creating a clean and safe environment. By separating waste into recyclable and non-recyclable materials, communities can significantly reduce litter, prevent pollution and minimize health risks associated with improper waste disposal. This, in turn, protects wildlife and ecosystems, reduces the spread of diseases and pests and creates a cleaner and more aesthetically pleasing environment. As a result, communities can enjoy improved public health, increased property values and a better overall quality of life, making the environment clean and safe.

3.4. Students' Perception on the Barriers to Waste Segregation and Recycling Programme

The comments provided by selected students on the barriers to effective waste segregation and recycling were categorized into four themes:

Lack of Awareness and Education

- **Limited knowledge about waste segregation and recycling:** Some respondents mentioned that they have “*no idea about waste segregation and recycling*”, emphasizing the need for education and awareness-raising efforts.

A lack of awareness about waste segregation and recycling can significantly hinder efforts to implement effective waste management systems. Many individuals and communities may not understand the importance of separating waste into different categories, such as paper, plastic and organic materials, or be unaware of

the benefits of recycling, including environmental conservation and economic gains. This knowledge gap can lead to improper waste disposal, reduced recycling rates and increased environmental pollution.

- ***Insufficient education on waste management.*** One respondent noted that “*little or no education is provided on it*”, suggesting that educational initiatives could play a crucial role in promoting waste segregation and recycling practices.

Infrastructure and Resource Constraints

- ***Inadequate recycling facilities.*** Respondents mentioned that “*recycling facilities not enough*”, highlighting the need for increased investment in waste management infrastructure.
- ***Lack of dustbins and appropriate bins.*** The absence of dustbins and appropriate bins at vantage points was cited as a significant barrier, making it difficult for individuals to practice waste segregation.
- ***Unavailability of companies to recycle separated waste.*** One respondent noted that there is a lack of companies to recycle separated waste, emphasizing the need for more recycling facilities and services.

The scarcity of recycling facilities in many communities poses a significant hurdle to effective waste management. Even when waste is properly segregated and collected, the lack of adequate processing facilities means that recyclable materials often end up in landfills or are disposed of improperly, undermining efforts to reduce waste and promote sustainability. This inadequacy not only leads to increased waste disposal costs but also squanders opportunities for resource recovery and income generation, highlighting the need for investment in recycling infrastructure and collaborative initiatives to develop more sustainable waste management systems.

Economic and Technical Challenges

- ***Cost and expense.*** Some respondents mentioned that waste segregation and recycling are “*costly*” and “*expensive*”, highlighting the economic challenges associated with implementing effective waste management systems.
- ***Technical difficulties.*** One respondent described waste segregation and recycling as “*stressful*” and “*technical*”, suggesting that the process can be complex and challenging to implement.

Implementing effective waste segregation and recycling systems can be a costly and expensive endeavour, requiring significant investments in infrastructure, education and operational costs. The setup and operation of recycling facilities, collection systems and public awareness campaigns all come with a price tag. However, these upfront costs can be offset by the long-term benefits of recycling, including revenue generated from the sale of recyclable materials and the reduced environmental and health costs associated with improper waste disposal.

Social and Cultural Factors

- ***Limited community practice.*** Respondents noted that waste segregation and recycling are “*not well practiced*” in their community and are “*not a common*

practice in Ghana”, highlighting the need for cultural and social shifts to promote sustainable waste management practices.

- **Compliance challenges.** One respondent mentioned that “*uneducated people will not comply*”, suggesting that education and awareness-raising efforts are crucial for promoting compliance with waste segregation and recycling practices.

The success of waste segregation and recycling initiatives often hinges on community participation, which can be hindered when people lack awareness about proper practices. Without education on the importance and processes of waste segregation, individuals are less likely to comply with recycling guidelines, leading to contaminated recyclables, reduced programme effectiveness and increased waste management costs. Addressing this issue requires targeted education and awareness initiatives to promote behavioural change and encourage active participation in sustainable waste management practices.

4. Discussion

The findings of this study underscore the critical role of effective waste segregation in generating revenue from recyclable materials and promoting environmental sustainability in educational institutions. The implementation of a waste segregation and recycling programme at the University of Environment and Sustainable Development (UESD) yielded significant financial and environmental benefits, corroborating existing literature on the importance of waste segregation in achieving sustainable waste management [13] [15].

The study’s results indicate a direct relationship between the quantity of recyclables separated and financial benefits, highlighting the need for targeted awareness campaigns and educational initiatives to encourage students and staff to segregate waste properly. The absence of designated recycling stations on campus was identified as a significant barrier to efficient collection of recyclable materials, resulting in lost revenue opportunities.

Notably, the study found a positive correlation between environmental awareness and recycling outcomes, with students demonstrating awareness of the importance of waste segregation and a willingness to participate in sustainable waste management programmes [29]. The recovery of an average of 269 kg of recyclable materials per month corresponded to a reduction in residual waste and financial savings, suggesting that environmental awareness initiatives, supported by infrastructure and institutional commitment, can produce measurable improvements in waste diversion.

The convergence of perception-based evidence and waste quantification data highlights the importance of combining education with practical waste management systems in educational institutions to achieve significant reductions in residual waste volume, financial savings and increased recovery of recyclable materials. These findings support the viability of waste segregation as a strategy for effective waste management and mitigating environmental impacts, aligning with

existing research [19] [30].

The study's results have implications for policy and practice in educational institutions, emphasizing the need for investing in waste segregation infrastructure and awareness campaigns to promote sustainable waste management practices. Establishing environmental advocacy groups among students can serve as a catalyst for promoting sustainable waste management practices and fostering a culture of environmental responsibility.

5. Conclusions and Recommendations

Effective waste management poses a significant environmental challenge in Ghana and other developing countries, with waste segregation and recycling being particularly problematic for many educational institutions in the sub-region. This challenge is largely attributable to deficiencies in financing, infrastructure, public education and awareness, which collectively hinder effective waste management practices. The University of Environment and Sustainable Development (UESD) in Somanya, Ghana pioneered a 6-month case study on waste segregation viability on its campus which yielded promising results. This initiative demonstrates that waste segregation, coupled with requisite facilities, amenities and financial investment, can generate long-term economic and environmental benefits. The UESD's multifaceted approach, encompassing educational programmes, awareness campaigns, conferences and stakeholder engagements positively impacted surrounding educational institutions, including Krobo Girls Senior High, Manya Krobo Senior High, Yilo Krobo Senior High, Somanya technical and Mount Mary College of Education.

A mutually beneficial approach involves establishing partnerships between schools and recyclable materials collectors. This model incentivizes schools to establish on-campus recycling stations, providing a convenient means of collecting recyclables and generating revenue through the sale of these materials. Concurrently, collectors benefit from a reliable and consistent source of recyclables, collected in substantial volumes from the schools, thereby enhancing the efficiency of their operations.

Furthermore, the implementation of a waste segregation and recycling programme at UESD resulted in a 50% reduction in waste management costs incurred by the institution. It is anticipated that effective implementation of this programme, coupled with the institution's growing population, could yield additional revenue streams.

It is recommended that initiatives aimed at promoting waste segregation and recycling practices in educational institutions prioritise consistent and multifaceted educational efforts on campus, incorporating diverse strategies and awareness programmes. Collaboration with recycling companies and recyclable materials collectors is also essential, fostering mutually beneficial partnerships that support the effective implementation of these initiatives.

To ensure the long-term success and widespread adoption of such initiatives,

government policy and funding are essential. A policy framework that supports waste reduction and recycling in educational institutions could provide the necessary structure and resources for implementing and maintaining sustainable waste management practices. Government funding could facilitate the development of infrastructure, educational materials and training programmes, thereby enabling schools to effectively integrate waste segregation and recycling into their daily operations.

By leveraging student enthusiasm and government support, educational institutions can create a model for sustainable waste management that not only benefits the environment but also educates and empowers future generations. The establishment of environmental advocacy groups and the implementation of sustainable waste segregation and recycling projects can contribute significantly to achieving this goal.

UESD commitment to environmental stewardship and sustainable development is evident through its efforts to promote waste segregation and recycling practices, foster community engagement and education, collaborate with environmental stakeholders and opinion leaders and develop eco-friendly policies and initiatives. These endeavors align with global sustainability goals, emphasizing the importance of environmental conservation and public health.

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Conflicts of Interest

The author declares no conflicts of interest.

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