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Analysis of Campus Waste Management Priorities Based on FKIP Students' Perceptions Using USG Method

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ABSTRACT

Campus waste management remains a significant challenge due to low student awareness and inadequate supporting facilities. This study aimed to analyze the priority of waste management problems in the campus environment based on FKIP students' perceptions using the Urgency, Seriousness, and Growth (USG) method. A quantitative descriptive survey approach was employed involving 32 respondents selected through purposive sampling. Data were collected using a validated USG-based questionnaire assessing ten indicators of waste management issues on a four-point scale. The results revealed that littering behavior was the highest priority issue (score 330), followed by low awareness of using reusable containers (score 328), and the accumulation of waste in high-traffic areas (score 325). These findings indicate that student behavior is the dominant factor influencing ineffective waste management on campus. Therefore, an integrated strategy is required, including strengthening environmental education, improving supporting facilities such as water refill stations, and optimizing waste management systems through adjustments in bin capacity and collection frequency. This study provides data-driven recommendations to support more effective and sustainable campus waste management policies.

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INTRODUCTION

Waste is material that is no longer utilized by humans and is generally considered dirty and discarded without further thought. Every human activity generates waste, making its management a shared responsibility between local governments and communities. Poor waste handling can cause significant negative impacts on the surrounding environment. Waste management systems are influenced by various factors, including population density, socioeconomic conditions, physical environment, and community attitudes and culture. Inadequate planning in waste management has caused existing systems to operate suboptimally (Elamin *et al*., 2018).

From a technological development perspective, universities are expected to pioneer the use of information technology aligned with environmental sustainability principles. The implementation of environmentally friendly and sustainable technology on campus can serve as a basis for important strategic decision-making across organizations, reinforcing the campus role as an agent of change. Beyond institutional contributions, students can also make real impact as agents of change through social activities, including community service programs. These activities create direct synergy between students and communities, such as providing waste segregation education and fostering environmental awareness. Economically, the ability to process and utilize waste can generate added value as a potential source of income (Sasono, 2024).

Campus waste management presents unique challenges, with an average generation of 0.19 kg per person per day, dominated by organic waste (30%), paper and cardboard (23%), and plastic (18%) (Guerreiro *et al*., 2024). Cafeteria areas generated 83.4% organic waste while academic areas produced only 6.7%, indicating high spatial variability (Tangwanichagapong *et al*., 2017). Although 91.5% of students were aware of recycling bins, only 30.7% actually practiced waste segregation (Tangwanichagapong *et al*., 2017). Subjective norms and environmental knowledge were identified as important predictors of student waste management behavior (Wu *et al*., 2022). Therefore, identifying problem priorities based on student perceptions was a crucial step in designing effective interventions.

Problem prioritization can be conducted using the Urgency, Seriousness, and Growth (USG) method, which ranks issues based on urgency, severity of impact, and rate of development over time. This approach enables objective comparison of issues through a specific scoring scale, usually ranging from 1–5 or 1–10. Through this analysis, researchers can identify problems requiring the fastest attention and strategic intervention. The final result of the USG method produces a total score, where the highest value indicates the issue most worthy of immediate resolution (Saptadi *et al*., 2024). This method has proven effective across various fields in determining intervention priorities objectively.

The USG method has been applied in various studies to determine problem priorities in specific areas. Research in Wawatu Village demonstrated that the USG method effectively mapped public health problems such as smoking habits, waste management, and high sodium consumption patterns (Handayani, 2025). Another study at Banten Mangrove Center proved that the USG method was effective in identifying urgent, serious, and potentially growing problems (Utari & Wahyuni, 2020). However, the application of the USG method in campus waste management, particularly based on FKIP students' perceptions, has rarely been found in existing literature. This study was expected to contribute data-based recommendations for campus managers in determining waste management intervention priorities more effectively and systematically. Therefore, this study aimed to analyze waste management problem priorities in a campus environment based on FKIP students' perceptions using the Urgency, Seriousness, and Growth (USG) method.

METHODS

This study employed a quantitative descriptive survey approach conducted in the FKIP campus environment in 2025. This approach was selected because it was suitable for systematically and measurably collecting student perception data regarding campus waste management problems. The population of this study consisted of FKIP students from various study programs who were active in the campus environment. A total of 32 respondents were selected using purposive sampling technique based on the criteria of active FKIP students who were considered relevant to assess campus waste management conditions. The research procedure began with instrument development, validation, questionnaire distribution, data collection, and USG score analysis.

The research instrument was a questionnaire based on the Urgency, Seriousness, and Growth (USG) method that assessed ten waste management problem indicators through a four-level categorical scale. Prior to use, the instrument underwent content validation by a supervising lecturer and peers to ensure the appropriateness of each item with the research objectives. Data were collected through direct questionnaire distribution to all respondents. Data analysis was conducted by summing the Urgency, Seriousness, and Growth scores for each indicator to obtain a total value reflecting the priority level of each problem. The total scores were then ranked from highest to lowest to determine rankings one through ten, where the highest score indicated the most prioritized problem requiring immediate attention.

RESULTS AND DISCUSSION

The research instrument uses the Urgency, Seriousness, and Growth (USG) rating scale to determine the priority level of each waste management issue on campus. Each aspect is assessed using a four-point scale that describes the level of urgency, magnitude of impact, and potential for the problem to escalate based on students' perceptions. The rating categories for each aspect are presented in (Table 1).

Table 1. Assessment Categories for the Urgency, Seriousness, and Growth (USG) Method

Score	U (Urgency)	S (Seriousness)	G (Growth)
1	Not Urgent	Very Low Impact	No Growth
2	Less Urgent	Low Impact	Slow Growth
3	Urgent	Significant Impact	Rapid Growth
4	Very Urgent	Very Critical Impact	Exponential Growth

These categories serve as the basis for calculating the total USG score, ensuring that each issue can be prioritized objectively based on its level of urgency and impact.

Table 2. Prioritization of Issues Using the USG Method

Specific Issue	U	S	G	Total	Ranking
Students littering	116	114	100	**330**	1
Students' lack of awareness about bringing their own reusable containers, resulting in a high volume of single-use waste	113	111	104	**328**	2

Significant accumulation of trash in high-traffic areas such as the cafeteria and in front of classrooms during peak hours	113	112	100	**325**	3
Inadequate trash bin emptying schedules causing bins to fill up quickly or overflow Poorly managed campus	103	107	99	**309**	4
Conditions at the Temporary Shelter (TPS) on the campus, which is not well-managed	104	104	102	**310**	5
The lack of effective waste sorting at the collection points before transport to the landfill	102	102	101	**305**	6
Limited number of cleaning staff relative to the campus area and daily waste volume	97	94	96	**287**	7
Limited number and improper placement of separated waste bins	96	100	90	**286**	8
Lack of environmental education materials such as posters or banners about waste sorting	99	93	88	**280**	9
Inconsistent design of separated waste bins	77	87	78	**242**	10

(Table 2) shows the results of the identification of factors contributing to the suboptimal waste management system on campus; ten specific issues have been identified as priorities for analysis. These issues are grouped according to dimensions such as infrastructure, student behavior, internal operations, and waste processing facilities. The issues analyzed include: 1) Student behavior involving littering, 2) Lack of student awareness regarding bringing their own reusable containers for food and drinks, resulting in high levels of single-use waste, 3) High accumulation of waste in strategic areas such as the cafeteria and in front of classrooms during peak hours, 4) Inadequate trash bin emptying schedules, causing bins to fill up quickly or overflow, 5) Poorly managed campus Temporary Waste Storage Areas (TPS), 6) The absence of effective waste sorting at the TPS level prior to transport to the Landfill, 7) Insufficient number of cleaning staff relative to the campus area and daily waste volume, 8) Limited number and inappropriate placement of sorted waste bins, 9) Lack of environmental education materials such as posters or banners about waste sorting, and 10) Inconsistent design of sorted waste bins.

The ten waste management issues were analyzed using the USG Matrix to determine the most effective intervention priorities. The assessment was based on the aspects of Urgency, Seriousness, and Growth, so that each indicator received a different total score and resulted in varying resolution rankings. Issues ranked 1 through 3 represent the most urgent problems that will have a significant impact if not addressed immediately. The top priority students littering highlights the need to improve understanding and discipline regarding campus cleanliness.

The second priority the lack of awareness among students to bring their own food and drink containers reflects a low level of internalization of environmental values. This finding underscores the need for special attention to student behavior as a key factor in the increase in campus waste volume. The third priority the high accumulation of waste in strategic areas indicates limited disposal facilities and suboptimal supervision at locations with high activity levels. Issues with medium scores remain important but do not carry the same level of urgency as the top priorities. Some indicators also received low rankings because their impact is not as significant as core issues that more directly influence the

increase in waste generation. The tenth-ranked issue the inconsistent design of segregated waste bins is the lowest priority because its impact is indirect and its potential for development is relatively small.

Waste Management Practices Among College Students

Community participation plays a crucial role in achieving effective and sustainable waste management. Active community involvement supports policy formulation, recycling implementation, and the adoption of eco-friendly behaviors. Such participation is key to integrating ecological, economic, and social aspects to maintain environmental balance (Missouri *et al*., 2023). However, student participation in eco-friendly practices remains relatively low, as evidenced by habits such as littering and the use of personal water bottles (Sirait et al., 2025). Therefore, strengthening education and policy understanding is necessary to improve environmentally conscious behavior.

Students' lack of support, despite having good knowledge, may be influenced by factors such as a lack of environmental reinforcement, unsupportive habits, and weak educational incentives. These conditions underscore the need for effective strategies to link knowledge with action through hands-on education and the reinforcement of campus policies (Ayuningtias & Wijayanti, 2024). Waste sorting is also a crucial component in supporting SDG goals related to waste reduction and management. This practice is essential to prevent waste from becoming mixed and to ensure it can be processed more effectively. The more positive students' attitudes toward waste sorting, the greater the likelihood they will practice it consistently (Azka *et al*., 2021).

The behavior of students who still dispose of food and drink waste carelessly indicates a lack of responsibility toward campus cleanliness. Research by Patimah et al. (2021) shows that proper waste management behavior is only observed among students with a high level of knowledge. Although some students have engaged in eco-friendly activities such as "before–after" cleanups, plogging, or composting, these practices are not yet widespread. This low level of awareness contributes to increased waste accumulation in strategic areas such as the cafeteria and classroom hallways. This situation underscores the need for education and behavioral conditioning to ensure students consistently practice proper waste management.

The recommendation put forward is the need for an integrated strategy that combines education, facilities, and policy reinforcement to improve students' waste management practices. The campus needs to strengthen education through seminars, digital campaigns, and the integration of waste management materials into coursework so that students' understanding leads to concrete action. Waste management policies must also be clearly communicated and supported by adequate facilities, such as segregated trash bins and informative signage. Additionally, the adoption of eco-friendly behaviors can be reinforced through routine activities such as plogging or zero-waste programs at the faculty level. Regular monitoring of attitudes, facilities, and waste generation is necessary to ensure these recommendations are implemented sustainably and effectively.

Student Awareness of Waste

Environmental awareness is an attitude that demonstrates an understanding of the importance of a healthy, stable, and comfortable environment, as reflected in voluntary, caring behavior (Wardhana et al., 2025). Efforts to foster this awareness must be undertaken among the academic community through environmental management focused on maintaining and improving environmental quality. A well-maintained environment fosters a sense of safety and comfort in supporting academic activities, both inside and outside the classroom. However, the high use of plastic packaging presents new challenges in waste management. Plastic waste from bottled drinking water (BDW) increases the volume of non-biodegradable waste that is difficult to decompose and has the potential to pollute the environment if not managed properly (Risqi *et al*., 2025).

Waste that is not properly managed can cause health problems and have a negative impact on the environment. The social factors that play a major role in waste management within a community are educational level and occupation. Low educational levels can lead to a lack of knowledge and understanding regarding the importance of waste management. Additionally, occupations related to income levels also influence public awareness of clean living practices. Thus, the higher the educational level and income of the community, the greater the public's awareness of maintaining environmental cleanliness (Salewangeng & Yusuf, 2021).

Recommendations may include sustainable environmental education strategies to raise student awareness, particularly regarding the use of reusable water bottles, which can be an effective step toward reducing plastic pollution because they are more practical and economical than buying bottled water. The success of efforts to reduce plastic waste depends heavily on changes in individual behavior as well as the availability of water refill stations (Risqi *et al*., 2025). These findings indicate that the simple habit of carrying a reusable water bottle can have a tangible impact on reducing the volume of plastic waste on campus. However, this habit can only be fully effective if supported by adequate infrastructure. Therefore, campuses should prioritize the provision of water refill stations as a key recommendation to strengthen plastic waste reduction programs.

Mismatch Between Waste Generation and Waste Container Capacity

Population growth and rising living standards have led to an increase in waste volume. This situation has strained the capacity of waste containers and collection systems. Temporary Waste Storage Sites (TPS) serve as temporary storage locations for waste before it is transported to Final Disposal Sites (TPA) in accordance with Law No. 18 of 2008. In the early stages of a region's development, waste management was not yet a serious issue due to the availability of land and the still-low volume of waste. However, as the population grows and lifestyles change, waste management issues have become increasingly complex and threaten the quality of life for the community (Asdiani *et al*., 2024).

Based on the researcher's observations, waste accumulation in front of classrooms in the afternoon often reaches an overflowing condition before the staff have the opportunity to empty the bins. This phenomenon is consistent with the findings of Widiarti *et al*. (2020), which indicate that waste collection on campus is carried out only once per day, making it unable to keep pace with increased waste generation during peak hours. In addition, the collection process does not take into account whether the bins are already full, thereby increasing the likelihood of overflow. The same study also reports that waste piles are frequently found outside the bins, indicating insufficient container capacity. Therefore, this condition reflects an imbalance between waste volume and the available capacity as well as the frequency of waste collection.

According to Government Regulation No. 81 of 2012, waste collection is the activity of transporting waste from the source to a waste transfer station (WTS) or a 3R waste transfer station. Collection can be carried out using carts, motorcycles, or open-bed trucks, whether compartmentalized or non-compartmentalized. In the partitioned system, waste is collected at least every two days according to type, while in the non-partitioned system, collection focuses on easily degradable waste. Special waste such as hazardous waste (B3), reusable items, and recyclables is collected according to a specific schedule. These collection activities may be carried out by neighborhood unit (RT) or sub-neighborhood unit (RW) officials, or private entities (Safrida & Warmadewanthi, 2019).

To address the imbalance between waste generation and container capacity, the campus needs to increase the frequency of waste collection, especially during peak hours when waste volume spikes sharply. Container capacity must also be adjusted to on-site conditions by providing larger bins and 500–1,000-liter composters to reduce the burden of organic waste. Additionally, waste containers

should be placed at strategic, highly visible locations near high-traffic areas to prevent accumulation outside the bins. Condition-based emptying should be implemented so that nearly full containers can be emptied immediately without waiting for the regular schedule. With these measures, campus waste management will become more effective and capable of preventing overflow in strategic areas.

Implications of Waste Management Priorities for Environmental Education and Critical Thinking Development

The findings regarding priority issues in campus waste management identified in this study have direct implications for the development of environmental education and students' critical thinking skills, the USG method enables the systematic and objective identification of problems, thereby allowing educational intervention strategies to be designed in a more targeted and measurable manner (Ariyanti *et al*., 2020). Students' critical thinking skills regarding environmental change remain relatively low, with an average of 43.73%, indicating a need for a more structured digital learning model to develop all aspects of critical thinking evenly (Chusni *et al*., 2021). SETS-based digital modules have been proven to improve students' conceptual understanding and critical thinking with N-Gains of 0.72 and 0.71, both of which fall into the high-effectiveness category (Kustantia *et al*., 2023). Problem-Based Learning (PBL)-based e-modules combined with Socratic dialogue have been proven effective in enhancing students' critical thinking, with the experimental class's average post-test score (87.85) being significantly higher than that of the control class (71.76) (Pitorini *et al*., 2024). The involvement of various stakeholders in higher education has been shown to enhance the relevance and tangible impact of sustainable environmental education programs (Filho *et al*., 2025).

Students' knowledge of waste sorting remains very low, with 70.7% not understanding the concept of sorting and 77% reporting a lack of separate waste bins on campus (Owojori *et al*., 2022). This situation implies that environmental education must begin with strengthening self-awareness competency so that students can reflect on their personal role in waste management (Debrah *et al*., 2021). The Conceptual Change Model-Cognitive Conflict Approach (CCM-CCA) in SDG-based e-modules incorporating local wisdom has proven effective in enhancing students' critical thinking skills, with a significance value of 0.000 in the t-test (Makhrus *et al*., 2025 The implementation of the IoT smart planter project in project-based learning showed that multidisciplinary groups achieved higher scores (9.09) compared to non-multidisciplinary groups (7.49), while integrating SDG goals such as clean energy, sustainable consumption, and climate action (Tabuenca *et al*., 2020). The research findings also reveal that science students exhibit higher engagement and knowledge, while social science students demonstrate better environmental behavior; thus, effective environmental education must integrate key sustainability competencies through structured campus programs, economic incentives, and faculty training (Yusuf & Fajri, 2022; Debrah *et al*., 2021; Gherheș *et al*., 2022).

CONCLUSION

This study concludes that campus waste management issues are primarily driven by student behavior, with littering identified as the highest priority problem, followed by low awareness of using reusable containers and the accumulation of waste in strategic areas. These findings indicate that behavioral factors play a more dominant role than infrastructural limitations in influencing the effectiveness of waste management systems. The results of the USG analysis emphasize the need for immediate and targeted interventions focusing on the most critical issues. Therefore, an integrated approach combining environmental education, behavioral reinforcement, and facility improvement is necessary. Strengthening student awareness alongside optimizing waste management infrastructure and collection systems is essential to achieve sustainable and effective campus waste management.

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