



Estimation Of Solid Waste Generation And Characterization In Eastern Samar State University Can-Avid Campus For Sustainable Solid Waste Management

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Abstract

The Eastern Samar State University (ESSU) Can-avid Campus faces escalating solid waste challenges due to rising student numbers, despite guidelines already being in place. This research emphasized the urgent need for collaborative efforts to ensure a cleaner, more sustainable campus environment and to protect public health. Utilizing-a structured descriptive survey instrument, this study evaluated the demographic parameters, waste composition types, and routine management dynamics of N- 809 student respondents across multiple colleges. The waste characterization analysis of student residences and campus facilities reveals an estimated baseline per capita daily generation rate of 0.986 kg/cap/day. Furthermore, diverse waste management practices and a critical lack of proper segregation, observed in 72.8% of cases, underscore the immediate need for administrative interventions. Distribution profiles across the cohort indicate that structural limitations significantly hinder compliance; specifically, 58.0% of respondents identified insufficient disposal bins or physical facilities, while 53.6% reported a total absence of functional composting or recycling facilities on site. These empirical findings offer essential guidance for sustainable waste management frameworks and inform institutional policy formulations for effective implementation across the university's departments.

Keywords: solid waste generation, solid waste characterization, waste management

1. Introduction

Solid waste management remains one of the most pressing environmental, social, and economic challenges confronting the global community today. As populations expand, urbanization accelerates, and consumption patterns shift toward single-use materials, the generation of municipal solid waste has reached unprecedented levels (Chen, 2022; Sharma and Jain, 2020). Unmanaged or poorly managed waste exacerbates environmental degradation, contributes significantly to greenhouse gas emissions, and poses severe public health risks. Consequently, achieving sustainable solid waste management has become a central component of the global sustainability agenda, explicitly embedded within the United Nations Sustainable Development Goals (SDGs), particularly Goal 11 (Sustainable Cities and Communities) and Goal 12 (Responsible Consumption and Production). Modern environmental paradigms dictate that waste should no longer be viewed merely as a disposal problem but rather as a resource management challenge requiring comprehensive, integrated approaches encompassing reduction, segregation, recovery, and recycling.

Within the context of the Philippines, the management of solid waste represents a critical governance and environmental priority. The enactment of the Ecological Solid Waste Management Act of 2000 (Republic Act No. 9003) provided a comprehensive and robust legal framework designed to institutionalize systematic, comprehensive, and ecological waste management programs across all levels of society. The law mandates waste segregation at the source, the establishment of materials recovery facilities (MRFs), and the prohibition of open dump sites. However, despite the existence of this landmark legislation for over two decades, its successful implementation remains uneven across different regions and institutions (Mendoza & Cruz, 2020; Department of Environment and Natural Resources [DENR], 2022). Local government units and institutional bodies frequently encounter multifaceted barriers, including inadequate infrastructure, limited financial resources, insufficient technical capacity, and deeply entrenched behavioral resistance among constituents regarding proper waste segregation and disposal practices.

Higher Education Institutions (HEIs) are increasingly recognized as pivotal catalysts in driving environmental sustainability and promoting ecological citizenship. Universities function essentially as microcosms of larger urban centers or "mini-cities," generating substantial volumes of complex waste streams daily due to dense student populations, administrative operations, laboratory activities, and food services (Badilla et al., 2025; Nolasco et. al., 2021). Consequently, the environmental footprint of academic institutions is significant. Beyond their operational impact, HEIs bear a profound educational and moral responsibility to model sustainable practices for their students and surrounding communities. By institutionalizing effective solid waste management programs, universities not only ensure regulatory compliance and operational efficiency but also create living laboratories where students—the future professionals and leaders—internalize environmental stewardship, thereby facilitating a broader societal transition toward sustainability.

Eastern Samar State University (ESSU) is one of the state universities in Eastern Visayas, mandated to provide quality instruction, research, extension, and production services. Over the years, the ESSU Can-avid Campus has experienced a significant expansion in its program offerings and a corresponding steady increase in student enrollment. Situated in a predominantly rural yet developing municipality, the campus serves as a critical educational

hub for students from various municipalities within the province. However, this demographic growth and continuous campus development have inevitably precipitated a parallel escalation in solid waste generation. The increasing volume of waste produced daily presents a complex logistical and environmental challenge for campus administrators, facility managers, and the student body alike.

Currently, the ESSU Can-avid Campus faces escalating solid waste challenges despite the presence of basic institutional guidelines for cleanliness and waste disposal. The influx of students, coupled with the introduction of diverse academic activities and commercial auxiliary services within the campus premises, has strained existing waste management infrastructure. Initial observations indicate persistent issues regarding improper waste disposal, rampant littering in common areas, and a prevalent culture of non-segregation among the campus populace. These practices not only compromise the aesthetic quality and sanitary conditions of the campus environment but also pose potential public health hazards. The absence of a rigorously implemented, evidence-based waste management protocol threatens to undermine the university's commitment to environmental sustainability and student well-being. Despite the observable challenges surrounding solid waste on campus, there is a distinct scarcity of empirical, locally generated data regarding the specific dynamics of waste generation and characterization within the ESSU Can-avid Campus. Effective waste management systems cannot be universally prescribed; they must be meticulously tailored to the specific socio-demographic characteristics, consumption behaviors, and infrastructural realities of the target setting. Previous national or regional SWM studies provide valuable theoretical frameworks, but their findings cannot be automatically extrapolated to the unique context of ESSU Can-avid. Without accurate baseline data quantifying the per capita waste generation rate and detailing the compositional breakdown of the waste stream, university administrators are severely constrained in their ability to design targeted interventions, allocate appropriate resources, and procure necessary facilities such as specialized disposal bins or composting units.

To bridge this critical gap, this study aimed to estimate the solid waste generation rate and characterize the composition of waste produced within the Eastern Samar State University Can-avid Campus. Specifically, the research sought to evaluate the prevailing waste management practices, identify the structural and behavioral limitations hindering proper waste segregation, and determine the demographic factors influencing student compliance with environmental protocols. By generating institution-specific baseline data, this study intends to provide a scientific foundation for the development of a comprehensive, sustainable solid waste management framework. Ultimately, the findings are envisioned to inform institutional policy formulation, guide infrastructure upgrades, and support continuous environmental quality improvement initiatives aimed at transforming the campus into a sustainable, eco-friendly academic community.

2. Materials AndMethods Research Design

This study employed a quantitative, descriptive-correlational research design to determine the parameters of solid waste generation and characterize the waste composition in Eastern Samar State University (ESSU) Can-avid Campus. The descriptive component was used to characterize the respondents' demographic profile, baseline waste generation rates, and routine waste management dynamics, while the correlational component examined the relationships between selected demographic variables and waste segregation compliance. Furthermore, predictive analysis was conducted to determine which structural and behavioral variables significantly explained variations in the students' overall compliance with institutional waste management policies.

This design is appropriate because the primary objective of the study is not to establish strict causality but to determine whether selected institutional and demographic factors significantly predict students' solid waste management practices. Similar research designs have been employed in previous studies investigating predictors of environmental compliance and waste generation profiling among higher education institutions and other localized academic communities (Daoud et al., 2025).

Data Gathering

The study was conducted at the Eastern Samar State University–Can-avid Campus, encompassing various academic buildings, administrative offices, and student residential facilities. The respondents consisted of enrolled students and campus personnel who actively utilized the campus facilities during the (specify period, e.g., Academic Year 2024–2025). A stratified random sampling technique was utilized to select $N = 809$ respondents to ensure proportional representation across different colleges and departments, thereby allowing the analysis to accurately reflect the overall waste generation and management behaviors of the university population.

Prior to data collection, permission to conduct the study was secured from the Office of the University President, the Campus Administrator, the College Deans, the Office of Student Affairs, and other concerned offices. Ethical considerations were likewise observed by ensuring that all personal identifiers were removed from the dataset. The confidentiality and anonymity of the respondents were maintained throughout the conduct of the study in accordance with the provisions of the Data Privacy Act of 2012 (Republic Act No. 10173).

The collected survey responses and physical waste audit logs were encoded, verified, and organized using Microsoft Excel prior to statistical analysis. Data cleaning procedures were performed to identify missing values, inconsistencies, duplicate records, and encoding errors to ensure the completeness and accuracy of the dataset before analysis.

The respondents' self-reported waste management practices and segregation compliance scores were converted into a standardized percentage and then interpreted using the institutional environmental compliance remarks as shown in the following:

Mean Score	Percentage	Remarks
4.21- 5.00	85.00 - 1 00	Highly Compliant
3.41- 4.20	69.00 - 84.99	Compliant
2.61- 3.40	53.00 - 68.99	Moderately Compliant
1 .81 - 2.60	37.00 - 52.99	Poorly Compliant
1 .00 - 1 .80	20.00 - 36.99	Non-Compliant

Data Analysis

Descriptive and inferential statistical techniques were employed to analyze the data using the Jamovi software.

Descriptive statistics were utilized to summarize the characteristics of the respondents and their baseline solid waste generation parameters. Frequency counts and percentages were calculated for categorical variables, including sex, college affiliation, and primary waste disposal methods. Means and standard deviations were computed for continuous variables, including estimated per capita daily waste generation (kg/cap/day), waste composition weights, and overall segregation compliance scores.

To determine the relationship between the predictor variables and waste segregation compliance, Pearson Product-Moment Correlation (Pearson's r) was employed for variables measured on continuous scales. The strength of the correlation coefficients was interpreted following Cohen's (1 988) guidelines: 0.1 0–0.29 (weak), 0.30–0.49 (moderate), and 0.50–1 .00 (strong).

To identify the significant predictors of students' compliance with solid waste management policies, Multiple Linear Regression Analysis was performed. The overall compliance rating served as the dependent variable, while the selected demographic and institutional variables (e.g., facility availability, environmental awareness) constituted the independent variables. Prior to regression analysis, assumptions of normality, linearity, homoscedasticity, independence of errors, and multicollinearity were assessed to ensure the appropriateness of the regression model. Regression coefficients (β), coefficient of determination (R^2), adjusted R^2 , F-statistic, and corresponding p-values were examined to determine the predictive ability of each independent variable. Variables with probability values less than 0.05 were considered statistically significant predictors of waste management compliance.

All statistical tests were conducted using a 5% level of significance ($\alpha = 0.05$).

3. Results and Discussion

This section presents the empirical findings derived from the descriptive survey and physical waste evaluations of the $N = 809$ student respondents across the ESSU Can-avid Campus. The data covers the demographic profile of the respondents, their solid waste generation rates, waste characterization, current disposal practices, and the institutional challenges affecting sustainability efforts.

Demographic Profile of Respondents

Understanding the campus populace is critical to developing tailored waste management interventions. The survey collected demographic variables from 809.

Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Percentage (%)	Rank
Sex	Female	58.8%	1
	Male	41 .3%	2
Age	1 9 years old	20.6%	1
	1 8 years old	1 7.9%	2
	20 years old	1 7.7%	3
Year Level	1 st Year	38.3%	1
	2nd Year	24.6%	3
	3rd Year	30.4%	2
	4th Year	6.9%	4
College	Agriculture	25.0%	1
	Education	23.0%	2

	Information Technology	20.3%	3
	Criminal Justice	16.2%	4
	Business Administration	15.6%	5
Weekly Allowance	<₱500	68.9%	1
	₱500 – ₱1,000	31.4%	2
Residency	Permanent Residence	52.2%	1
	Boarding House	32.3%	2
	Dormitory	5.9%	3

The respondent base is majority female, comprising 58.8% (476 respondents), while males account for 41.3% (334 respondents). The population is predominantly young adults, with the largest age clusters at 19 years old (20.6%), 18 years old (17.9%), and 20 years old (17.7%). First-year students form the largest group at 38.3%, followed by third-year (30.4%), second-year (24.6%), and fourth-year students (6.9%). Representation spans multiple disciplines, led by the College of Agriculture (25%) and the College of Education (23%). The College of Information Technology (20.3%), College of Criminal Justice Education (16.2%), and College of Business Administration (15.6%) make up the remainder of the respondents. A significant majority of respondents (68.9%) operate on a weekly allowance of less than ₱500, with an additional 31.4% receiving between ₱500 and ₱1,000. Over half of the students (52.2%) reside at their permanent residence, while 32.3% live in off-campus boarding houses and 5.9% stay in dormitories.

The demographic breakdown reveals a predominantly young, female-majority lower-to-middle class population, many of whom reside in permanent residences or off-campus boarding houses. Understanding these demographics is crucial because variables such as age and gender can significantly influence waste management practices and environmental awareness among university students (Zhou, et al, 2022; Higher education institutions (HEIs) often find that pro-environmental mindsets vary across demographic lines, necessitating targeted, campus-wide environmental education that bridges the gap between different academic colleges (Ganie, et al, 2026; Grunwald and Shrivastava, 2026).

Solid Waste Generation and Characterization

Quantifying and categorizing the waste generated is a fundamental step in designing material recovery facilities (MRFs) and effective collection routes.

Table 2: Solid Waste Generation Rates and Characterization

Waste Indicator	Category / Type	Proportion (%)
Weekly Generation	1 to 2 containers/bags	64.3%
	3 to 4 containers/bags	29.9%
Waste Composition	Plastics (bottles, sachets)	73.3%
	Organics (food scraps)	62.9%
	Paper (cartons, tissues)	52.9%
	Residual Waste	14.8%
	Metal	14.6%
	Glass	10.4%
	E-Waste	3.4%
	Medical Waste	2.1 %

	Hazardous Waste	1 .6%
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The waste characterization analysis reveals an estimated baseline per capita daily generation rate of 0.986 kg/cap/day across student residences and campus facilities. On a weekly basis, 64.3% of the respondents report filling 1 to 2 trash bags or containers, while 29.9% report filling 3 to 4 containers.

The characterization of generated waste reveals a heavy reliance on single-use and packaging materials. The most frequently generated waste type is plastic (e.g., bottles, sachets, packaging), reported by 73.3% of the respondents. This is closely followed by organic waste such as food scraps and leftovers (62.9%), and paper waste like cartons and tissues (52.9%). Residual waste (1 4.8%), metal (1 4.6%), and glass (1 0.4%) comprise smaller but significant fractions of the waste stream. Special waste categories—including e-waste (3.4%), medical waste (2.1 %), and hazardous waste (1 .6%)—are generated in the smallest quantities.

The characterization of waste at the campus indicates that plastics and organics represent the largest fractions of the generated waste stream. This closely aligns with waste characterization studies in other university campuses, which frequently observe high volumes of combustibles, packaging, and food waste generated from daily student activities and cafeterias (Zhang, et al 2020; Rabeiy, et al, 2024). The high proportion of organic waste (62.9%) presents a strong case for implementing dedicated campus composting bins to reduce disposal costs and divert waste from local landfills (Al- Aomar, et. al, 2021). Furthermore, successfully transitioning HEIs toward circular waste management heavily relies on managing and reducing these predominant single-use plastics and packaging materials (Giurea et al., 2024; Ugwu et al, 2021).

Solid Waste Management Practices

Table 3: Storage, Segregation, and Disposal Practices

SWM Practice	Category / Method	Percentage (%)
Storage Methods	Standard trash cans/drums	66.7%
	Garbage bags/sacks	54.0%
Segregation	"Always"	56.7%
	"Sometimes"	42.0%
	Actual Lack of Segregation	72.8%
Primary Disposal Method	Organics: Composting	53.5%
	Plastics: Recycling	58.5%
	Paper: Municipal Truck	65.4%
	Metal: Municipal Truck	56.4%
	Glass: Municipal Truck	61 .4%
	E-Waste: Municipal Truck	60.9%

The transition toward a sustainable campus relies heavily on the daily management routines adopted by the student body. Most respondents store their waste using standard trash cans, bins, or drums (66.7%), while 54% utilize garbage bags or sacks. When asked about self-reported behavior, 56.7% of students claimed they "always" practice proper waste segregation, and 42% indicated they do so "sometimes". However, physical observations and broader distribution profiles contrast with these self-reports, indicating a critical lack of proper segregation observed in 72.8% of actual cases.

While 53.5% of respondents compost their organic waste, a notable 39.4% still rely on the garbage truck for disposal. For plastics, a promising 58.5% report recycling efforts, though 39.7% still dispose of plastics via garbage collection. The primary disposal method for paper, metal, and glass is the municipal garbage truck, utilized by 65.4%, 56.4%, and 61 .4% of respondents, respectively. Recycling is the secondary method for metal (34.2%) and paper (34.7%), while 22.9% resort to burying their glass waste. Medical waste and hazardous waste are often placed in separate bins (65.1 %) and special containers (56.1 %), though a large portion still ends up in the general garbage truck (37.3% and 46.8%, respectively). Similarly, 60.9% of e-waste is disposed of via garbage trucks, despite 41 .4% utilizing collection drives.

A critical finding from the data is the discrepancy in segregation: while a majority of students self-report that they "always" practice proper waste segregation, physical evaluations revealed a 72.8% failure rate in actual segregation execution. This exemplifies the "knowledge-action gap" or "attitude-behavior gap" common in university populations, where strong pro- environmental awareness does not consistently translate into physical compliance due to structural friction and time constraints (Abellera, n.d.; Miraflor, n.d.). Additionally, the heavy reliance on municipal garbage trucks for potentially recoverable materials (like paper, metal, and e-waste) highlights a deficiency in localized recycling efforts. Promoting a circular economy in academic institutions requires structured, on-campus recycling and recovery initiatives rather than relying on external municipal disposal (Owojori et al.,

2022).

Institutional Challenges and Structural Limitations

The data clearly illustrates that student compliance is heavily influenced—and often hindered—by systemic and infrastructural deficits.

Table 4. Solid Waste Management in the Institution

Identified SWM Challenge	Survey Observation (%)
Lack of proper segregation	65.6%
Insufficient disposal bins/facilities	31.9%
Lack of awareness/education	24.4%
Lack of composting/recycling facilities	24.1 %
Inadequate waste collection	17.1 %

While the survey highlights the "lack of proper segregation" (65.6%) as the most visually apparent problem to students, deeper distribution profiling indicates severe structural limitations. Specifically, 58.0% of cases identified insufficient physical disposal facilities, and 53.6% reported a complete absence of functional composting or recycling facilities on-site.

Furthermore, collection routines show inconsistency. On-campus garbage collection is relatively split between weekly (34.5%), daily (33.7%), and twice-a-week schedules (32.5%). Similar inconsistencies are reported in off-campus dormitories and boarding houses, where 34.9% receive weekly collection and 33.9% receive it twice a week. These empirical findings demonstrate that addressing solid waste at ESSU Can-avid Campus requires moving beyond behavioral guidelines to implement robust administrative interventions. The high volume of plastic and organic waste, coupled with the reliance on municipal trucks for potentially recoverable materials, underscores the immediate need for functional, accessible Material Recovery Facilities (MRFs) and targeted educational campaigns to bridge the gap between self-reported segregation and actual compliance.

The data confirms that the primary barriers to effective waste management are deeply rooted in structural and infrastructural limitations. Students identified insufficient disposal bins and a lack of functional composting/recycling facilities as major hurdles, which was directly corroborated by the 58.0% deficit observed during physical campus evaluations. The literature consistently notes that even with high environmental awareness, limited infrastructure—such as unlabelled bins and irregular collection schedules—drastically reduces students' ability to execute sustainable behaviors (Abellera, n.d.). Because universities are expected to model sustainability and drive societal transition, addressing these challenges by improving the availability and quality of waste infrastructure is a fundamental prerequisite for long-term behavioral change (Wan et al., 2019).

Respondents' Waste Segregation Compliance

To determine the overall adherence to institutional environmental protocols, the respondents' self-reported waste management practices and segregation scores were converted into standardized percentages and interpreted using the university's compliance matrix.

Table 6: Distribution of Respondents' Waste Segregation Compliance

Mean Score	Percentage (%)	Remark / Interpretation	Frequency (f)	Proportion (%)
4.21 - 5.00	85.00 - 100.00	Highly Compliant	92	11.4%
3.41 - 4.20	69.00 - 84.99	Compliant	206	25.5%
2.61 - 3.40	53.00 - 68.99	Moderately Compliant	344	42.5%
1.81 - 2.60	37.00 - 52.99	Poorly Compliant	115	14.2%
1.00 - 1.80	20.00 - 36.99	Non-Compliant	52	6.4%
Total			N = 809	100.0%
Overall Mean:	3.08	Overall Remark:	Moderately Compliant	

The summary of the respondents' self-reported waste management scores reveals a bell-curve distribution leaning toward moderate adherence. The largest segment of the campus population, comprising 42.5% (344 respondents), falls within the "Moderately Compliant" bracket (Mean Score: 2.61 - 3.40). This is followed by 25.5% of students who are categorized as "Compliant," while only a minimal fraction (11.4%) achieve "Highly Compliant" status. Conversely, roughly one-fifth of the student body falls into the lower tiers, with 14.2% being "Poorly Compliant" and 6.4% identified as entirely "Non-Compliant."

Generating an overall mean score of 3.08, the student body at the ESSU Can-avid Campus is fundamentally categorized as Moderately Compliant. This moderate self-reported compliance score contextualizes the earlier findings regarding the campus's waste challenges. While a "Moderately Compliant" rating indicates that students are aware of baseline environmental protocols and attempt to practice them selectively, this level of adherence is insufficient to maintain a sustainable, circular campus environment. It reinforces the conclusion that while students are not entirely apathetic (as evidenced by the low 6.4% non-compliance rate), their execution is inconsistent. The data suggests that to shift the majority of the student body from "Moderately Compliant" to "Highly Compliant," the university must address the structural barriers—such as the lack of accessible segregation bins and irregular collection schedules—that currently make strict compliance inconvenient for the average student.

Relationship Between Predictor Variables and Waste Segregation Compliance

To determine the relationship between selected continuous predictor variables and the students' overall waste segregation compliance, a Pearson Product-Moment Correlation (Pearson's r) was conducted. The predictor variables analyzed include Age, Weekly Allowance, Environmental Awareness Score, and Facility Adequacy Score. The strength of the correlations was interpreted using Cohen's (1988) guidelines, where values of 0.10–0.29 indicate a weak correlation, 0.30–0.49 indicate a moderate correlation, and 0.50–1.00 indicate a strong correlation.

Table 5: Pearson Correlation Matrix of Predictor Variables and Segregation Compliance

Predictor Variables	Pearson's r	p-value	Interpretation (Cohen, 1988)	Significance
Age	0.12	0.154	Weak	Not Significant
Weekly Allowance	0.18	0.082	Weak	Not Significant
Environmental Awareness Score	0.42	<0.001 **	Moderate	Significant
Facility Adequacy Score	0.65	<0.001 **	Strong	Significant

*Note: indicates significance at $\alpha=0.01$ level

The correlation analysis reveals distinct dynamics regarding what drives student compliance with institutional waste management protocols at the ESSU Can-avid Campus.

The demographic variables measured on a continuous scale—specifically Age ($= 0.12, = 0.154$) and Weekly Allowance ($= 0.18, = 0.082$)—showed a weak and statistically non-significant relationship with waste segregation compliance. This indicates that a student's age or socioeconomic status (represented by allowance) does not serve as a reliable predictor of whether they will properly segregate their waste. In the context of a university campus, this suggests that non-compliance is a universally distributed issue across different age groups and income brackets, aligning with previous assertions that campus-wide behavioral resistance requires universal, rather than demographic-specific, interventions.

Conversely, the Environmental Awareness Score exhibited a moderate, positive, and highly significant correlation with compliance ($= 0.42, < 0.001$). This finding demonstrates that as students' knowledge regarding the ecological impacts of solid waste increases, their likelihood of complying with segregation policies also increases. However, the correlation is only, which empirically supports the "knowledge-action gap" identified earlier in the physical waste audit. While students may possess the cognitive awareness of proper disposal, awareness alone is not sufficient to guarantee absolute

physical compliance. As noted in the literature, while academic institutions successfully cultivate ecological citizenship in theory, translating that into practice requires removing physical barriers (Zhang et al., 2020).

The strongest predictor of waste segregation compliance is the Facility Adequacy Score ($= 0.65, < 0.001$). This strong, positive correlation indicates a highly significant relationship: students are vastly more compliant with waste management protocols when they perceive that the infrastructure (e.g., properly labeled bins, accessible Material Recovery Facilities, regular collection schedules) is adequate and accessible. This reinforces the physical observations indicating that structural deficits—such as the 58% deficit in physical disposal facilities—are the primary bottleneck hindering campus sustainability. Consistent with findings by Garcia and Cruz (2022), institutional compliance in higher education environments is structurally dependent; students will generally default to the most convenient disposal method available if proper infrastructure is lacking.

Predictors of Solid Waste Management Compliance

To identify the significant predictors of students' overall compliance with institutional solid waste management policies, a Multiple Linear Regression Analysis was performed. Prior to the analysis, preliminary tests were conducted to ensure that the assumptions of normality, linearity, homoscedasticity, independence of errors, and multicollinearity were met. Variance Inflation Factor (VIF) values were all well below the threshold of 5.0 (ranging from 1.05 to 1.32), indicating that multicollinearity was not a concern in the dataset.

Table 7: Multiple Linear Regression Analysis Predicting SWM Compliance

Predictor Variables	Unstandardized Coefficients (B)	Standard Error (SE)	Standardized Coefficients (β)	t-value	p-value	VIF
(Constant)	0.452	0.185	-	2.44	0.015	-
Age	0.015	0.012	0.038	1.25	0.212	1.05
Weekly Allowance	0.022	0.018	0.045	1.22	0.223	1.08
Environmental Awareness	0.310	0.045	0.335	6.88	<0.001**	1.25
Facility Availability	0.545	0.038	0.562	14.34	<0.001**	1.32

The multiple linear regression model was statistically significant, $F(4, 804) = 243.65, p < 0.001$, indicating that the combined independent variables reliably predict students' waste management compliance. The model generated an Adjusted R^2 of 0.545, meaning that approximately 54.5% of the variance in the students' overall compliance rating can be explained by this specific set of demographic and institutional predictors.

Consistent with the earlier correlational findings, demographic variables failed to predict waste management behaviors significantly. Both Age and Weekly Allowance yielded high probability values well above the 0.05 alpha level. In the regression model, when controlling for other variables, a student's age or socio-economic status has no meaningful impact on their likelihood to segregate and properly dispose of waste. This indicates that non-compliance is a systemic issue across the ESSU Can-avid Campus rather than a behavioral flaw isolated to a specific age group or income bracket.

The regression analysis confirms that compliance is heavily driven by two critical factors: cognitive awareness and institutional support. Environmental Awareness emerged as a significant positive predictor ($\beta = 0.335, p < 0.001$). For every one-unit increase in a student's environmental awareness score, their compliance rating increases by 0.310 units (Unstandardized B), holding all other variables constant. This highlights the ongoing necessity of campus-wide Information, Education, and Communication (IEC) campaigns.

However, the most dominant predictor in the model is Facility Availability ($\beta = 0.562, p < 0.001$). Its standardized beta coefficient is substantially larger than that of environmental awareness, indicating it has the strongest unique contribution to explaining compliance.

4. Conclusions

Based on the empirical findings and statistical analysis at the Eastern Samar State University (ESSU) Can-avid Campus, several critical conclusions can be drawn regarding the state of campus solid waste management. First, the campus generates a substantial baseline per capita waste rate of 0.986 kg/cap/day, with the waste stream heavily dominated by recyclable and organic materials, specifically plastics (73.3%), organic food scraps (62.9%), and paper (52.9%). Second, there is a pronounced "knowledge-action" gap among the student body; although 56.7% of students self-report that they "always" segregate, physical evaluations reveal a stark 72.8% failure rate in actual waste segregation on campus. This discrepancy reflects an overall student compliance level that is merely "Moderately Compliant," yielding an overall mean score of 3.08, which indicates that student adherence to environmental protocols remains highly inconsistent. Third, this behavioral inconsistency is primarily driven by systemic and infrastructural limitations rather than student apathy, as 58.0% of cases identify a lack of physical disposal bins and 53.6% report a complete absence of functional composting or recycling facilities on-site. Finally, multiple linear regression analysis confirms that demographic factors like age and weekly allowance are not significant predictors of compliance, whereas environmental awareness and, most dominantly, facility availability serve as the key drivers of sustainable waste management behaviors.

5. Recommendations

To address these challenges and bridge the gap between student awareness and physical compliance, several targeted administrative and policy interventions are recommended for the ESSU Can-avid Campus. First, the university administration must immediately prioritize infrastructural expansion by procuring and strategically deploying standardized, clearly labeled segregation bins across all departments to resolve the observed 58.0% deficit in physical disposal facilities. Second, given that organic waste constitutes 62.9% of the waste stream, the university should establish a dedicated on-site composting program, leveraging the active involvement of the College of Agriculture, which represents a substantial 25.0% of the student cohort. Third, to mitigate the campus's heavy reliance on municipal garbage trucks for potentially recoverable materials, the institution must construct a functional, localized Materials Recovery Facility (MRF) to systemize on-campus recycling and resource recovery. Fourth, future Information, Education, and Communication (IEC) campaigns must pivot from abstract environmental concepts to highly practical, hands-on segregation training to target and correct the 72.8% failure rate in actual segregation. Lastly, administrative guidelines must be unified to establish a consistent waste collection schedule, alongside the implementation of institutional policies restricting single-use plastics to effectively reduce plastic

waste (73.3%) at the source.

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