

Attitude toward Environmental Behavior, Subjective Norms and Perceived Behavioral Control as Determinants of Waste Management Practices among Learners

Analyn M. Dayondon*

^a *analyn.dayondon@hcdc.edu.ph*

^a*Graduate School, Holy Cross of Davao College, Sta. Ana Avenue, corner C. De Guzman Street, Barangay 14-B, Davao City, Philippines*

Abstract

Improper waste management continues to challenge the development of environmental responsibility among learners. This study examined how attitude, subjective norms, and perceived behavioral control contribute to waste management practices. Using a diagnostic research design, the study gathered survey data from 351 public-school learners selected through proportionate stratified random sampling, and the results were analyzed through multiple linear regression. The findings revealed that subjective norms and perceived behavioral control significantly influenced waste management practices, whereas attitude toward waste management did not show significant influence. This result partially supports the Theory of Planned Behavior. The findings may serve as basis for school leaders, teachers, learners, and future researchers in designing programs and activities that strengthen environmental awareness, supportive social influence, and sustainable waste management behavior among learners.

Keywords: Attitude toward environmental behavior; subjective norms; perceived behavioral control; waste management practices among learners

1. Introduction

Poor waste management remains a continuing environmental issue in many parts of the world. It is commonly associated with population increase, urban development, and changing consumption behaviors that contribute to greater waste generation. Although awareness of waste-related concerns has improved, many communities still experience difficulty in translating knowledge into actual practice (Kumar & Agrawal, 2021). This concern is also evident in schools, where institutions are expected to demonstrate sustainability and environmental responsibility. However, proper waste management practices in school communities are not always consistently observed. In Indonesia, Erwinsyah (2022) found that university students had moderate to high environmental knowledge and positive attitudes, but their actual waste management behaviors did not fully reflect such awareness. In Pakistan, Fayyaz et al. (2023) reported that environmental awareness was present in school policies and activities in Karachi, yet students' conservation behaviors remained inconsistent. Similarly, Ana et al. (2011) reported that some secondary schools in Ibadan, Nigeria continued

to practice improper solid waste management, including open burning, poor segregation, and inadequate disposal, despite awareness campaigns.

In the Philippine school setting, waste management remains a continuing concern despite the provisions of Republic Act 9003, or the Ecological Solid Waste Management Act of 2001, which requires segregation, recycling, and proper waste disposal. Nerida and Dela (2025) reported serious concerns on the ineffective implementation of waste management practices at Narvacan National Central High School. In the local context, the same concern is observed in a public school in the Province of Sarangani. The observance of waste management policies among students, teachers, and staff remains uneven. Some members of the school community still do not properly segregate waste, practice recycling inconsistently, and manifest waste management behaviors that are not fully aligned with policy expectations.

Poor waste management in public schools may contribute to pollution, health-related risks, and unsanitary surroundings, thereby affecting the school environment and learners' well-being. If this concern continues, schools may encounter greater environmental and sanitation problems, while learners may carry improper waste disposal behaviors into the wider community and future generations. Hence, this study was considered necessary to respond to the continuing concern on improper waste management practices among learners and to examine the behavioral factors that may influence these practices. Understanding these factors may help improve environmental programs and promote more sustainable waste management behaviors in schools.

1.1. Significance of the Study

The findings of this study may contribute to Sustainable Development Goal 4 (Quality Education) by supporting environmental awareness, responsible actions, and sustainable waste management practices among learners. The study may also provide useful information to the Philippine education sector, especially to school leaders and teachers, in improving environmental education initiatives, waste management programs, and sustainability-related activities in schools. Likewise, the findings may guide schools and communities in strengthening supportive social influence and environmental responsibility through proper waste management practices among learners. For learners, the study may help promote positive attitudes, social responsibility, and perceived behavioral capability needed for consistent waste management behavior. The findings may also serve as reference for future researchers who may explore related topics on environmental behavior and waste management practices among learners.

1.2. Statement of the Problem

This study aimed to determine the significance of the contribution of attitude, subjective norms, and perceived behavioral control as determinants of waste management practices among learners in a public high school. Specifically, the following objectives were pursued:

1. To determine the levels of attitude toward waste management in terms of perceived value and willingness to act; subjective norms in terms of family expectations and peer influence; perceived behavioral control in terms of self-efficacy and convenience; and the waste management practices among learners in terms of waste segregation, recycling and reuse, and waste reduction.
2. To determine the significant relationship between attitude, subjective norms, and perceived behavioral control, and the waste management practices among learners.

3. To determine the significant influence of attitude, subjective norms, and perceived behavioral control on the waste management practices among learners.

1.3. Hypotheses

The following hypotheses were tested at the .05 level of significance:

H₀₁: Attitude toward waste management and waste management practices among learners are not significantly correlated.

H₀₂: Subjective norms and waste management practices among learners are not significantly correlated.

H₀₃: Perceived behavioral control and waste management practices among learners are not significantly correlated.

H₀₄: Attitude toward waste management does not significantly influence waste management practices among learners.

H₀₅: Subjective norms do not significantly influence waste management practices among learners.

H₀₆: Perceived behavioral control does not significantly influence waste management practices among learners.

1.4. Theoretical and Conceptual Framework

Ajzen's Theory of Planned Behavior explains that behavior is shaped by intention, which is influenced by attitude toward the behavior, subjective norms, and perceived behavioral control. In this theory, a person is more likely to perform a behavior when the behavior is viewed positively, when important people are perceived to support it, and when the person believes that the behavior can be carried out using available capability and resources. Perceived behavioral control may also affect behavior directly, particularly when the action depends on the opportunities available and the individual's ability to perform it (Ajzen, 1991).

In the present study, attitude toward waste management, subjective norms, and perceived behavioral control served as determinant variables, while waste management practices among learners served as the criterion variable. Guided by the Theory of Planned Behavior, the study assumed that learners who have favorable attitudes, receive supportive social influence, and possess stronger perceived behavioral capability are more inclined to practice proper waste management. Thus, the framework provides the basis for the predictive-correlational direction of the study by explaining how psychological and social factors may be associated with and may contribute to learners' waste management practices.

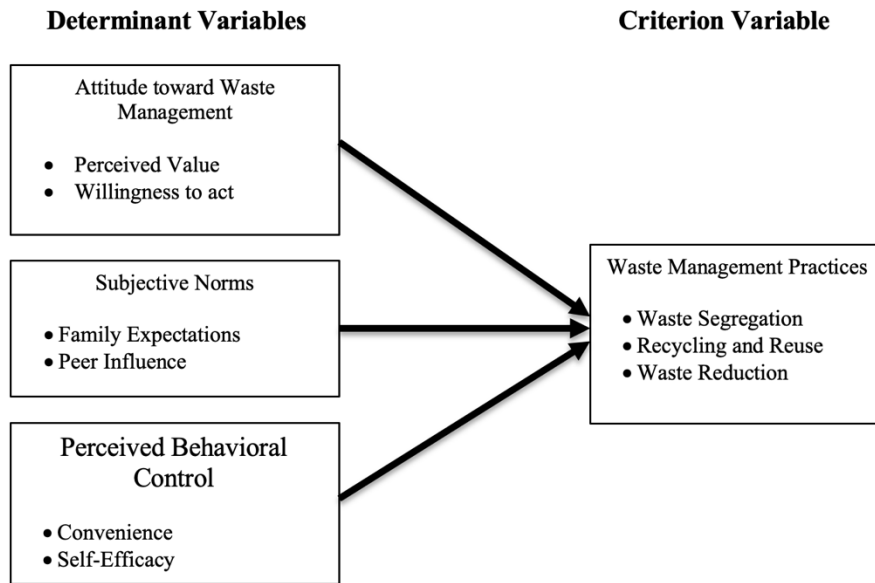


Figure 1. Conceptual Framework of the Study.

2. METHOD

2.1. Research Design

This study employed a diagnostic research design. This design allows the researcher to examine factors, conditions, or variables that may be connected with a particular problem or phenomenon. It is appropriate when a study intends to determine whether determinant variables are significantly related to or may influence a criterion variable through statistical procedures such as correlation and regression analysis (Creswell & Creswell, 2018). Diagnostic research design also helps clarify possible causes or contributing factors of a specific issue, which may guide the development of relevant interventions and programs. In this study, the design was applied to determine the relationship and influence of attitude toward waste management, subjective norms, and perceived behavioral control on learners' waste management practices.

2.2. Locale of the Study

The study was conducted in a public secondary school in Alabel, the capital municipality of Sarangani Province in Region XII (SOCCSKSARGEN), Philippines. This school was selected because of its large and diverse learner population and its involvement in environmental programs that are aligned with the sustainability goals of the Department of Education.

2.3. Sample and Sampling Technique

The respondents were 351 public-school learners from Grades 7 to 12 who were enrolled during the 2025–2026 school year in a public secondary school in Alabel, Sarangani Province. They were selected from different grade levels to ensure proper representation of the target population.

The inclusion criteria required the respondents to be officially enrolled during the school year and to have submitted the required parent or guardian consent and learner assent forms. Learners who were outside the identified grade levels, were not officially enrolled, or did not comply with the participation requirements were excluded from the study.

Proportionate stratified random sampling was used to ensure that the different grade levels were properly represented in the study. In this technique, the population is first divided into strata, and respondents are randomly selected from each stratum according to its proportion in the total population. This approach is suitable when the target population is composed of subgroups, such as grade levels or sections, that need appropriate representation in educational research. It also helps improve representativeness, lessen sampling bias, and strengthen the accuracy and reliability of the study findings (Cochran, 1977; Creswell & Creswell, 2018). Through this procedure, the total sample of 351 respondents was distributed according to the population size of each grade-level stratum.

2.4. Data Gathering Technique

The survey technique was used to gather the data needed for the study. This technique is appropriate for quantitative research because it allows the researcher to obtain standardized responses from a large group of respondents in an organized and efficient manner. It also provides numerical data that can be subjected to statistical analysis (Creswell & Creswell, 2018). In this study, a researcher-made and adapted survey questionnaire was used to collect data on attitude toward waste management, subjective norms, perceived behavioral control, and waste management practices among learners.

The adapted questionnaire contained items based on validated studies related to environmental behavior and sustainability. These items were modified to fit the variables of the present study, namely attitude toward waste management, subjective norms, perceived behavioral control, and waste management practices among learners. To establish content validity, three experts in the field reviewed the instrument. Pilot testing was also conducted to determine reliability using Cronbach's alpha, with a coefficient of 0.70 or higher considered acceptable.

The questionnaire consisted of four sections aligned with the variables of the study. The first section assessed attitude toward waste management in terms of perceived value and willingness to act, focusing on learners' beliefs, evaluations, and readiness to practice proper waste management. The second section measured subjective norms in terms of family expectations and peer influence, which described how learners perceived the influence of important people such as family members and classmates on their waste management behavior. The third section assessed perceived behavioral control in terms of self-efficacy and convenience, focusing on learners' perceived ability, confidence, and ease in performing proper waste management practices. The fourth section measured waste management practices in terms of waste segregation, recycling and reuse, and waste reduction in learners' daily school-related activities.

A four-point Likert scale was used to determine the respondents' level of agreement with each statement. The responses were scored as follows: 4 – Strongly Agree, 3 – Agree, 2 – Disagree, and 1 – Strongly Disagree. The mean scores were interpreted using the scale shown below:

Table 1. Interpretation of Mean Scores

Mean Interval	Descriptive Level	Attitude Toward Waste Management	Subjective Norms	Perceived Behavioral Control	Waste Management Practices
3.26-4.00	Very High	Very Good	Very Good	Very Strong	Very Good
2.51-3.25	High	Good	Good	Strong	Good
1.76-2.50	Low	Poor	Poor	Weak	Poor
1.00-1.75	Very Low	Very Poor	Very Poor	Very Weak	Very Poor

2.5. Data Analysis Technique

The data were analyzed using descriptive analysis, correlation analysis, and multiple linear regression analysis. Descriptive analysis was applied to describe the levels of attitude toward waste management, subjective norms, perceived behavioral control, and waste management practices among learners using the mean and standard deviation. This statistical technique summarizes the general characteristics of quantitative data (Creswell & Creswell, 2018). Correlation analysis using the Pearson Product-Moment Correlation Coefficient (Pearson r) was employed to examine the significant relationships between attitude toward waste management, subjective norms, perceived behavioral control, and waste management practices among learners. This technique determines the strength and direction of relationships among variables (Cohen et al., 2013). Multiple linear regression analysis was also used to determine the significant influence of attitude toward waste management, subjective norms, and perceived behavioral control on learners' waste management practices. This analysis identifies whether determinant variables significantly influence a criterion variable (Cohen et al., 2013). The beta (β) coefficient was used as a statistical treatment. For hypothesis testing, the 0.05 level of significance served as the basis for the decision. The null hypothesis was rejected when the computed probability value was less than 0.05; otherwise, it was not rejected.

For the interpretation of the correlation coefficient (r), the following scale was used:

Table 2. Interpretation of Correlation Coefficients.

Computed r Value	Descriptive Interpretation
± 1.00	Perfect Correlation
Between ± 0.75 and ± 0.99	High Correlation
Between ± 0.51 and ± 0.74	Moderately High Correlation
Between ± 0.31 and ± 0.50	Moderately Low Correlation
Between ± 0.01 and ± 0.30	Low Correlation
0.00	No Correlation

For the scale of Beta (β) Coefficient Strength, the following scheme was used:

Table 3. Interpretation of Correlation Coefficients

Beta Coefficient (β) Range	Strength of Influence
$\pm 0.80 - \pm 1.00$	Very Strong Influence
$\pm 0.60 - \pm 0.79$	Strong Influence
$\pm 0.40 - \pm 0.59$	Moderate Influence
$\pm 0.20 - \pm 0.39$	Weak Influence
$\pm 0.01 - \pm 0.19$	Very Weak Influence
0.00	No Influence

2.6. Ethical Considerations

The study underwent ethical review and approval by the Society for Moral Integrity and Legal Ethics (SMILE) of Holy Cross of Davao College. Before data collection, permission was obtained from the appropriate academic and school authorities. Since the respondents were minors, parent or guardian consent and learner assent were secured prior to their participation. The respondents were informed about the purpose of the study, and their participation was voluntary. They were also assured that their responses would be kept confidential and used only for academic purposes. To lessen response bias, the researcher clarified that there were no right or wrong answers and encouraged the respondents to answer honestly. Throughout the conduct of the study, voluntary participation, informed consent, confidentiality, anonymity, and protection from harm were observed and maintained.

3. RESULTS

3.1. Descriptive Results

Table 4. Descriptive Statistics of the Study Variables (N = 351)

Variables / Indicators	Number of Respondents (N)	Standard Deviation	Mean	Descriptive Level
Attitude Toward Waste Management	351	0.73	3.48	Very High
<i>Perceived Value</i>	351	0.57	3.69	Very High
<i>Willingness to Act</i>	351	0.81	3.27	Very High
Subjective Norms	351	0.77	3.24	High
<i>Family Expectations</i>	351	0.67	3.43	Very High
<i>Peer Influence</i>	351	0.82	3.05	High
Perceived Behavioral Control	351	0.75	3.35	Very High
<i>Convenience</i>	351	0.73	3.35	Very High
<i>Self-Efficacy</i>	351	0.77	3.35	Very High
Waste Management Practices	351	0.76	3.28	Very High
<i>Waste Segregation</i>	351	0.72	3.40	Very High
<i>Recycling and Reuse</i>	351	0.79	3.21	High
<i>Waste Reduction</i>	351	0.75	3.24	High

As shown in Table 1, attitude toward waste management obtained a mean of 3.48, interpreted as very high. This means that learners showed very good attitudes toward waste management practices. Its indicators were likewise interpreted as very high. The standard deviation of 0.73 suggests that the learners' responses were consistent.

For subjective norms, the mean score was 3.24, described as high. This indicates that learners generally perceived good social influence in relation to proper waste management practices. In terms of its indicators, family expectations was interpreted as very high, while peer influence was interpreted as high. The standard deviation of 0.77 shows that the responses were consistent.

Perceived behavioral control obtained a mean of 3.35, interpreted as very high. This means that learners generally considered themselves capable of practicing proper waste management behaviors. Its indicators were also interpreted as very high. The standard deviation of 0.75 indicates consistent responses among the learners.

Lastly, waste management practices obtained a mean of 3.28, described as very high. This indicates that learners generally practiced proper waste management behaviors. Among its indicators, waste segregation was interpreted as very high, while recycling and reuse and waste reduction were interpreted as high. The standard deviation of 0.76 shows consistency in the responses.

Overall, the variables reflected very good descriptive interpretations. Among the determinant variables, attitude toward waste management showed a higher level compared with subjective norms and perceived behavioral control among learners.

3.2. Correlation Results

Table 5. Relationship Between Variables

Variables	r-value	p-value	Decision on H_0	Interpretation
Attitude toward Waste Management and Waste Management Practices	0.50	< .001	<i>Reject H_0</i>	Moderate positive, significant correlation
Subjective Norms and Waste Management Practices	0.67	< .001	<i>Reject H_0</i>	Moderately high positive, significant correlation
Perceived Behavioral Control and Waste Management Practices	0.68	< .001	<i>Reject H_0</i>	Moderately high positive, significant correlation

Level of Significance: 0.05

Decision Rule: *Reject H_0 if $p < 0.05$; otherwise, fail to reject H_0 .*

Specifically, attitude toward waste management and waste management practices obtained a p-value of < .001, which is below the 0.05 level of significance. Thus, the null hypothesis was rejected. This result indicates a significant relationship between attitude toward waste management and waste management practices. The r-value of 0.50 shows a moderately positive correlation, suggesting that changes in learners' attitude toward waste management are associated with a moderate change in their waste management practices.

Moreover, subjective norms and waste management practices obtained a p-value of < .001, which is below the 0.05 level of significance. Thus, the null hypothesis was rejected. This indicates that subjective norms were significantly related to waste management practices. The r-value of 0.67 shows a moderately high positive correlation, suggesting that changes in subjective norms are associated with a moderately high change in learners' waste management practices.

Furthermore, perceived behavioral control and waste management practices obtained a p-value of < .001, which is below the 0.05 level of significance. Thus, the null hypothesis was rejected. This result shows that perceived behavioral control was significantly related to waste management practices. The r-value of 0.68 indicates a moderately high positive correlation, suggesting that changes in learners' perceived behavioral control are associated with a moderately high change in their waste management practices.

Overall, the correlation results indicate that attitude toward waste management, subjective norms, and perceived behavioral control were all significantly associated with waste management practices. Among the determinant variables, subjective norms and perceived behavioral control showed stronger relationships with waste management practices than attitude toward waste management.

3.3. Regression Results

Table 6. Regression table (n=351)

Variables	B	Std. Error	t-value	p-value	Decision on H_0	Interpretation
Constant	0.22	0.166	1.329	.185	--	--
Attitude Toward Waste Management	0.051	0.058	0.888	.375	<i>Fail to Reject H_0</i>	No significant Moderate influence
Subjective Norms	0.439	0.054	8.077	< .001	<i>Reject H_0</i>	Positive significant Moderate influence
Perceived Behavioral Control	0.436	0.052	8.396	< .001	<i>Reject H_0</i>	Positive significant Moderate influence

Model Summary:

$R = 0.75$ | $R^2 = 0.563$ | $Adjusted\ R^2 = 0.559$ | $F = 148.87$ | $p < .001$ | $N = 351$

Level of Significance: 0.05

Decision Rule: *Reject H_0 if $p < 0.05$*

Specifically, attitude toward waste management obtained a p-value greater than the 0.05 level of significance; therefore, the null hypothesis was not rejected. This means that attitude toward waste management did not significantly influence waste management practices. Its beta coefficient indicated a weak positive influence, suggesting that although learners had favorable attitudes toward waste management, attitude alone was not sufficient to affect their actual waste management practices significantly. On the other hand, subjective norms obtained a p-value below the 0.05 level of significance; therefore, the null hypothesis was rejected. This means that subjective norms significantly influenced waste management practices. Its beta coefficient indicated a positive moderate influence, suggesting that social influence from family, peers, teachers, and the community contributed to strengthening learners' waste management practices. Lastly, perceived behavioral control also obtained a p-value below the 0.05 level of significance; therefore, the null hypothesis was rejected. This means that perceived behavioral control significantly influenced waste management practices. Its beta coefficient indicated a positive moderate influence, suggesting that learners who viewed themselves as capable of practicing proper waste management were more likely to engage in positive waste management behaviors.

The regression model obtained an R^2 value of 0.563. This indicates that attitude toward waste management, subjective norms, and perceived behavioral control jointly accounted for 56.3% of the variance in learners' waste management practices. The remaining percentage may be attributed to other factors not covered in the study. This implies that the independent variables included in the model provided a substantial contribution to explaining learners' waste management practices.

3.4. Summary of Findings

Based on the statistical results, the following findings were drawn:

1. Attitude toward waste management, subjective norms, perceived behavioral control, and waste management practices among learners showed significant correlations.
2. Subjective norms and perceived behavioral control significantly influenced waste management practices among learners, while attitude toward waste management did not show significant influence.

4. DISCUSSION

The findings showed that attitude toward waste management, subjective norms, and perceived behavioral control were significantly related to waste management practices among learners. This result affirms Ibrahim et al. (2021), Kusuma et al. (2025), Pan and Liu (2024), and Waxin et al. (2025), who emphasized that proper environmental and waste management behaviors are associated with favorable attitudes, positive social influence, and stronger perceived behavioral control. The finding also affirms Hu et al. (2026), who highlighted the contribution of subjective norms and perceived behavioral control to waste separation behavior. This means that learners are more likely to practice proper waste management when they hold positive environmental beliefs, experience supportive social influence, and possess behavioral capability.

The findings further showed that subjective norms and perceived behavioral control significantly influenced waste management practices among learners. This result affirms Bang et al. (2025), Waxin et al. (2025), Amir (2025), and Pan and Liu (2024), who asserted that waste management and recycling behaviors among learners and students are affected by social influence and perceived behavioral capability. Likewise, the finding affirms Hu et al. (2026), who identified perceived behavioral control as one of the strongest predictors of waste separation behavior. This suggests that learners are more likely to engage in proper waste management when positive social expectations are present and when they are confident in performing environmental behaviors.

However, the findings also showed that attitude toward waste management did not significantly influence waste management practices when the determinant variables were analyzed simultaneously in the regression model. This result affirms Erwinsyah (2022), who emphasized that positive environmental attitudes do not always lead directly to proper environmental behavior. In contrast, the finding differs from Ibrahim et al. (2021), Waxin et al. (2025), and Pan and Liu (2024), who reported that attitude significantly influenced environmental intention and behavior in other contexts. Such differences may be explained by variations in environmental support systems, social influence, and behavioral conditions across educational settings. This implies that favorable attitudes alone may not be enough to directly influence waste management practices when stronger social and behavioral control factors are present.

Conclusion

Based on the findings, the study concludes that subjective norms and perceived behavioral control significantly influenced waste management practices among learners, while attitude toward waste management did not show a significant influence. This result gives partial support to the Theory of Planned Behavior, which explains that human behavior is shaped by behavioral intention through attitude toward the behavior, subjective norms, and perceived behavioral control.

Recommendations

Based on the findings and conclusion of the study, the following recommendations are offered:

1. School leaders may improve waste management programs and environmental education activities by encouraging supportive social influence from family, peers, teachers, and the community to promote proper waste management practices among learners.

2. Teachers may implement sustainability initiatives and environmental activities that strengthen learners' perceived behavioral control in terms of convenience, self-efficacy, and access to proper waste management facilities and practices.
3. Learners may be encouraged to take active part in environmental and waste management activities that develop responsibility, environmental awareness, and sustainable behavior within the school and community.
4. Future researchers may conduct related studies using other variables, settings, or research approaches to further examine the factors that influence waste management practices among learners.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Amir, F. (2025). Determinants of University Students' Waste Management Behavior: A Theory of Planned Behavior Approach at an Indonesian Engineering Faculty. *International Journal of Social Science and Human Research*, 08. <https://doi.org/10.47191/ijsshr/v8i1195>
- Ana, G. R. E. E., Oloruntoba, E. O., Shendell, D., Elemile, O. O., Benjamin, O. R., & Sridhar, M. K. C. (2011). Solid waste management problems in secondary schools in Ibadan, Nigeria. *Journal of Environmental Health*, 74(2), 24–28. <https://pubmed.ncbi.nlm.nih.gov/21949981/>
- Bang, N.-V., Hoang Nguyen, Y. T., Luong, L.-C., & Ngan, N.-K. (2025). Towards sustainable education: Investigating waste source sorting behavior among students in Vietnam. *Social Sciences & Humanities Open*, 11, 101446. <https://doi.org/10.1016/j.ssaho.2025.101446>
- Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Routledge.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Erwinsyah, E. (2022). Environmental knowledge, attitudes, and practices for behavior change of university students: the case of Indonesia. *Journal of STEAM Education*, 5(2), 181–192. <https://doi.org/10.55290/steam.1075516>
- Fayyaz, S., Lashari, A. A., Nandwani, S., & Chang, M. A. (2023). Assessing environmental awareness and conservation behavior in schools for sustainable development. *Pakistan Journal of Humanities and Social Sciences*, 11(4), 4070–4081. <https://doi.org/10.52131/pjhss.2023.1104.0675>
- Hu, J., Reginald, L. N., Dong, L., & Qian, X. (2026). Beyond theory of planned behavior: A meta-analysis of psychological and contextual determinants of household waste separation. *Environmental Impact Assessment Review*, 116, 108087. <https://doi.org/10.1016/j.eiar.2025.108087>
- Ibrahim, H., Mariapan, M., Lin, E. L. A., & Bidin, S. (2021). Environmental concern, attitude and intention in understanding student's anti-littering behavior using structural equation modeling. *Sustainability*, 13(8), 4301. <https://doi.org/10.3390/su13084301>
- Kumar, S., & Agrawal, M. (2021). Challenges in waste management and sustainable development in the context of urbanization. *Environmental Science and Pollution Research*, 28(12), 14684–14696. <https://doi.org/10.1007/s11356-020-11704-5>
- Kusuma, W. D., Wahyono, B., Indira, F. R., Rahmawati, Diya Rofika & Andriyati, R. (2025). Circular economy in education: Determinants of school recycling intentions and behaviors for inorganic waste. *Cleaner Waste Systems*, 12, 100420. <https://doi.org/10.1016/j.clwas.2025.100420>
- Nerida, B. E., & Dela, R. L. (2025). Problems encountered in the implementation of the Ecological Solid Waste Management Act of 2000 (R.A. 9003) in Narvacan National Central High School. *International Journal of Research and Innovation in Applied Science*, X(IV), 1088–1105. <https://doi.org/10.51584/ijrias.2025.10040088>
- Pan, J., & Liu, P. (2024). Exploring waste separation using an extended theory of planned behavior: A comparison between adults and children. *Frontiers in Psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1337969>
- Waxin, M.-F., Baber, H., Bartholomew, A., & Ahammed, A. (2025). Exploring waste sorting behavior and its antecedents among university students in the UAE using an extended theory of planned behavior. *Cleaner Waste Systems*, 12, 100402. <https://doi.org/10.1016/j.clwas.2025.100402>