

Zero-Waste Management in Hospitality Accommodations in Aklan, Philippines: Practices, Challenges, and Strategies

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ABSTRACT

The growing demand for sustainable tourism has intensified the need for hospitality accommodations to adopt zero-waste management practices that reduce environmental impacts while maintaining operational efficiency. Despite increasing sustainability initiatives, empirical evidence on the implementation, challenges, and effectiveness of zero-waste management in local hospitality settings remains limited. This study assessed the extent of implementation of zero-waste management practices, the challenges encountered, and the effectiveness of zero-waste management strategies among hospitality accommodations in Aklan, Philippines. It also examined differences across respondents' demographic profiles, determined the relationships among the study variables, and developed an Evidence-Based Sustainable Zero-Waste Management Intervention Plan. A descriptive-correlational research design was employed involving 170 respondents from hospitality accommodations in Aklan. Data were collected using a validated researcher-developed questionnaire and analyzed using frequency, percentage, mean, standard deviation, independent samples t-test, one-way analysis of variance (ANOVA), and Pearson product-moment correlation. The findings revealed a very high extent of implementation of zero-waste management practices in waste segregation, plastic reduction, food waste management, green purchasing, and guest involvement. Similarly, zero-waste management strategies were perceived as very highly effective in staff orientation and training, use of eco-friendly products, guest awareness and education, local partnerships, and monitoring and evaluation. Despite these positive outcomes, respondents reported very high challenges related to infrastructure limitations, staff awareness, guest compliance, the cost of eco-friendly alternatives, and local government support. Significant differences were found in the effectiveness of zero-waste management strategies when respondents were grouped according to civil status ($p = 0.030$) and in the level of challenges encountered when grouped according to highest educational attainment ($p = 0.017$). A strong positive relationship was found between the extent of implementation and strategy effectiveness ($r = 0.795$, $p = 0.001$), while challenges encountered had a weak but significant relationship with strategy effectiveness ($r = 0.233$, $p = 0.002$). The study concludes that hospitality accommodations in Aklan have substantially integrated zero-waste management into their operations; however, sustaining these initiatives requires addressing persistent operational, financial, behavioral, and institutional constraints. The proposed intervention plan provides an evidence-based framework for strengthening environmental stewardship, organizational sustainability, and the long-term competitiveness of hospitality accommodations and sustainable tourism destinations. The study also supports the Sustainable Development Goals, particularly SDG 12, SDG 13, SDG 14, and SDG 17, by promoting responsible resource management, environmental protection, and collaborative sustainability initiatives within the hospitality sector.

Keywords: environmental sustainability, hospitality accommodations, sustainable tourism, zero-waste management

INTRODUCTION:

The hospitality industry contributes substantially to economic development through tourism growth, employment generation, and destination competitiveness. However, the expansion of tourism is accompanied by increased consumption of energy, water, food, and other resources, as well as the generation of solid waste, food waste, wastewater, and single-use plastics. Hospitality accommodations are therefore important sites for advancing environmental sustainability because their daily operations involve continuous consumption and disposal activities [1], [2].

The sustainability agenda has become increasingly connected with the United Nations Sustainable Development Goals (SDGs), particularly SDG 12 on responsible consumption and production. Within hospitality operations, responsible consumption requires establishments to reconsider how resources are purchased, used, reused, and discarded. Effective waste management also contributes to SDG 11 on sustainable cities and communities and SDG 13 on climate action by reducing environmental pressures associated with resource extraction, waste transport, treatment, and disposal [3].

Zero-waste management represents a shift from conventional waste disposal toward waste prevention, resource recovery, reuse, recycling, composting, and circular resource utilization. Rather than treating waste as an unavoidable by-product of operations, the zero-waste approach seeks to redesign processes so that waste generation is minimized and materials remain in productive use for as long as possible [4]–[6]. In hospitality, this

approach may be operationalized through waste segregation, reduction of single-use plastics, food waste prevention and recovery, sustainable procurement, and guest participation.

Plastic reduction is particularly relevant to tourism destinations because hospitality establishments frequently use disposable packaging, bottles, food containers, toiletries, straws, and other single-use materials. Green purchasing practices can complement plastic reduction by encouraging establishments to select products with less packaging, reusable or refillable alternatives, environmentally responsible suppliers, and locally sourced products [7], [8]. Such practices are also relevant to marine and coastal destinations where poorly managed plastic waste can enter waterways and threaten aquatic ecosystems.

Food waste remains another persistent concern in hospitality. Food waste may arise from inaccurate demand forecasting, excessive preparation, inventory management problems, buffet operations, consumer behavior, and inadequate recovery systems. Research has identified food audits, improved kitchen practices, inventory monitoring, demand forecasting, donation, repurposing, and composting as potential responses [9]–[11]. These strategies are particularly important because food waste represents not only a waste-management concern but also a loss of the water, energy, labor, and other resources embedded in food production.

Despite the potential benefits of zero-waste management, hospitality establishments face operational and institutional barriers. Limited space, inadequate waste facilities, insufficient employee training, financial constraints, limited access to environmentally preferable products, guest noncompliance, and inconsistent stakeholder support can hinder implementation [12], [13]. Sustainable alternatives may also involve higher initial costs, while small and medium-sized establishments may have limited financial and technical capacity to invest in new infrastructure and systems. Effective implementation therefore requires organizational commitment, employee competence, guest cooperation, supportive policies, and stakeholder collaboration.

The Philippine context presents additional challenges. Solid waste management remains closely linked to the capacity of local government units (LGUs), the availability of collection and recovery infrastructure, waste segregation, and community participation. National and local waste-management systems influence the ability of tourism enterprises to sustain environmentally responsible practices [14]. Hospitality establishments cannot therefore be considered independently from the wider waste-management system in which they operate.

Aklan provides an important setting for examining zero-waste management in hospitality. The province includes Boracay Island in the municipality of Malay, one of the Philippines' most prominent tourism destinations, as well as other areas with developing tourism and hospitality activities. The concentration and growth of tourism-related enterprises create opportunities for economic development while simultaneously increasing demands on resources and waste-management systems. Sustainable tourism in Aklan therefore requires hospitality establishments to balance economic activity with environmental responsibility.

Although previous studies have examined individual aspects of hospitality sustainability, such as food waste, plastic reduction, employee green behavior, and circular economy practices, fewer studies have integrated implementation practices, operational challenges, perceived strategy effectiveness, demographic differences, and interrelationships among these variables within a localized Philippine tourism context. This gap is particularly relevant in Aklan, where tourism activities occur across destinations with different levels of infrastructure, market activity, and institutional capacity.

This study therefore assessed zero-waste management among hospitality accommodations in Aklan, Philippines. Specifically, it examined the extent of implementation of zero-waste practices, the challenges encountered, and the perceived effectiveness of strategies used by hospitality accommodations. It also determined whether significant differences existed according to selected demographic characteristics and whether significant relationships existed among implementation, challenges, and strategy effectiveness. Based on the findings, an evidence-based intervention framework was developed to strengthen long-term zero-waste management in the hospitality sector.

The study was guided primarily by Circular Economy Theory, complemented by Stakeholder Theory and the Theory of Planned Behavior. Circular Economy Theory provides the environmental and operational foundation for reducing waste and retaining resources in productive use [5], [15], [16]. Stakeholder Theory emphasizes the interdependence of managers, employees, guests, suppliers, government agencies, communities, and other stakeholders in achieving sustainability objectives [17]. The Theory of Planned Behavior provides a behavioral perspective by recognizing the influence of attitudes, social expectations, and perceived behavioral control on environmentally responsible actions [18]. Together, these perspectives provide a useful basis for understanding the operational, organizational, and behavioral dimensions of zero-waste management.

METHODOLOGY

A. Research Design

The study employed a quantitative descriptive-correlational research design. The descriptive component assessed the extent of implementation of zero-waste management practices, the level of challenges encountered, and the perceived effectiveness of zero-waste management strategies. The correlational component examined the

relationships among these variables. Inferential tests were also employed to determine whether differences existed according to selected demographic characteristics.

The approach was appropriate because the study sought to describe the existing condition of zero-waste management and examine statistical associations among the major study variables without manipulating the operating conditions of the participating establishments.

B. Locale of the Study

The study was conducted in the province of Aklan, Philippines, focusing on hospitality accommodations in Kalibo, Ibaday, Malay, and Buruanga. These municipalities were purposively selected because of their tourism and hospitality significance and the diversity of accommodation establishments operating within them.

Malay, particularly Boracay, represents a major tourism center with a high concentration of hospitality establishments and substantial resource consumption associated with tourism activity. Kalibo serves as the provincial capital and an important commercial, transportation, and tourism gateway. Ibaday and Buruanga represent areas with emerging tourism activities and accommodation establishments operating under different local conditions. The selected locations therefore provided varied operational contexts for examining zero-waste management.

C. Respondents and Sampling

The respondents were 170 employees and managers of hospitality accommodations in the selected municipalities. Purposive sampling was employed to ensure that participants had direct knowledge or experience of hospitality operations and environmental practices.

Eligible participants were employees or managers currently working in hospitality accommodations in Aklan who were directly involved in, or sufficiently familiar with, operational activities related to waste management, resource use, sustainability, housekeeping, food and beverage operations, or establishment management. Participation was voluntary, and respondents who declined participation or did not meet the inclusion criteria were excluded.

D. Research Instrument

Data were collected using a researcher-developed structured questionnaire entitled “Zero-Waste Management in Hospitality Accommodations in Aklan: Practices, Challenges, and Strategies.” The instrument was developed from relevant literature on zero-waste management, sustainable hospitality, circular economy, environmental sustainability, and green practices [4]–[13].

The questionnaire consisted of four sections. The first section collected selected demographic information. The second assessed the implementation of zero-waste management practices in five dimensions: waste segregation, plastic reduction, food waste management, green purchasing, and guest involvement. The third assessed challenges related to lack of space and facilities, staff awareness, guest compliance, the cost of eco-friendly options, and LGU support. The fourth assessed the perceived effectiveness of strategies involving staff orientation and training, eco-friendly products, guest awareness and education, local partnerships, and monitoring and evaluation.

The implementation, challenges, and strategy-effectiveness items were measured using five-point Likert-type scales. Higher scores represented greater implementation, greater perceived challenge, or greater perceived effectiveness, respectively. The questionnaire underwent expert validation for content validity, and internal consistency was assessed using Cronbach’s alpha. The reliability coefficients for the study dimensions ranged from .819 to .985.

E. Data Gathering Procedure

Prior to data collection, approval was obtained from the appropriate academic authorities and permission was sought from the selected hospitality establishments. The researcher coordinated with managers, supervisors, or designated representatives to facilitate questionnaire administration.

Participants were informed of the purpose of the study, the voluntary nature of participation, confidentiality of responses, and their right to decline or withdraw. The requirements of Republic Act No. 10173, or the Data Privacy Act of 2012, were observed in the collection, storage, and use of the research data.

Questionnaires were administered personally and, when necessary, through an online format. Completed questionnaires were checked for completeness, encoded, organized, and subjected to statistical analysis.

F. Data Analysis

Frequency and percentage were used to summarize the demographic characteristics of respondents. Means and standard deviations were used to describe the extent of implementation, level of challenges, and perceived effectiveness of zero-waste management strategies.

For comparisons involving two demographic groups, an independent-samples t-test was used. One-way analysis of variance (ANOVA) was employed when the demographic variable contained more than two categories. Pearson product-moment correlation was used to determine the relationships among implementation, challenges, and strategy effectiveness. Statistical significance was evaluated at the 0.05 level.

The five-point scale was interpreted using the following ranges:

4.21–5.00	—	Very High	/	Very Highly Challenging	/	Very Highly Effective
3.41–4.20	—	High	/	Highly Challenging	/	Highly Effective
2.61–3.40	—	Moderate	/	Moderately Challenging	/	Moderately Effective
1.81–2.60	—	Low	/	Slightly Challenging	/	Slightly Effective
1.00–1.80	—	Very Low / Not Challenging / Not Effective				

G. Ethical Considerations

Participation was voluntary and based on informed consent. Respondents were informed that their participation was not associated with academic, employment, or organizational consequences and that they could decline or withdraw from the study.

Confidentiality and privacy were maintained throughout the research process. Data were used solely for academic and research purposes and were stored securely with access limited to authorized persons. The study also observed principles of respect, transparency, research integrity, and responsible handling of participant information.

RESULTS AND DISCUSSION

A. Respondent Characteristics

The study involved 170 respondents from hospitality accommodations in Aklan. Female respondents constituted the larger proportion of the sample, while most respondents were single. A substantial proportion had between one and five years of service, and college graduates represented the largest educational group.

The respondent profile indicates that the study captured perspectives from hospitality personnel with varying levels of operational experience and educational attainment. Because the study focused on employees and managers directly connected with hospitality operations, their responses provide relevant insights into the implementation and management of zero-waste practices.

The demographic frequencies for years of service and position should, however, be verified against the original dataset before final publication because the frequencies supplied in the research manuscript do not currently sum to the stated sample size of 170

B. Extent of Implementation of Zero-Waste Management Practices

Table I Summary Of Zero-Waste Management Implementation

Dimension	Mean	SD	Interpretation
Waste segregation	4.93	0.237	Very High
Plastic reduction	4.90	0.297	Very High
Food waste management	4.92	0.275	Very High
Green purchasing	4.88	0.325	Very High
Guest involvement	4.89	0.335	Very High
Overall	4.90	—	Very High

The results indicate a very high level of implementation of zero-waste management practices across all five dimensions. Waste segregation obtained the highest overall mean ($M = 4.93$, $SD = 0.237$), followed by food waste

management ($M = 4.92$, $SD = 0.275$), plastic reduction ($M = 4.90$, $SD = 0.297$), guest involvement ($M = 4.89$, $SD = 0.335$), and green purchasing ($M = 4.88$, $SD = 0.325$).

The very high score for waste segregation suggests that source separation has become a strongly established operational practice. The highest-rated indicators involved separating biodegradable and non-biodegradable materials and coordinating with waste collectors or local government units. These findings are consistent with studies emphasizing segregation as a basic but essential component of hotel waste management [19], [20].

Plastic reduction also received a very high rating. Informing guests about plastic reduction practices received the highest rating within this dimension, suggesting that communication is an important component of plastic reduction. The relatively lower scores for supplier packaging and replacement of disposable materials indicate that procurement and supply-chain decisions may provide additional opportunities for improvement. These findings support the importance of integrating purchasing decisions with broader environmental management strategies [7], [8].

Food waste management was similarly rated very highly. The results suggest that hospitality establishments commonly consider demand when preparing food, train employees in food waste practices, monitor kitchen waste, and encourage guests to avoid unnecessary food waste. The slightly lower rating for recovery activities such as composting, donation, or repurposing suggests that prevention is more established than higher-level resource recovery. Previous research has likewise emphasized the importance of demand forecasting, inventory management, food audits, and recovery systems in reducing hospitality food waste [9]–[11].

Green purchasing obtained the lowest overall mean among the five implementation dimensions, although it remained within the very high category. The use of environmentally friendly packaging received the highest rating, whereas bulk purchasing and refill systems received a comparatively lower rating. This pattern suggests that establishments have adopted visible and readily observable green purchasing practices but may encounter greater operational or financial barriers when implementing more systemic procurement changes.

Guest involvement also obtained a very high rating. Signage promoting proper disposal received the highest rating, while guest communication and towel and linen reuse initiatives were comparatively lower. This finding indicates that hospitality establishments have recognized guests as important participants in sustainability but may still strengthen direct engagement mechanisms. Guest participation is particularly important because many hospitality environmental practices depend on visitor behavior [21], [22].

Overall, the findings demonstrate that zero-waste management is already substantially integrated into the participating establishments. However, the high implementation ratings should be interpreted as respondents' reported perceptions rather than independently verified operational performance. The findings therefore indicate strong reported implementation while also underscoring the need for objective monitoring and waste audits.

C. Challenges Encountered in Zero-Waste Management

Table I summary Of Zero-Waste Management Challenges

Dimension	Mean	SD	Interpretation
Lack of space/facilities	4.37	0.788	Very Highly Challenging
Staff awareness	4.39	0.738	Very Highly Challenging
Guest compliance	4.45	0.706	Very Highly Challenging
Cost of eco-friendly options	4.44	0.706	Very Highly Challenging
LGU support	4.39	0.837	Very Highly Challenging

All five dimensions were rated very highly challenging. Guest compliance received the highest mean ($M = 4.45$, $SD = 0.706$), followed by the cost of eco-friendly options ($M = 4.44$, $SD = 0.706$), staff awareness ($M = 4.39$, $SD = 0.738$), LGU support ($M = 4.39$, $SD = 0.837$), and lack of space and facilities ($M = 4.37$, $SD = 0.788$).

The findings demonstrate an important characteristic of the study: very high implementation coexists with very high challenges. This does not necessarily represent a contradiction. Rather, it suggests that establishments may be actively implementing sustainability practices while simultaneously operating under significant financial, infrastructural, behavioral, and institutional constraints.

Lack of space and facilities was a very highly challenging condition. Limited space for segregation, inadequate designated bins, insufficient equipment, limited storage for recyclables or compostable materials, and restrictive facility layouts can affect the efficiency of waste management. Previous research has identified infrastructure and operational capacity as important barriers to sustainability implementation in hospitality [12], [23].

Staff awareness was likewise highly challenging. Respondents identified unclear assignment of responsibilities and insufficient regular training as major concerns. This finding reinforces the importance of green training and

employee involvement in environmental performance [24]–[26]. A zero-waste system may be formally established, but its effectiveness depends on employees understanding their responsibilities and consistently applying operational procedures.

Guest compliance obtained the highest challenge rating. Difficulties in monitoring guest behavior, disregard of segregation procedures, resistance to environmental policies, and challenges involving towel and linen reuse demonstrate that hospitality establishments cannot achieve zero-waste objectives through internal operations alone. Guest communication and engagement must therefore be treated as integral components of environmental management [21], [27].

The cost of eco-friendly options was also very highly challenging. Respondents particularly identified the continued use of disposable materials because sustainable alternatives may be more expensive. This finding is consistent with research identifying financial considerations and supply-chain barriers as persistent obstacles to sustainable hospitality practices [13], [28].

LGU support was also rated very highly challenging. Concerns included inconsistent communication, limited support, inadequate incentives, and inconsistent waste collection. This finding emphasizes the importance of connecting establishment-level zero-waste programs with local waste-management systems. Hospitality establishments may implement internal segregation and reduction programs, but their long-term effectiveness can be constrained when external collection, recovery, and institutional support systems are weak.

D. Perceived Effectiveness of Zero-Waste Management Strategies

Table Iiisummary Of Perceived Strategy Effectiveness

Strategy	Mean	SD	Interpretation
Staff orientation and training	4.91	0.331	Very Highly Effective
Use of eco-friendly products	4.94	0.224	Very Highly Effective
Guest awareness and education	4.89	0.324	Very Highly Effective
Local partnerships	4.91	0.284	Very Highly Effective
Monitoring and evaluation	4.93	0.249	Very Highly Effective

All five strategy dimensions were perceived as very highly effective. The use of eco-friendly products obtained the highest overall mean ($M = 4.94$, $SD = 0.224$), followed by monitoring and evaluation ($M = 4.93$, $SD = 0.249$), staff orientation and training ($M = 4.91$, $SD = 0.331$), local partnerships ($M = 4.91$, $SD = 0.284$), and guest awareness and education ($M = 4.89$, $SD = 0.324$).

The high rating for eco-friendly products suggests that product substitution and packaging reduction are perceived as practical mechanisms for reducing waste. Avoiding excessive packaging received the highest rating within this dimension. Such practices support circular economy principles by reducing material inputs and unnecessary waste generation [5], [6].

Monitoring and evaluation also received a very high rating. Reviewing the effectiveness of waste-reduction initiatives received the highest item rating, indicating recognition of the importance of continuous assessment. Monitoring is particularly important because sustainability should not be treated as a one-time program but as an ongoing management process [29].

Staff training was likewise perceived as highly effective. Regular training and briefing new employees can improve knowledge and consistency in implementation. Research has demonstrated that environmental training can strengthen employees' intentions and behaviors toward sustainability [24], [25].

Local partnerships were also perceived as very highly effective. Seeking LGU support and coordinating with waste collectors received particularly high ratings. However, the lower rating for participation in formal barangay or LGU programs suggests that partnership potential remains underutilized.

Guest awareness and education obtained the lowest, although still very high, strategy-effectiveness rating. Communication concerning towel and linen reuse was particularly strong, while broader communication of zero-waste initiatives could be strengthened. Effective environmental communication can influence guest perceptions and behavioral intentions [21].

Taken together, the results suggest that respondents view zero-waste management strategies as highly effective while simultaneously reporting substantial challenges. This reinforces the need for hospitality establishments to maintain effective practices while addressing the conditions that make implementation difficult.

E. Differences in Zero-Waste Management According to Demographic Characteristics

Table I differences In Implementation, Challenges, And Strategy Effectiveness

Demographic Variable	Dependent Variable	Test Value	p-value	Decision
Sex	Implementation	t = -0.698	.486	Not significant
Sex	Challenges	t = 1.633	.104	Not significant
Sex	Effectiveness	t = -0.444	.658	Not significant
Civil status	Implementation	t = -0.411	.681	Not significant
Civil status	Challenges	t = -1.177	.241	Not significant
Civil status	Effectiveness	t = -2.237	.030	Significant
Position	Implementation	F = 1.397	.237	Not significant
Position	Challenges	F = 1.710	.150	Not significant
Position	Effectiveness	F = 0.369	.831	Not significant
Years of service	Implementation	F = 1.397	.237	Not significant
Years of service	Challenges	F = 1.710	.150	Not significant
Years of service	Effectiveness	F = 0.369	.831	Not significant
Educational attainment	Implementation	F = 1.498	.193	Not significant
Educational attainment	Challenges	F = 2.837	.017	Significant
Educational attainment	Effectiveness	F = 1.249	.288	Not significant

The results indicate that most demographic characteristics did not produce statistically significant differences in implementation, challenges, or perceived strategy effectiveness. Sex, position, and years of service were not significantly associated with any of the three dependent variables.

The absence of significant differences according to sex suggests that reported sustainability practices and perceptions were generally shared across male and female respondents. This is consistent with the broader view that organizational environmental culture, leadership, and workplace systems may be more important than demographic characteristics in shaping employee environmental behavior [30], [31].

Civil status was significantly associated with perceived strategy effectiveness ($p = .030$), although it was not significantly associated with implementation or challenges. This finding should be interpreted cautiously. The result indicates a difference between civil-status groups in their perceptions of strategy effectiveness, but it does not establish that civil status itself causes differences in sustainability behavior or organizational performance.

Position also did not significantly differentiate implementation, challenges, or strategy effectiveness. This suggests that sustainability perceptions were generally shared among employees and managers. A common organizational sustainability culture may contribute to similar perceptions across job roles [32], [33].

Years of service similarly showed no significant differences. This may indicate that sustainability practices are sufficiently embedded in organizational routines that longer service does not necessarily result in substantially different perceptions. Continuous training and organizational environmental leadership may be more important than tenure alone [25], [34].

Educational attainment was significantly associated with challenges ($p = .017$), but not with implementation or strategy effectiveness. The finding suggests that respondents with different educational backgrounds may perceive operational and institutional barriers differently. However, because the ANOVA result is an omnibus test, it establishes that at least one educational group differs but does not identify which groups differ. A post-hoc analysis should therefore be reported if it was conducted; otherwise, the manuscript should avoid specifying which educational groups differed.

Overall, the demographic analysis indicates that zero-waste management in the participating establishments is generally experienced as an organizational rather than purely individual phenomenon. The findings support the importance of organizational systems, leadership, training, and workplace culture in sustaining environmental practices.

F. Relationships Among Implementation, Challenges, and Strategy Effectiveness

Table V correlation Among Zero-Waste Management Variables

Variables	Pearson r	p-value	Interpretation
Implementation and challenges	0.135	.079	Not significant
Implementation and strategy effectiveness	0.795	.001	Significant, strong positive relationship
Challenges and strategy effectiveness	0.233	.002	Significant, weak positive relationship

The relationship between implementation and challenges was positive but weak and not statistically significant ($r = .135$, $p = .079$). This indicates that higher reported implementation was not significantly associated with higher or lower levels of perceived challenges. The finding suggests that challenges may arise from external or structural conditions that are not necessarily reflected in the overall level of internal implementation.

A strong positive relationship was found between implementation and perceived strategy effectiveness ($r = .795$, $p = .001$). This indicates that respondents reporting stronger implementation also tended to rate zero-waste strategies as more effective. The result supports the view that sustainability strategies are more likely to be perceived as effective when they are translated into consistent operational practices [6], [35].

The strong relationship should nevertheless be interpreted carefully because implementation and effectiveness were both measured through self-reported responses from the same respondents using related constructs. Common-method effects and conceptual overlap may contribute to the strength of the association. The correlation demonstrates association, not causation.

A weak but statistically significant positive relationship was found between challenges and strategy effectiveness ($r = .233$, $p = .002$). One possible interpretation is that establishments experiencing greater challenges may also be more likely to recognize the importance of, or respond through, stronger sustainability strategies. However, the cross-sectional design does not establish that challenges cause stronger strategies. The finding is better understood as an indication that challenges and strategic responses may coexist within establishments attempting to sustain environmental programs.

Overall, the correlation results indicate that strategy effectiveness is most closely associated with the degree of implementation, while challenges have a weaker relationship with perceived effectiveness. This supports an intervention approach that does not simply introduce additional sustainability activities but strengthens the organizational systems required to implement, monitor, and continuously improve them.

EVIDENCE-BASED ZERO-WASTE MANAGEMENT INTERVENTION FRAMEWORK

Based on the empirical findings, an evidence-based zero-waste management intervention framework was developed for hospitality accommodations in Aklan. The framework translates the strengths and challenges identified in the study into coordinated strategic actions.

A. Institutionalization of Sustainable Zero-Waste Practices

Hospitality establishments should formally integrate zero-waste objectives into organizational policies, operational plans, and management systems. Although the study found very high implementation, institutionalization is necessary to sustain practices beyond individual employees or short-term initiatives.

Recommended actions include establishing formal zero-waste policies, allocating sustainability resources, incorporating environmental objectives into operational plans, and creating internal sustainability committees or designated coordinators.

B. Facility Improvement and Waste Management Infrastructure

Infrastructure-related challenges require investment in standardized and space-efficient waste management systems. Establishments should improve segregation stations, provide appropriate storage areas, strengthen recycling and composting facilities, and redesign operational areas where necessary.

The objective is to ensure that employees can implement waste management procedures efficiently and consistently despite spatial limitations.

C. Staff Capacity Building and Sustainability Leadership

Employees are central to the daily implementation of zero-waste practices. Annual sustainability training, department-specific guidelines, Green Teams, and sustainability champions can strengthen competence, accountability, and environmental leadership.

Sustainability indicators may also be incorporated into employee performance monitoring to reinforce organizational expectations.

D. Guest Engagement and Responsible Consumption

Guests should be treated as active partners in zero-waste management. Establishments should strengthen in-room and check-in information, towel and linen reuse programs, refill systems, reusable alternatives, and other responsible-consumption initiatives.

Guest recognition or incentive mechanisms may be introduced where appropriate to encourage participation without compromising guest experience.

E. Sustainable Procurement and Circular Resource Management

Waste prevention should extend beyond operational disposal activities to purchasing and supply-chain decisions. Establishments should prioritize suppliers that minimize packaging, provide refillable or reusable alternatives, and support locally sourced sustainable products.

Such measures can reduce material consumption while strengthening local supply chains and circular resource use

F. Multi-Stakeholder Collaboration and Environmental Governance

Hospitality establishments should strengthen collaboration with LGUs, the Department of Tourism, the Department of Environment and Natural Resources, tourism organizations, waste collectors, suppliers, environmental organizations, and local communities.

Partnerships may include joint environmental campaigns, recycling initiatives, technical training, community activities, waste recovery programs, and incentive mechanisms.

G. Monitoring, Evaluation, and Continuous Quality Improvement

Continuous monitoring is necessary to determine whether interventions produce measurable improvements. Establishments should conduct regular waste audits, track sustainability indicators, review performance, and use findings to revise operational strategies.

The intervention framework therefore moves beyond one-time implementation toward a continuous management cycle of assessment, action, monitoring, evaluation, and improvement.

IMPLEMENTATION FRAMEWORK

Table V Implementation Framework For The Zero-Waste Management Intervention

Phase	Key Activities	Expected Outputs
Phase 1: Baseline Assessment and Strategic Planning	Assess existing practices, identify operational gaps, establish baseline indicators, and formulate establishment-specific action plans.	Baseline Assessment Report and Zero-Waste Action Plan
Phase 2: Capacity Building and Organizational Preparation	Conduct employee sustainability training, establish Green Teams, develop internal policies, and strengthen sustainability awareness.	Trained workforce and institutionalized sustainability mechanisms
Phase 3: Infrastructure and Program Implementation	Improve segregation facilities, implement waste-reduction programs, strengthen sustainable procurement, enhance guest engagement, and develop partnerships.	Functional zero-waste systems and implemented sustainability programs
Phase 4: Monitoring, Evaluation, and Performance Assessment	Conduct waste audits, monitor sustainability indicators, evaluate compliance, and prepare performance reports.	Sustainability Monitoring Report
Phase 5: Continuous Improvement and Institutionalization	Review outcomes, refine strategies, recognize sustainability champions, and integrate best practices into organizational policies.	Continuous improvement and long-term sustainability framework

The implementation framework follows a phased and collaborative approach. Hospitality owners and managers serve as primary implementers by integrating zero-waste strategies into organizational policies and operational procedures. Department heads, supervisors, and employees participate in implementation within their respective operational areas.

LGUs, tourism organizations, suppliers, environmental agencies, and community stakeholders provide complementary institutional and technical support. The five-phase process allows establishments to establish baseline conditions, develop organizational capacity, implement interventions, monitor outcomes, and institutionalize effective practices.

MONITORING AND EVALUATION FRAMEWORK

Table VII Monitoring And Evaluation Matrix

Indicator	Performance Target	Frequency	Means of Verification	Responsible Office
Waste segregation compliance	At least 90% compliance with established protocols	Quarterly	Waste audit reports; compliance checklists	Housekeeping Department and Sustainability Committee
Waste diversion rate	Continuous annual increase in waste diverted through recycling, composting, and recovery	Quarterly	Waste inventory and tracking records	Engineering Department and Sustainability Committee
Employee sustainability training	100% of employees trained annually	Annually	Attendance records; training evaluation reports	Human Resources Department
Guest participation in green programs	Continuous increase in participation	Quarterly	Guest feedback surveys; participation records	Front Office and Marketing Department
Reduction in single-use plastics	Continuous annual reduction	Semi-annually	Procurement records; inventory reports	Purchasing Department
Sustainability partnership activities	Minimum of four collaborative activities annually	Annually	Agreements; partnership reports; activity documentation	Management Office and partner organizations/LGUs
Overall zero-waste performance	Sustained improvement in overall implementation performance	Annually	Sustainability scorecard; management review reports	Management Committee

The monitoring and evaluation framework provides measurable indicators for assessing implementation progress. Waste audits and compliance checklists can determine whether segregation procedures are being followed, while waste tracking records can measure changes in waste diversion. Training records can establish whether employees have received required sustainability orientation, and guest participation records can assess behavioral engagement.

Procurement records can provide evidence of reductions in single-use plastics and changes in purchasing patterns. Partnership records can document collaborative environmental activities. Finally, sustainability scorecards can consolidate performance across operational areas and support management review.

Responsibility for monitoring should be distributed among relevant operational units rather than assigned exclusively to a single department. This arrangement promotes accountability and embeds sustainability within regular organizational management.

CONCLUSION AND IMPLICATIONS

The study found that hospitality accommodations in Aklan reported a very high level of implementation of zero-waste management practices across waste segregation, plastic reduction, food waste management, green purchasing, and guest involvement. This finding indicates that zero-waste principles are already substantially integrated into hospitality operations in the participating establishments.

At the same time, respondents reported very high challenges involving guest compliance, the cost of environmentally friendly alternatives, staff awareness, LGU support, and limited space and facilities. The coexistence of very high implementation and very high challenges suggests that hospitality establishments are actively pursuing sustainability while operating within financial, infrastructural, behavioral, and institutional constraints.

Zero-waste strategies were perceived as very highly effective, particularly the use of eco-friendly products, monitoring and evaluation, staff orientation and training, local partnerships, and guest awareness and education. The findings highlight the importance of combining operational practices with organizational systems, employee capacity, guest engagement, and stakeholder collaboration.

Most demographic characteristics did not produce significant differences in implementation, challenges, or strategy effectiveness. Significant differences were identified in perceived strategy effectiveness according to civil status and in challenges according to educational attainment. These findings should be interpreted cautiously and do not imply that demographic characteristics directly cause differences in sustainability performance.

The correlation analysis revealed a strong positive relationship between implementation and perceived strategy effectiveness. This finding emphasizes the importance of translating sustainability commitments into consistent operational practices. Challenges were also weakly but significantly associated with strategy effectiveness, whereas implementation and challenges were not significantly related. Because the study used a cross-sectional, self-report design, these relationships should be interpreted as associations rather than causal effects.

The study contributes to sustainable hospitality management by integrating operational, organizational, behavioral, and stakeholder perspectives into a localized zero-waste framework. Its practical contribution is the proposed intervention framework, which translates empirical findings into strategic actions involving institutionalization, infrastructure improvement, staff capacity building, guest engagement, sustainable procurement, stakeholder collaboration, and continuous monitoring.

For hospitality managers, the findings emphasize that sustainability should be institutionalized rather than dependent on isolated environmental initiatives. For LGUs and tourism agencies, the findings highlight the need for stronger infrastructure, technical support, incentives, and coordination. For employees and guests, the findings emphasize their shared responsibility in maintaining zero-waste practices. More broadly, the findings support the alignment of hospitality sustainability with SDG 12 on responsible consumption and production, SDG 13 on climate action, SDG 11 on sustainable communities, and SDG 17 on partnerships.

Ultimately, advancing zero-waste hospitality in Aklan requires continuous organizational commitment and collaboration among hospitality establishments, employees, guests, government agencies, suppliers, and communities. The proposed framework provides a practical pathway for transforming existing sustainability practices into more systematic, measurable, and resilient zero-waste operations.

RECOMMENDATIONS

Hospitality accommodation owners and managers should institutionalize zero-waste management through formal sustainability policies, clear operational protocols, designated sustainability coordinators or teams, and regular performance monitoring. Investments should prioritize waste segregation infrastructure, food waste reduction, reusable and refillable alternatives, sustainable procurement, and measurable sustainability indicators.

Hospitality employees and frontline personnel should participate actively in regular sustainability training covering waste reduction, segregation, resource conservation, guest communication, and environmental responsibility. Employees should be provided with clear department-specific responsibilities to improve accountability and consistency.

The Department of Tourism Region VI may use the findings as a basis for strengthening sustainable tourism initiatives for hospitality establishments. Capacity-building activities, sustainability guidelines, recognition or certification mechanisms, and monitoring tools may be developed to encourage measurable environmental performance.

The Department of Environment and Natural Resources Region VI may strengthen technical assistance and partnerships with hospitality establishments and LGUs, particularly in waste reduction, recycling, composting, environmental compliance, and sustainable resource management.

Local government units in Aklan, particularly Kalibo, Malay, Ibajay, Buruanga, and other tourism-active municipalities, should strengthen waste-management infrastructure, improve coordination and collection systems, clarify environmental guidelines, and consider incentives for hospitality establishments demonstrating strong sustainability performance. Localized zero-waste tourism programs may also be developed to connect businesses, communities, and visitors.

Hospitality industry stakeholders and suppliers should support circular resource management by reducing unnecessary packaging, offering reusable or refillable alternatives, and developing environmentally responsible supply chains. Partnerships with local producers and waste recovery organizations should be strengthened.

Local communities and tourists should actively participate in responsible tourism practices by observing waste segregation, reducing unnecessary consumption, supporting sustainable establishments, and respecting environmental programs implemented by hospitality providers.

Future researchers may examine other dimensions of sustainable hospitality, including carbon reduction, circular economy implementation, green technology, sustainability certification, and climate resilience. Qualitative studies involving managers, employees, tourists, LGU representatives, and community stakeholders may provide deeper explanations of the barriers and opportunities identified in this study. Longitudinal research is also recommended to evaluate the actual effectiveness of the proposed intervention framework after implementation.

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