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TOWARD ZERO WASTE: A NEEDS ANALYSIS FOR THE FORMULATION OF A COMPREHENSIVE UNIVERSITY SATELLITE CAMPUS WASTE MANAGEMENT POLICY

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ABSTRACT

This study explores how much waste is currently produced in a university satellite campus, how well students understand existing sustainability efforts, and how ready they are to support a Zero Waste Policy. Using a quantitative descriptive design, the research gathered data from a validated questionnaire (Cronbach's alpha = 0.794) administered to 222 undergraduate students selected through stratified random sampling across eight academic departments. Results show that food scraps, plastics, and paper or cardboard remain the most common types of waste generated on campus. Despite this, most students still dispose of their waste in general trash bins, with very few using available recycling or composting facilities. While many students are aware of the campus's sustainability-related reminders and policies, their understanding of specific programs – such as composting or the proper handling of e-waste – remains limited. Even so, most respondents reported feeling prepared to shift toward more sustainable daily practices, and an overwhelming 89.64% expressed strong support for the establishment of a Zero Waste Policy. Students cited environmental concern, encouragement from peers, and seeing the visible effects of their actions as their main reasons for participating. In contrast, they identified the lack of adequate waste-segregation facilities and insufficient training as the biggest obstacles. Overall, the findings point to the need for better waste-management infrastructure on campus, more targeted education and training activities, and engagement strategies that involve students and other stakeholders more actively. These insights provide a practical foundation for crafting a comprehensive and workable Zero Waste Policy for the university.

KEYWORDS: *Zero Waste Policy, Waste Management, University Campus, Sustainability, Stakeholder Readiness, Stratified Sampling, Environmental Behavior*

INTRODUCTION

The global challenge of solid waste management has intensified over the past decade, with urban centers producing more than 2 billion tons of municipal solid waste each year—a figure expected to reach 3.4 billion tons by 2050 (World Bank, 2018). As the consequences of improper waste handling become increasingly evident, from polluted waterways to worsening climate risks, the urgency of transitioning to more sustainable and circular waste systems has grown substantially. This call aligns strongly with the United Nations Sustainable Development Goals (SDGs), particularly SDG 12 on Responsible Consumption and Production, SDG 13 on Climate Action, and SDG 15 on Life on Land, all of which emphasize responsible resource use, waste reduction, and strengthened institutional accountability.

Within this global landscape, universities occupy a unique position as centers of learning, innovation, and community influence. Their potential to model responsible waste behavior and embed sustainability into daily operations has been widely acknowledged (Leal Filho et al., 2019). In many countries, higher education institutions have begun implementing campus-wide zero-waste programs as part of broader environmental commitments. Efforts in the United States, Australia, and Japan demonstrate how coordinated waste reduction, policy-driven initiatives, and strong stakeholder involvement can significantly improve campus sustainability outcomes (Evans et al., 2015; Armstrong &

Reeve, 2020; Smyth et al., 2010). These examples highlight that successful waste initiatives require not only infrastructure but also sustained behavioral change and institutional support.

The Philippine context presents a contrasting picture. Despite long-standing legislation such as the Ecological Solid Waste Management Act of 2000 (RA 9003), waste management challenges remain pervasive. The country produces an estimated 61,000 metric tons of waste daily, with plastic pollution emerging as a major ecological concern affecting both land and marine ecosystems (DENR, 2020). While policies mandating segregation and local recycling systems exist, their implementation remains uneven across institutions, including universities. Research examining how Philippine higher education institutions incorporate zero-waste principles is still limited, despite their potential to influence local communities and promote environmentally responsible practices (Mante & Briones, 2021).

Initial observations in many universities suggest a pattern of fragmented efforts—sporadic recycling activities, occasional clean-up drives, and the presence of collection bins that are often underutilized. These efforts, while well-intentioned, tend to occur without a unified policy framework or clear implementation strategy, resulting in inconsistent practice and minimal long-term impact. This disconnect reflects broader issues related to institutional readiness, lack of coordinated monitoring, and limited stakeholder engagement.

Against this backdrop, the present study, *Toward Zero Waste: A Needs Analysis for the Formulation of a Comprehensive University Waste Management Policy*, seeks to provide an evidence-based understanding of current waste practices, levels of awareness, and stakeholder readiness within the university setting. By examining waste patterns, campus-wide behaviors, and the willingness of students and personnel to participate in zero-waste initiatives, the study offers insights that are essential for crafting a realistic, participatory, and sustainable waste management policy aligned with SDGs 12, 13, and 15. Anchored in sustainability frameworks and participatory governance, this research contributes to ongoing discussions on how higher education institutions can catalyze broader societal shifts toward environmental responsibility (Lozano et al., 2013; AASHE, 2021).

To guide this inquiry, the study is structured around three core research questions: (1) What are the current patterns of waste generation and disposal across different sectors of the campus? (2) How aware are stakeholders of zero-waste concepts and existing sustainability initiatives? and (3) To what extent are students prepared and willing to support and participate in a campus-wide Zero Waste Policy? Together, these questions illuminate the behavioral, institutional, and systemic conditions necessary for designing an effective and context-sensitive waste management policy.

Theoretical Framework

This study is grounded in three interrelated theoretical perspectives: Theory of Planned Behavior (TPB), Institutional Theory, and the Zero Waste Hierarchy. Together, these frameworks provide a comprehensive lens for analyzing individual behavior, institutional structures, and systemic approaches to waste management in a university context. First, Ajzen's (1991) Theory of Planned Behavior (TPB) serves as a foundation for understanding the readiness and willingness of university stakeholders—including students, faculty, and staff—to engage in zero-waste practices. TPB posits that behavior is influenced by three core components: attitudes toward the behavior, subjective norms, and perceived behavioral control. Applied to waste management, this theory suggests that a stakeholder's intention to participate in sustainable waste practices (e.g., segregation, recycling, composting) is shaped by their personal views, social pressure, and confidence in their ability to do so. TPB has been widely used in environmental behavior research, particularly in university settings, to predict recycling behaviors and pro-environmental decision-making (Bamberg & Möser, 2007; Chen & Tung, 2010).

Second, Institutional Theory (Meyer & Rowan, 1977) is used to examine how organizational structures, such as university policies and administrative processes, influence the adoption of sustainability initiatives. This theory highlights how institutions conform to social expectations and regulatory norms to gain legitimacy. In the context of this study, it explains how universities implement waste management practices not only in response to environmental concerns but also to align with broader societal expectations, legal frameworks (e.g., RA 9003 in the Philippines), and global sustainability agendas such as the UN Sustainable Development Goals (SDGs). Institutional pressures—whether coercive, mimetic, or normative—can drive universities to adopt formal policies and infrastructure that support zero-waste goals (DiMaggio & Powell, 1983).

Lastly, the Zero Waste Hierarchy, as outlined by the Zero Waste International Alliance (ZWIA, 2018), provides a practical and ethical framework that guides the study's definition of "zero waste." Unlike traditional waste management approaches that focus on end-of-pipe solutions (e.g., landfill diversion), the Zero Waste Hierarchy emphasizes source reduction, reuse, redesign, recycling, and composting, placing landfill or incineration as last resorts. This framework encourages systemic thinking and supports the formulation of policies that aim not only to manage waste but to prevent it at the source, aligning with SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). It also emphasizes community and stakeholder involvement, aligning with the study's participatory approach.

By integrating these three frameworks, the study is well-positioned to analyze the behavioral, institutional, and systemic dimensions of campus waste generation and management. The resulting insights will guide the development of a comprehensive, feasible, and stakeholder-informed Zero Waste Policy for a university satellite campus.

METHODOLOGY

Research Design

This study employed a quantitative descriptive research design to explore current waste management practices, levels of awareness, and stakeholder readiness and willingness to support a Zero Waste Policy at a university satellite campus. Descriptive research is appropriate when the goal is to systematically describe a population, situation, or phenomenon through quantitative data (Creswell & Creswell, 2018). In this context, the design allowed the researchers to gather baseline data on patterns of waste generation and disposal, perceptions of sustainability programs, and the level of preparedness among students to engage in zero-waste initiatives.

A needs analysis approach was integrated into the design to identify gaps between existing campus practices and the requirements for effective waste management policy development. Needs analysis is frequently used in educational and organizational research to inform the creation of targeted, data-driven programs and policies (Watkins, Meiers, & Visser, 2012). By combining this approach with survey-based data collection, the study aimed to provide evidence-based recommendations that align with institutional sustainability goals and relevant global frameworks such as the United Nations Sustainable Development Goals (SDGs 12, 13, and 15).

Participants and Inclusion Criteria

The participants of this study were undergraduate students enrolled at a university satellite campus. Inclusion was limited to currently enrolled college students from various academic departments. Faculty, staff, and graduate students were excluded from the sampling frame to maintain a focus on the undergraduate student population as primary stakeholders in campus sustainability practices.

Sampling Technique and Sample Size

A stratified random sampling technique was used to ensure representation across the different academic departments within the university. Students were grouped based on their department affiliation, and participants were randomly selected from each stratum. A total of 222 students participated in the survey, representing eight academic departments. This sampling approach allowed for diversity in academic backgrounds and minimized sampling bias.

Data Collection Instrument

Data were collected using a structured questionnaire composed of three main sections, designed in a Likert-scale format.

- Section 1 gathered demographic and profile information of respondents.
- Section 2 assessed awareness of zero-waste principles and sustainability-related programs and policies.
- Section 3 measured participants' readiness and willingness to support and engage in a potential campus-wide Zero Waste Policy.

The questionnaire was administered in English, the primary medium of instruction at the university.

Validity and Reliability of the Instrument

To ensure content validity, the instrument was reviewed and validated by three subject matter experts in the fields of environmental science, educational research, and sustainability policy. Revisions were made based on their feedback

to improve clarity and relevance. A pilot test was conducted prior to full data collection, and the instrument yielded a Cronbach's alpha of 0.794, indicating acceptable internal consistency (George & Mallery, 2003).

Data Analysis Procedure

Data collected from the questionnaires were encoded and analyzed using descriptive statistical methods, including frequencies and percentages, and were presented in tabular and graphical formats. The analysis was aimed at identifying general trends in waste generation, awareness, and stakeholder readiness and willingness to engage in zero-waste initiatives. Tabular presentations were used to summarize and interpret the findings based on each research question.

Ethical Considerations

Ethical clearance was secured from the campus head prior to the implementation of the study. Participants were informed of the study's objectives and assured that their responses would be treated with confidentiality and used solely for academic purposes. Participation was voluntary, and informed consent was obtained prior to data collection. No personally identifiable information was collected, and data were stored securely to protect respondent privacy.

RESULTS AND DISCUSSIONS

This section presents the analysis of data collected to address the key research questions guiding this study. The first research question focuses on identifying the current patterns of waste generation and disposal across the university's academic, residential, and administrative sectors. Understanding these patterns is critical for establishing a baseline assessment of waste behaviors and management practices on campus. The following results provide insight into the volume and types of waste generated daily, as well as disposal methods and perceptions of waste management effectiveness.

Current Patterns of Waste Generation and Disposal Across University Sectors

Research Question 1 sought to examine the current patterns of waste generation and disposal across the academic, residential, and administrative sectors of the university. Understanding these patterns is essential to identify key waste streams and disposal behaviors, which will inform the formulation of an effective and comprehensive waste management policy.

Estimated Average Number of Items Disposed Daily by Category

Table 1 summarizes the estimated average number of items disposed daily by category, highlighting the predominant types of waste generated on campus. The data reveal variations in waste quantities across different categories such as food waste, plastics, paper/cardboard, e-waste, and mixed/general waste. These patterns provide a foundational understanding of the waste profile within the university environment and serve as a basis for targeted interventions and policy development.

Food waste, plastic waste (bottles, wrappers), and paper/cardboard were the most commonly disposed items, with a majority of respondents reporting disposal of 0-5 items daily in these categories. Specifically, 181 respondents disposed of 0-5 items of food waste daily, while 193 and 176 respondents disposed of 0-5 items of plastic and paper/cardboard waste, respectively. Mixed/general waste showed a somewhat broader distribution, with 66 respondents disposing of 6 or more items daily. E-waste (such as batteries and chargers) had the lowest frequency of disposal, with most respondents (189) disposing of 0-2 items daily, reflecting either lower generation rates or less frequent disposal practices for such waste.

These patterns align with prior studies documenting that organic waste, plastics, and paper constitute the bulk of university-generated waste (Mazzanti & Zoboli, 2008; Park et al., 2013). For instance, a study by Dudgeon et al. (2017) reported that food waste and plastics dominate waste streams in educational institutions, due largely to dining services and packaging waste. The relatively low e-waste disposal corroborates findings from Ting et al. (2019), who noted that electronic waste disposal frequency is generally lower but poses greater environmental hazards if improperly managed.

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Table 1

Estimated Average Number of Items Disposed Daily by Category

Waste Type	0-2 items	3-5 items	6-10 items	Greater than 10 items
Food waste	91	90	30	11
Plastic (bottles, wrappers)	100	93	23	6
Paper/Cardboard	95	81	31	15
E-waste (batteries, chargers)	189	24	5	4
Mixed/General Waste	74	92	47	19

Note. Data collected from a campus-wide sustainability survey (N = 222).

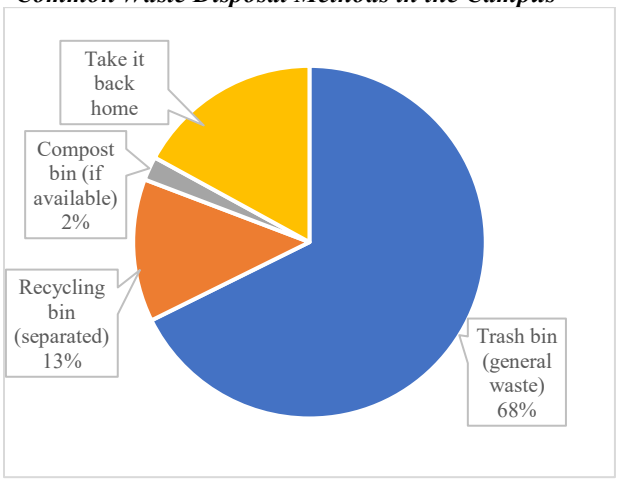
Common Waste Disposal Methods

Among the 222 respondents, the majority (68%) reported disposing of waste in general trash bins, indicating a reliance on mixed waste disposal with limited segregation. Only 13% used recycling bins and a mere 2% utilized compost bins, suggesting barriers such as poor infrastructure, low visibility, or limited awareness—issues echoed in recent campus waste studies (Abdulredha et al., 2021; Uddin et al., 2023). Meanwhile, 17% take their waste home, which may reflect personal commitment or dissatisfaction with on-campus options.

These results highlight a gap between waste generation and sustainable disposal practices. Limited participation in recycling and composting suggests a need for improved infrastructure, clearer waste segregation systems, and increased awareness. Consistent with findings by Wahab et al. (2022), investing in accessible and well-communicated waste solutions is essential for driving behavior change and supporting zero-waste goals in university settings.

Figure 1

Common Waste Disposal Methods in the Campus



Note. Data collected from a campus-wide sustainability survey (N = 222).

Awareness of Waste Segregation Bins in the Campus

Survey results show that 84% of respondents are aware of waste segregation bins on campus, a positive sign for supporting recycling and sorting efforts (Omran et al., 2014). However, 22% were either unaware or unsure, indicating possible gaps in communication, signage, or bin visibility.

Previous studies highlight that awareness alone is not enough—effective use requires clear labeling, consistent placement, and education (Hernandez & Hemphill, 2014; Mazzanti & Zoboli, 2008). The uncertainty among some respondents may stem from inconsistent bin access or new community members unfamiliar with facilities. Continued outreach and improved infrastructure are necessary to boost participation and reduce contamination in recycling streams (Park et al., 2013), helping the university advance its sustainability goals.

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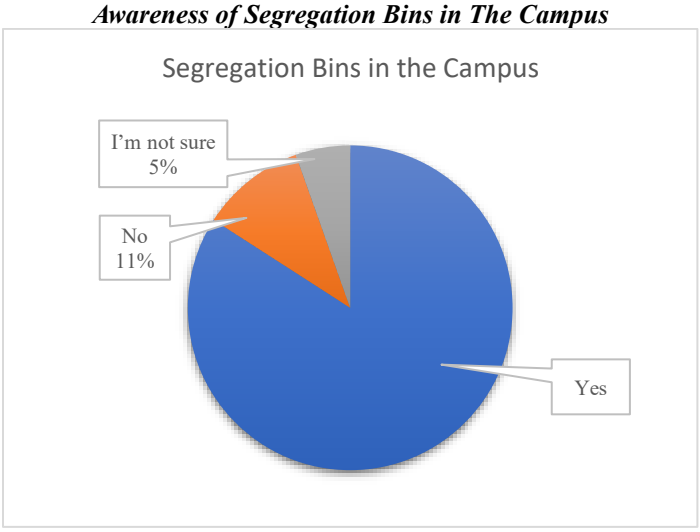
Figure 2

Awareness of Segregation Bins in The Campus



Note. Data collected from a campus-wide sustainability survey (N = 222).

Frequency of Waste Bin Collection in the Area

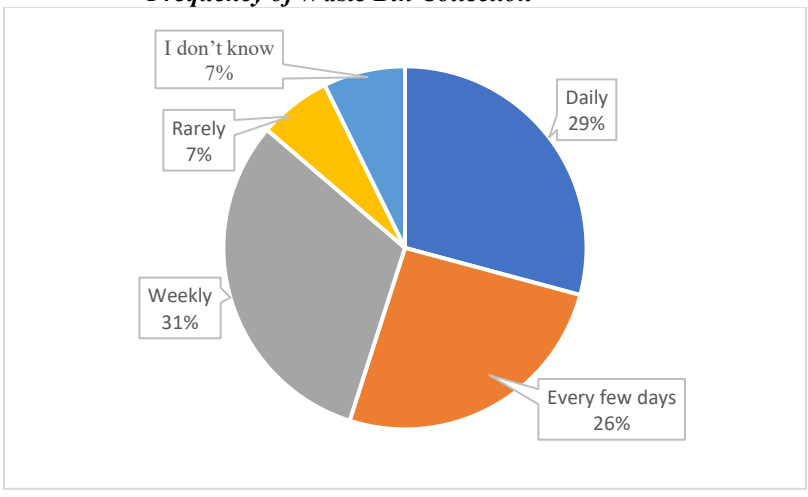
The data on waste bin collection frequency reveal a varied pattern across the campus, with 29% of the respondents reporting daily collection, 26% every few days, and 31% weekly. A smaller number indicated that bins are rarely collected (7%) or that they are unsure about the collection schedule (7%). These findings suggest inconsistencies in waste collection services, which can impact the overall effectiveness of campus waste management.

Regular and frequent waste collection is critical to prevent overflow, reduce littering, and control odors, all of which contribute to a cleaner and healthier campus environment (Omran, Khalil, & Abdullah, 2014). Infrequent collection, as reported by some respondents, may lead to increased waste accumulation and discourage proper disposal practices, thereby undermining waste segregation and recycling efforts (Hernandez & Hemphill, 2014).

Similar studies have highlighted that maintaining consistent collection schedules is essential to sustain community participation and improve perceptions of waste management effectiveness (Mazzanti & Zoboli, 2008). The uncertainty expressed by some respondents regarding collection frequency further emphasizes the need for clear communication and visible collection routines to foster trust and cooperation among campus stakeholders.

Figure 3

Frequency of Waste Bin Collection



Note. Data collected from a campus-wide sustainability survey (N = 222).

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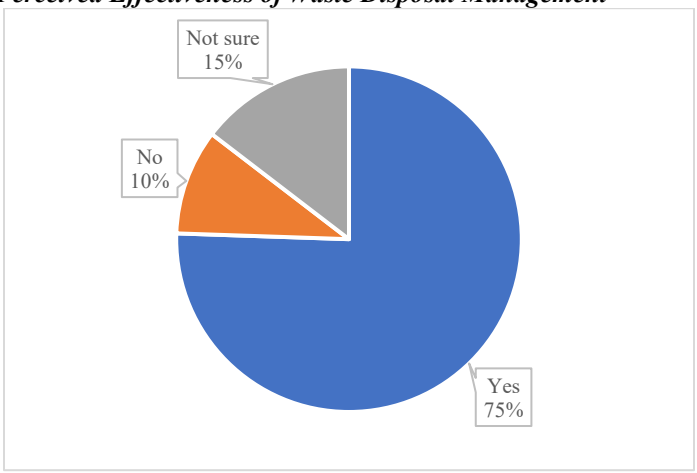
Perceived Effectiveness of Waste Disposal Management on Campus

Most respondents (75%) view campus waste disposal as effective, reflecting general satisfaction with current practices such as bin availability and regular collection. However, 25% expressed uncertainty or dissatisfaction, pointing to potential issues in communication, infrastructure, or performance.

Studies have shown that even functional systems can be perceived as ineffective if users encounter unclear signage, inconsistent service, or lack of education (Zhou et al., 2022; Babafemi & Roseland, 2020). Perceptions significantly influence participation—if students and staff doubt the system's efficiency, they may be less inclined to engage in proper waste sorting (Wang et al., 2021). Addressing these gaps through better visibility, feedback, and outreach can strengthen overall support for sustainability on campus.

Figure 4

Perceived Effectiveness of Waste Disposal Management



Note. Data collected from a campus-wide sustainability survey (N = 222).

Awareness of Zero-Waste Principles and Sustainability Practices Among University Stakeholders

Understanding the level of awareness among university stakeholders regarding zero-waste principles and sustainability practices is essential for shaping effective waste management strategies. This section presents findings on how well-informed students, faculty, and staff are about relevant policies, programs, and practices currently in place. By identifying gaps in knowledge and awareness, the university can better target its communication and engagement efforts to foster a more sustainability-minded campus community.

Awareness of Campus Policies on Waste Management and Sustainability

The results show that a strong majority of respondents (93%) are aware of formal university policies related to waste management or sustainability, while only 1% reported being unaware, and 6% were uncertain. This high level of awareness is a positive indicator of institutional communication efforts and suggests that sustainability policies are visible and well-integrated into the university culture.

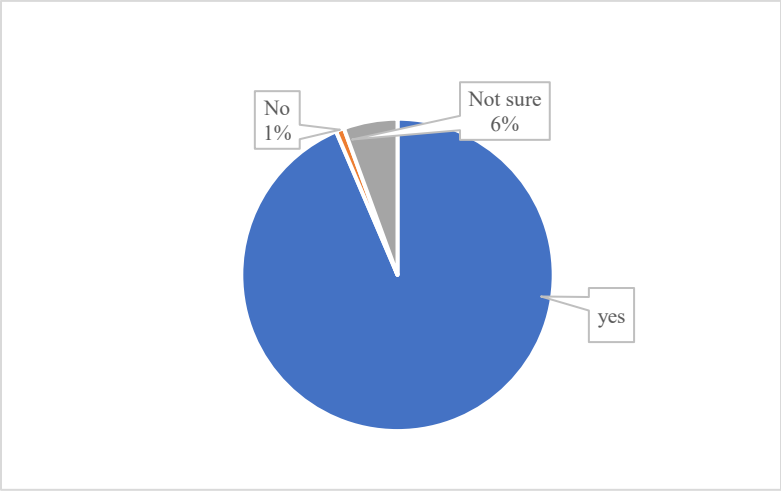
Awareness of institutional policies is critical for the successful implementation of waste management programs. According to Omran, Khalil, and Abdullah (2014), informed stakeholders are more likely to comply with guidelines and participate in environmentally responsible behaviors. Similarly, Hernandez and Hemphill (2014) found that policy visibility and stakeholder engagement were directly linked to more effective waste reduction outcomes in campus settings.

However, the presence of a small percentage (7%) of respondents who are unaware or unsure of such policies highlights the need for ongoing education and outreach. These efforts should aim to ensure that all members of the university community—not just those in sustainability-focused roles—are fully informed and equipped to participate.

Overall, the high awareness rate reflects a promising foundation for advancing sustainability goals, but maintaining and deepening that awareness through continuous communication and student engagement remains essential.

Figure 5

Awareness of Campus Policies on Waste Management and Sustainability



Note. Data collected from a campus-wide sustainability survey (N = 222).

Awareness of Waste Management Programs on Campus

The results in Table 2 indicate that among the 222 respondents, awareness of specific waste management programs on campus varies considerably. The most widely recognized program is the presence of recycling bins for plastic, paper, or metal, reported by 81.53% of respondents. This suggests that recycling infrastructure is well-established and visible across campus, which is consistent with the findings of Omran, Khalil, and Abdullah (2014), who observed that visible and conveniently placed recycling bins significantly improve user participation in waste segregation.

In contrast, awareness of other sustainability initiatives is notably lower. Only 16.22% of respondents reported awareness of composting stations, and 13.96% were aware of e-waste disposal points, despite the environmental importance of these programs. These low figures may reflect either limited infrastructure or inadequate communication regarding these specialized waste streams. As Park, Kim, and Kim (2013) emphasized, composting and e-waste programs require not only physical facilities but also strong promotional efforts to raise awareness and encourage use.

Moderate awareness was observed for bring-your-own-container (BYOC) programs (40.09%) and water refill stations (31.53%), which aim to reduce single-use plastics. These programs align with global best practices in reducing consumption-related waste and promoting behavioral change (Hernandez & Hemphill, 2014). Awareness of sustainability awareness campaigns themselves was relatively low (30.18%), which may indicate a need to evaluate the reach and impact of such campaigns.

Overall, while recycling efforts appear well-recognized, there is a clear opportunity to strengthen visibility and promotion of other waste management programs—especially those addressing compost, e-waste, and sustainable consumption. Enhancing awareness of these initiatives can play a crucial role in moving the university closer to its zero-waste goals.

Table 2

Awareness of Waste Management Programs on Campus

Waste Management Program	*f*	%
Recycling bins for plastic, paper, or metal	181	81.53%
Composting stations	36	16.22%
E-waste disposal points	31	13.96%
Water refill stations (to reduce bottled water use)	70	31.53%
Bring-your-own-container programs in food areas	89	40.09%
Sustainability awareness campaigns	67	30.18%

Note: *n = 222 (A respondent may select all options that may apply.)*

Sources of Awareness About Campus Waste Management Programs

The data in Table 3 highlight the various channels through which university stakeholders become aware of campus waste management programs. The most frequently cited sources were word of mouth (53.60%) and social media (52.70%), indicating that informal communication and digital platforms play a key role in disseminating information about sustainability initiatives. These findings support earlier research by Omran, Khalil, and Abdullah (2014), which emphasized the importance of peer influence and digital outreach in promoting environmental programs within university settings.

Posters and signage were also a significant source of awareness, reported by 45.95% of respondents. This suggests that traditional visual communication remains effective, particularly in high-traffic campus areas. Meanwhile, courses or classroom instruction accounted for 39.19%, underscoring the value of integrating sustainability education into the formal curriculum—a strategy supported by Park, Kim, and Kim (2013), who argue that education is a critical driver of long-term behavioral change in waste management.

Less effective, by comparison, were campus emails or newsletters, cited by only 27.03% of respondents. This may indicate email fatigue or low engagement with institutional communications, a trend observed in other studies of student information behavior (Hernandez & Hemphill, 2014).

Notably, only 2.25% of respondents reported being completely unaware of any waste management programs, suggesting that outreach efforts have been relatively successful in reaching the majority of the campus population. However, to further increase program visibility and engagement, universities should continue to leverage multiple communication channels—particularly peer networks and social media—while also strengthening educational integration and visual messaging on campus.

Table 3

Sources of Awareness About Campus Waste Management Programs

Sources	*f*	%
Campus email/newsletter	60	27.03%
Posters/signage	102	45.95%
Social media	117	52.70%
Word of mouth	119	53.60%
Class or course	87	39.19%
I was not aware	5	2.25%

Note: *n = 222 (A respondent may select all options that may apply.)*

Stakeholder Readiness & Willingness Survey for Campus Zero Waste Policy Participation

To ensure the successful implementation of a campus-wide Zero Waste Policy, it is essential to assess the readiness and willingness of university stakeholders—including students, faculty, and staff—to participate in and support such an initiative. This section presents survey findings related to stakeholders' preparedness to adopt more sustainable habits, their openness to policy participation, and the factors that may influence their level of engagement. Understanding these attitudes and motivations provides critical insight into the behavioral and institutional shifts needed to foster a culture of sustainability within the university.

Readiness to Participate in Zero Waste Efforts

Assessing the readiness of university stakeholders to participate in zero waste efforts is a crucial step in determining the feasibility and potential impact of implementing a campus-wide Zero Waste Policy. Readiness reflects not only awareness but also the willingness and confidence of individuals to adopt sustainable practices in their daily routines. This section explores how prepared students, faculty, and staff feel to engage in such efforts, providing insight into existing attitudes and identifying areas where additional support or education may be needed to foster active participation.

Readiness to Adopt Daily Habit Changes in Support of a Zero Waste Policy

The results of the survey reveal a highly encouraging level of readiness among university stakeholders to participate in zero waste efforts. Out of 222 respondents, 135 (60.8%) identified themselves as very prepared, while the remaining 87 (39.2%) reported being somewhat prepared. Notably, none of the respondents indicated being unprepared, suggesting a strong foundational willingness to engage in sustainability-related behaviors.

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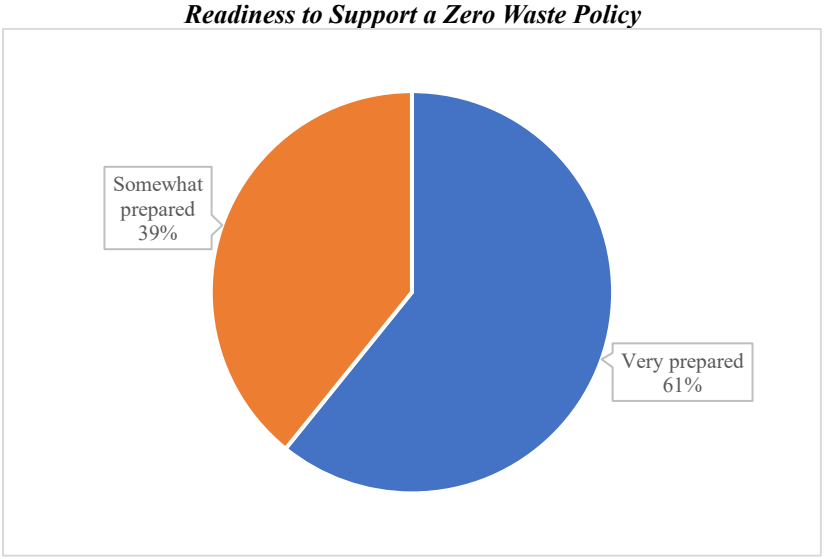
This high level of self-reported readiness aligns with studies emphasizing the positive impact of institutional culture and environmental education on individual attitudes toward sustainability (Kollmuss & Agyeman, 2002; Park, Kim, & Kim, 2013). It also suggests that the university may have already cultivated a favorable environment for behavioral change, through either formal instruction, awareness campaigns, or visible sustainability practices on campus.

However, the distinction between "very prepared" and "somewhat prepared" still highlights an opportunity to further support stakeholders in translating intent into action. According to Bamberg and Möser (2007), perceived behavioral control and access to infrastructure (e.g., accessible bins, composting facilities, and clear guidelines) are critical in bridging the gap between willingness and actual participation.

Given this readiness, the university is well-positioned to implement a Zero Waste Policy, provided it continues to invest in capacity-building, targeted training, and systems that make sustainable choices easy and intuitive.

Figure 6

Readiness to Support a Zero Waste Policy



Note. Data collected from a campus-wide sustainability survey (N = 222).

Factors That Support Readiness to Participate in a Zero-Waste Program

The survey findings highlight that while stakeholders generally feel prepared to engage in zero-waste efforts, their readiness is strongly influenced by the presence of supportive conditions. The most frequently cited factor was the need for better infrastructure, such as bins, signage, and collection stations, selected by 73.87% of respondents. This suggests that despite their willingness, stakeholders still encounter logistical barriers that hinder full participation. Research by Omran, Khalil, and Abdullah (2014) confirms that accessible and well-maintained infrastructure is a fundamental enabler of effective waste segregation and recycling, especially in institutional settings. Similarly, clear policies and enforcement were identified by 61.26% of respondents as essential, indicating a desire for structured guidance and accountability mechanisms to support consistent action—findings echoed in studies by Mazzanti and Zoboli (2008), which underscore the role of policy clarity in environmental behavior compliance.

In addition to physical and policy-related supports, more education or training was cited by 59.46% of respondents, demonstrating that even among those who feel somewhat or very prepared, there is a recognized need for ongoing capacity-building. This aligns with the conclusions of Kollmuss and Agyeman (2002), who emphasize that knowledge and awareness are critical but often insufficient without sustained reinforcement. Furthermore, peer or leadership support (48.20%) and incentives or recognition (48.65%) also emerged as meaningful motivators, pointing to the social and psychological dimensions of environmental behavior. Encouragement from influential figures and the opportunity for positive reinforcement can foster a sense of collective responsibility and sustained engagement (Bamberg & Möser, 2007). Notably, only 5.41% of respondents felt fully ready without needing any additional support, indicating that even motivated individuals benefit from a well-supported and strategically communicated zero-waste framework.

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Table 4

Factors That Support Readiness to Participate in a Zero-Waste Program

Factors	f	%
More education or training	132	59.46%
Better infrastructure (bins, signage, stations)	164	73.87%
Clear policies and enforcement	136	61.26%
Support from leadership or peers	107	48.20%
Incentives or recognition	108	48.65%
Nothing—I already feel ready	12	5.41%

Note: *n = 222 (A respondent may select all options that may apply.)*

Willingness to Participate and Support the Policy

Understanding the willingness of university stakeholders to support and participate in a Zero Waste Policy is essential for ensuring its successful implementation and long-term impact. Willingness reflects the level of commitment among students, faculty, and staff to adopt sustainable behaviors and contribute to institutional change. This section presents data on how inclined stakeholders are to support the policy and identifies the specific ways they are prepared to get involved, offering valuable insights into potential engagement strategies and areas for further encouragement.

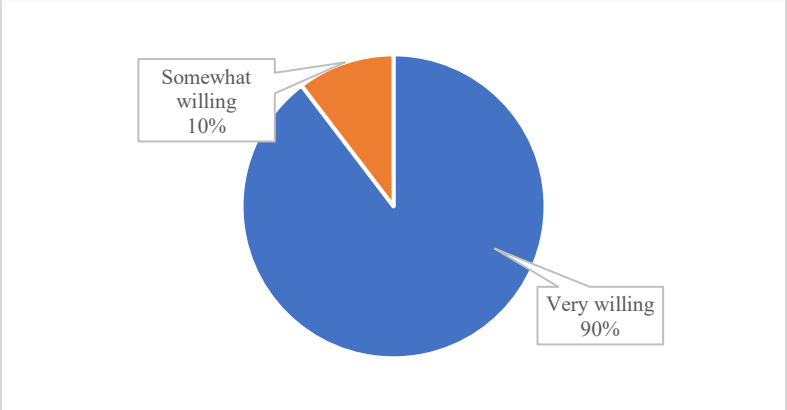
Willingness to Support Campus-Wide Zero Waste Policy Implementation

The results show an overwhelmingly positive response toward the implementation of a campus-wide Zero Waste Policy. Out of 222 respondents, 199 (89.64%) reported being very willing, while the remaining 23 (10.36%) indicated that they were somewhat willing to support such a policy. Not a single respondent reported being neutral or unwilling. This strong endorsement reflects a high level of environmental consciousness and community engagement within the university, suggesting a receptive environment for institutional sustainability initiatives. According to Lo and Leung (2015), stakeholder willingness is a key determinant of the success of campus environmental policies, as it signals a readiness for collective action and behavioral change. Similarly, Sharp (2002) emphasizes that when institutional goals align with individual values—such as reducing environmental impact—support for environmental policies tends to be stronger and more sustained.

This broad willingness may also stem from a growing awareness of environmental issues and the increasing visibility of sustainability efforts in higher education institutions. According to Velazquez et al. (2006), universities play a critical role in shaping pro-environmental behaviors, not only through formal education but also by modeling sustainable practices in daily operations. The result aligns with previous studies showing that campus communities often express strong support for environmental programs when they perceive these efforts as both meaningful and achievable (Emanuel & Adams, 2011). However, to translate willingness into consistent participation, the university must ensure the policy is accompanied by transparent goals, accessible infrastructure, and inclusive decision-making processes—factors identified by Bamberg and Möser (2007) as crucial for maintaining long-term engagement in pro-environmental behavior.

Figure 7

Willingness to Support the Zero-Waste Policy Implementation



Note. Data collected from a campus-wide sustainability survey (N = 222).

Willingness to Contribute to the Zero Waste Policy Initiative by Type of Participation

The data reveal that the most preferred form of engagement with the Zero Waste Policy initiative is through changing daily habits, such as bringing reusable items, with 82.88% of respondents selecting this option. This result is encouraging, as it indicates a strong personal commitment to sustainability practices, aligning with previous findings by Kollmuss and Agyeman (2002), who emphasized the role of individual behavior in driving environmental change. Everyday actions like reducing single-use plastics or bringing personal containers are considered low-barrier but high-impact practices that contribute significantly to waste reduction (Leal Filho et al., 2018). Such behaviors are often the first steps toward deeper environmental engagement and signal a cultural shift toward sustainable living on campus.

Beyond personal habits, students and staff also expressed willingness to engage in broader community initiatives. Participating in awareness campaigns (65.32%) and helping enforce or advocate the policy in their unit (44.59%) demonstrate that many are open to collective action and peer-led advocacy—factors which, according to Bamberg and Möser (2007), enhance the success of sustainability programs by leveraging social norms and shared responsibility. However, slightly fewer respondents indicated interest in joining sustainability-related events or clubs (43.69%) and providing feedback or suggestions (37.84%), which may suggest barriers such as time constraints, lack of information, or limited perceived influence in formal decision-making. As highlighted by Mader and Rüter (2019), to maximize participation, institutions should diversify engagement strategies and ensure stakeholders feel their voices are heard and valued. These findings suggest a strong foundation of willingness, particularly at the personal level, which can be nurtured into sustained, organized involvement through targeted programming, leadership support, and institutional recognition.

Table 5
Willingness to Contribute to the Zero Waste Policy Initiative

Forms of Engagement in Sustainability Initiatives	*f*	%
Changing my daily habits (e.g., bringing reusables)	184	82.88%
Participating in awareness campaigns	145	65.32%
Joining sustainability-related events or clubs	97	43.69%
Providing feedback or suggestions	84	37.84%
Helping enforce or advocate the policy in my unit	99	44.59%

Note: *n = 222 (A respondent may select all options that may apply.)*

Motivating Factors for Participation in the Zero Waste Initiative

The results show that the strongest motivating factor for stakeholder participation in the Zero Waste Initiative is environmental concern, with 78.83% of respondents citing it as a key driver. This aligns with findings by Ajaps and McLellan (2015), who found that pro-environmental values and ecological awareness are among the most consistent predictors of sustainable behavior in academic institutions. When individuals perceive environmental degradation as a direct threat to their community or future, they are more likely to support and participate in waste-reducing initiatives. This intrinsic motivation is particularly important because it fosters long-term behavioral change beyond the scope of incentives or enforcement (Steg & Vlek, 2009). The data suggest that the university already has a population with strong ecological values—an asset that can be further leveraged through education and value-based messaging.

In contrast, institutional incentives such as rewards or recognition were selected by only 27.48% of respondents, and top-down support from leadership received even lower acknowledgment (22.97%). These findings are consistent with the work of White, Habib, and Hardisty (2019), who argue that while extrinsic motivators can enhance short-term compliance, they often fail to sustain engagement without deeper value alignment. Interestingly, peer influence and social norms (36.04%) and the visibility of impact and results (42.79%) emerged as moderate motivators—suggesting that when individuals see others participating or when the outcomes of their actions are made tangible, they are more likely to join in. According to Cialdini and Goldstein (2004), social proof and visible feedback loops are powerful behavioral nudges, particularly in communal settings like universities. The relatively low percentage (19.82%) citing integration into academics or staff duties highlights a potential area for policy development—embedding sustainability responsibilities into coursework or job roles could normalize and institutionalize participation over time.

Table 6
Motivating Factors for Participation in the Zero Waste Initiative

Factors	*f*	%
Environmental concern	175	78.83%
Institutional incentives (e.g., rewards, recognition)	61	27.48%
Peer influence / social norms	80	36.04%
Visible impact and results	95	42.79%
Top-down support from university leadership	51	22.97%
Integration into academics or staff responsibilities	44	19.82%

Note: *n = 222 (A respondent may select all options that may apply.)*

CONCLUSIONS

The results of this study offer valuable insights into the current waste generation patterns, disposal behaviors, awareness levels, and stakeholder readiness across the university campus. They reveal both strengths—such as high awareness of recycling programs and strong willingness to support zero-waste initiatives—and challenges, including limited use of composting and e-waste facilities, inconsistent waste collection, and infrastructure gaps. These findings collectively highlight the opportunities and barriers that must be addressed to advance campus sustainability. The following conclusions summarize the key takeaways from the study and provide a foundation for strategic planning and policy implementation aimed at achieving a zero-waste university environment.

The predominance of disposals into general trash bins and the low uptake of recycling or composting suggest that perhaps infrastructural and informational barriers remain significant obstacles to proper waste segregation on campus. It is probable that the convenience of trash bins, combined with limited access to or visibility of recycling and composting facilities, still directs most waste toward non-segregated streams (Abdulredha et al., 2021; Uddin et al., 2023). Furthermore, the 17 % of respondents who report taking waste home may reflect dissatisfaction or lack of trust in campus systems, or maybe a personal attempt to compensate for perceived shortfalls in institutional provision.

Similarly, the high awareness of segregation bins juxtaposed with the who are unaware or unsure indicates that perhaps awareness campaigns and facility placement are effective for many but still inconsistent or fragmented in reaching all stakeholders. Previous research shows that awareness does not always translate into correct usage unless bins are clearly labeled, well placed, and supported by ongoing education (Hernandez & Hemphill, 2014; Mazzanti & Zoboli, 2008). The mixed results in collection frequency and perceptions of effectiveness suggest that probably variability in collection schedules, maintenance, and visibility of waste issues affect stakeholder confidence (Zhou et al., 2022; Babafemi & Roseland, 2020).

In terms of readiness and willingness, the fact that all respondents indicated they were at least “somewhat prepared” and that a large majority were “very willing” to support a Zero Waste policy suggests that perhaps the university community has latent capacity and motivation to embrace more sustainable practices. This aligns with behavioral theories which posit that when positive attitudes and intentions exist, the right enabling conditions can convert them into action (Ajzen, 1991; Bamberg & Möser, 2007). The preference for daily habit changes and the significant demand for better infrastructure, clear policies and training further suggest that probably the primary constraints are not attitudinal but structural—that is, the gap lies in resources, institutional support, and system design.

Overall, the results imply that the university is well-positioned to move toward a Zero Waste Policy, because stakeholder willingness and awareness are relatively strong. Yet, for that potential to be realized, the institution must probably address logistic, infrastructural, and governance gaps by deploying clear policies, accessible facilities, consistent collection systems, ongoing education, and transparent feedback loops. Only by doing so can the campus convert good intentions into sustained behavioral change and meaningful waste reduction.

Recommendations

Based on the findings presented in the Results and Discussion section, it is evident that while there is a strong foundation of awareness and willingness among university stakeholders to participate in sustainability efforts, several challenges persist—particularly regarding infrastructure, communication, and engagement in specialized waste programs such as composting and e-waste disposal. These insights underscore the need for a strategic, multi-dimensional approach to enhance waste management practices and support the successful implementation of a

campus-wide Zero Waste Policy. The following recommendations aim to address the identified gaps and leverage the university community's readiness to foster a more sustainable and environmentally responsible campus.

Strengthen Waste Segregation Infrastructure and Practices. Given that only 13% of respondents use recycling bins and 2% use compost bins, yet food waste, plastics, and paper/cardboard are among the most frequently disposed items, the university may prioritize expanding and enhancing waste segregation infrastructure.

- Action: Install clearly labeled and color-coded bins for recyclables, compost, and landfill waste in all high-traffic areas (e.g., cafeterias, dormitories, lecture halls).
- Supportive evidence: Prior research underscores that clear labeling, placement consistency, and bin visibility significantly increase proper sorting (Mazzanti & Zoboli, 2008; Hernandez & Hemphill, 2014).

Increase Awareness and Utilization of Specialized Waste Programs. Awareness of recycling is relatively high (81.53%), but awareness of composting (16.22%) and e-waste programs (13.96%) is notably low, despite the environmental risks posed by these waste streams.

- Action: Conduct targeted campaigns promoting composting and e-waste disposal stations, especially in dining and tech-heavy areas.
- Supportive evidence: Awareness alone does not guarantee behavior change, but it is a prerequisite for program success (Park et al., 2013; Ting et al., 2019).

Ensure Consistent and Visible Waste Collection Schedules. The data revealed variability in collection frequency, with 31% reporting weekly collection, and 7% reporting infrequent or unknown schedules, contributing to confusion and dissatisfaction.

- Action: Standardize and clearly communicate waste collection schedules in residential and academic zones via digital boards, posters, and social media.
- Supportive evidence: Regular collection improves perceptions of cleanliness and waste system reliability, which are critical for user participation (Omran et al., 2014; Mazzanti & Zoboli, 2008).

Expand Sustainability Education and Training Programs. While general policy awareness is high (93%), readiness to act is still constrained by the need for more education or training (59.46%). Additionally, only 30.18% were aware of sustainability campaigns.

- Action: Incorporate zero-waste principles into orientation sessions, general education courses, and faculty/staff training.
- Supportive evidence: Embedding environmental literacy in formal education strengthens long-term engagement and pro-environmental behavior (Kollmuss & Agyeman, 2002; Park et al., 2013).

Leverage Peer Networks and Social Media for Communication. Word of mouth (53.60%) and social media (52.70%) are the top channels of program awareness, while official emails and newsletters were among the least effective (27.03%).

- Action: Utilize student ambassadors, peer influencers, and interactive social media campaigns to disseminate information about sustainability efforts.
- Supportive evidence: Peer influence and informal communication are powerful tools for reinforcing sustainable behaviors in communal settings (Omran et al., 2014; Cialdini & Goldstein, 2004).

Develop Incentives and Recognition Programs. While intrinsic motivation (environmental concern) is high (78.83%), institutional incentives still play a role, with 27.48% of respondents motivated by rewards and 48.65% by recognition.

- Action: Launch a "Green Champion" program that recognizes individuals, units, or departments actively supporting zero-waste efforts.
- Supportive evidence: Recognition can enhance visibility of desired behaviors and establish social norms (White et al., 2019; Bamberg & Möser, 2007).

Foster Inclusive Policy Design and Feedback Mechanisms. While support for the Zero Waste Policy is high (89.64%), only 37.84% of respondents expressed willingness to provide feedback, suggesting a need to encourage more active involvement in co-creating solutions.

- Action: Establish a zero-waste advisory council composed of students, faculty, and staff to co-develop and review policy actions.
- Supportive evidence: Inclusive decision-making improves commitment and accountability (Mader & Rüter, 2019; Sharp, 2002).

Institutionalize Sustainability Roles and Responsibilities. Only 19.82% indicated that integration into academic or job duties motivates their participation. This presents a gap in aligning institutional roles with sustainability objectives.

- Action: Integrate sustainability goals into course syllabi, staff performance metrics, and departmental KPIs.
- Supportive evidence: When sustainability becomes part of institutional expectations, long-term behavior change is more likely (Velazquez et al., 2006; Babafemi & Roseland, 2020).

Monitor, Evaluate, and Communicate Impact. Stakeholders are more likely to participate when they see the results of their efforts—42.79% said visibility of impact was a motivator.

- Action: Publish annual waste audit reports, infographics, and dashboards showing waste diversion rates, participation growth, and success stories.
- Supportive evidence: Providing feedback on impact reinforces engagement and builds trust in the process (Cialdini & Goldstein, 2004; Wang et al., 2021).

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