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Implementation of Sustainable Management-Based Design Thinking to Reduce Flower Board Waste in Higher Education

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ABSTRACT

Universities pursuing Green University status often face a critical conflict between sustainability mandates and the deep-seated cultural tradition of receiving floral boards (*papan bunga*), which generates massive, unmanageable waste. This study applies the Design Thinking methodology to resolve this cultural-environmental conflict at a state university in South Tangerang. Through the Empathize and Define stages, the study identified that the root problem lay not in waste management, but in the cultural habit of sending physical tokens. Consequently, the Ideate phase formulated a "Dual-Strategy Approach": a Primary Prototype (Official Appeal for Substitution) to eliminate the waste source, and a Secondary Prototype (Standardized Handling SOP) as a contingency for waste management. Field testing of the Primary Prototype during the Rector's Inauguration achieved a 100% reduction in waste, reducing floral board deliveries from over 300 to zero, substituting 317 tree seedlings and digital greetings. Given this absolute success in prevention, the Secondary Prototype (SOP) was not operationally executed but was validated as a necessary blueprint for future compliance risks. While the intervention effectively eliminated the waste source, the high volume of substituted seedlings introduced a new logistical challenge regarding land allocation. The study concludes that shifting the operational focus from downstream handling to upstream prevention via formal policy nudging is the most effective strategy for achieving genuine zero-waste targets in academic institutions.

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INTRODUCTION

The growing awareness of environmental issues has become one of the most pressing challenges in today's global society (Uralovich et al., 2023). Communities are increasingly focused on sustainability practices to address the detrimental effects of consumerism and waste (Aiguobarueghian et al., 2024).

This issue is especially relevant in higher education institutions, which play a pivotal role in setting standards for future generations. With the rise in environmental consciousness, universities are expected to take a leadership role in promoting sustainable practices (Amin et al., 2024). A major concern is the waste generated by floral gifts, such as floral boards (papan bunga), which are commonly used in major university celebrations (Haron et al., 2024; Chauhan et al., 2024). These single-use items contribute to significant environmental waste, often made up of non-biodegradable materials (Gabriel et al., 2024). This research is vital because it tackles an issue affecting not only universities but the broader community, offering innovative, sustainable solutions that align with the goals of sustainable development (González-Sánchez et al., 2023). By addressing this issue, universities can lead by example, thereby reducing waste and promoting sustainability. Many universities, particularly in Indonesia, face the challenge of managing floral gifts presented during significant campus events. These floral boards, while symbolic and traditional, are made of both organic and non-organic materials that contribute to environmental degradation (Dafri et al., 2024; Tiwari et al., 2024). Many of these boards are single-use, resulting in substantial waste after events, which is often difficult to recycle or decompose (Dey et al., 2024). In universities that pride themselves on sustainability, such practices conflict with ongoing efforts to implement zero-waste strategies and achieve circular-economy goals (Ghosh et al., 2025; Tripathi et al., 2024). Despite the good intentions behind the gifts, their environmental impact remains a challenge. This study aims to address this problem by exploring sustainable alternatives to floral boards and by offering solutions that support a more environmentally friendly approach to campus events (Supina, 2025). In campus events, floral boards are common during celebratory occasions such as graduations, anniversaries, and other important milestones. However, these floral arrangements are often left to decay in public spaces or discarded after the events. This practice generates unnecessary waste, with flowers often not reused or composted, and boards often difficult to recycle due to the mixture of materials. As universities increasingly align themselves with environmental movements, the waste generated by such floral gifts becomes a paradox. This phenomenon reflects the broader societal issue of excessive consumption and waste in celebratory settings, with insufficient consideration of the environmental repercussions. The challenge lies in preserving traditions while introducing more sustainable practices to reduce waste and foster awareness among the university community. Various studies have highlighted the environmental impact of single-use items, particularly floral gifts, in public and private events (Devi et al., 2025). The disposal of these materials, including flowers and boards made from non-biodegradable substances, has become a growing concern for sustainability advocates. Research

on floral waste management, however, remains relatively sparse, particularly within universities. Previous studies have emphasized the importance of green practices within academic institutions, yet they often overlook the impact of nonessential celebratory items, such as floral boards. While some research has explored sustainable event management in higher education, few have focused on redesigning such traditional practices through a design thinking approach. This research aims to address the gap by examining the specific issue of floral board waste and its environmental impact within the context of Indonesian universities. Several studies have already examined sustainable practices in event management, but much of the research remains focused on larger-scale issues such as waste management systems and recycling technologies (Zafari et al., 2025). Some studies have examined how design thinking and innovative solutions can be applied to waste management in events. However, these approaches have not yet been fully explored in the context of floral gifts at universities. Additionally, prior research has often failed to provide actionable solutions to reduce floral board waste while preserving the cultural significance of such gifts. The literature gap is clear: there are few studies that specifically address the use of design thinking to develop sustainable alternatives for floral gift management in university events (Etheredge et al., 2024). This study aims to bridge this gap by developing and testing sustainable solutions grounded in design thinking. This research is innovative in applying design thinking to address floral board waste in universities, an area underexplored in the context of environmental sustainability and event waste management. By focusing on sustainable management, the study aims to develop practical solutions for minimizing floral board waste while preserving cultural traditions. It explores alternative flower-management practices and sustainable gift options to reduce environmental impact in major university celebrations, thereby supporting the growing movement toward zero-waste events and the Green University concept. The research provides an actionable framework for reducing waste at university events and offers practical recommendations for integrating sustainability into university policies, raising awareness, and promoting environmental consciousness. By combining sustainability with cultural preservation, the study addresses a commonly overlooked issue in event management. It has the potential to influence the broader adoption of sustainable practices in higher education institutions, contributing to global sustainability goals.

RESEARCH METHOD

This research employs a qualitative, descriptive design to examine and interpret the phenomena surrounding the use of floral boards at major university events. The study investigates stakeholders' perspectives on the cultural practice

of gifting floral boards and their associated environmental impacts. Conducted at a state university in South Tangerang, the research leverages the university's commitment to sustainability and its Green University program, making it a strategic site for exploring challenges in waste management and related sustainability issues. The university's willingness to participate in this study further aligned with the research objectives of finding sustainable solutions for managing floral board waste. Several qualitative data collection techniques were employed, including in-depth interviews with five key informants (the Rector, LPPM representatives, and Directors of Facilities/Infrastructure and Marketing/PR), participatory observation during campus events, and the collection of documentation, such as photographs and videos, related to the Green University program. Additionally, a literature review was conducted to gather best practices from other campuses regarding organic waste management and eco-friendly event practices. These combined methods provided a comprehensive understanding of current practices and challenges surrounding the use of floral boards, contributing valuable insights for the development of sustainable solutions. The collected data were analyzed using thematic analysis, which involved data condensation, reduction, display, and verification to ensure meaningful and reliable results. Triangulation was used to cross-check data from interviews, observations, documentation, and literature to enhance the credibility of the findings. Member checking was also employed, with interim findings shared with informants for feedback and validation, thereby ensuring data accuracy and confirming its relevance. This rigorous approach ensured that the research findings were well-supported and trustworthy.

RESULT AND DISCUSSION

The results section presents the outcomes of a Design Thinking–based intervention implemented to address the cultural environmental conflict arising from the tradition of floral boards within the Green University initiative. Through the sequential stages of Empathize, Define, Ideate, Prototype, and Test, the study systematically reveals stakeholder perceptions, identifies core cultural and operational constraints, formulates integrative solution strategies, and validates their effectiveness through real-world application. The findings highlight how a dual-strategy approach combining upstream behavioral prevention with downstream contingency planning successfully transformed institutional practices, eliminated floral board waste during a significant academic event, and generated new managerial insights regarding sustainable substitution mechanisms, thereby demonstrating the practical viability of design-led policy innovation in higher education sustainability governance.

Empathize

In the Empathize stage, the research explored the perspectives of internal stakeholders through a human-centered approach, revealing a core conflict between the tradition of floral boards and the university's commitment to sustainability (Green University). Interviews with the Rectorate highlighted their recognition of the cultural significance of floral boards. However, they emphasized the environmental impact and overload at the Cipeucang Landfill, suggesting the practice should be transformed or even halted to align with sustainability goals. The Research and Community Service Institute (LPPM) further corroborated this, identifying waste management challenges and noting that, despite campus-wide waste processing exceeding 75%, floral board waste remains a significant logistical burden due to the need for component separation and limited operational schedules. The data consistently revealed a pattern of inconsistency between the university's cultural values and sustainability goals. While stakeholders acknowledge the social and cultural value of floral boards, they also recognize the environmental drawbacks, indicating a dilemma between preserving traditions and meeting environmental objectives. The findings suggest an urgent need for the university to reconsider the floral board tradition and explore alternative practices that better align with its sustainability values, underscoring the importance of finding innovative solutions that balance cultural preservation with environmental responsibility.

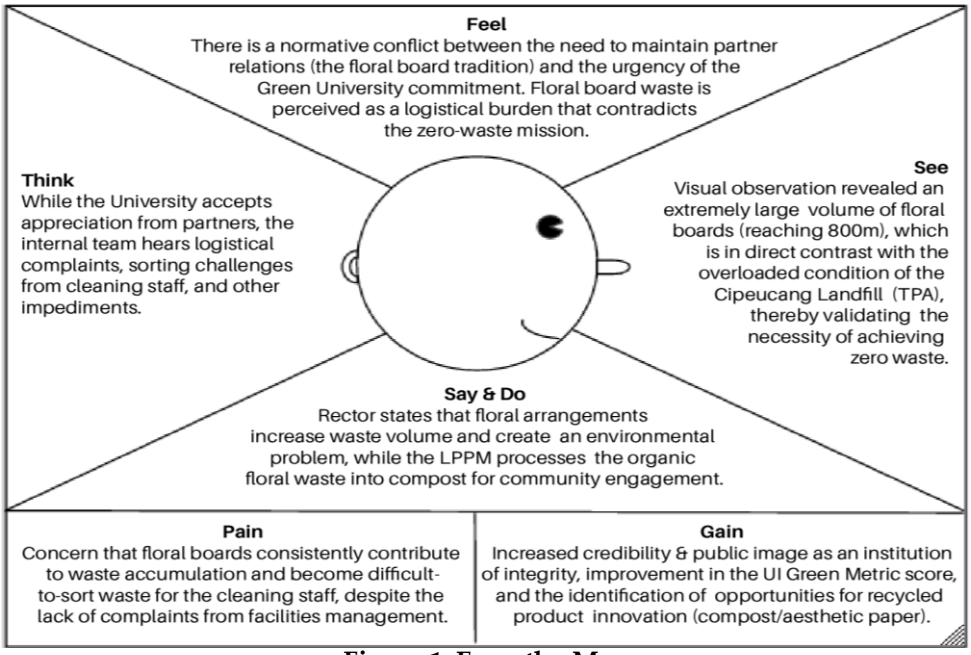


Figure 1. Empathy Map

Define

In the Define stage, the research used Qualitative Content Analysis to identify three core issues: the cultural dilemma between tradition and the Green University's mission, the operational challenge of separating components of floral arrangements, and the need for waste-free alternatives that maintain the aesthetic value of floral boards. The findings highlight the importance of balancing the cultural significance of floral boards with the university's sustainability goals and aligning traditional practices with environmental responsibility. Interviews with the Rectorate revealed that, while recognizing the social and cultural value of floral boards, they view the tradition as conflicting with the university's Green University mission, particularly due to its environmental impact and the overload at the Cipeucang Landfill. The Rectorate emphasized the need for tangible, environmentally friendly solutions, underscoring the university's commitment to aligning cultural traditions with sustainability efforts. Further insights from the Research and Community Service Institute (LPPM) highlighted operational challenges in the disposal of floral boards, particularly the need to separate components before composting, which is constrained by limited operational schedules. This situation underscores the need for innovative waste management solutions that align with the university's zero-waste goals. Overall, the data suggest that while floral boards are culturally valued, they present operational and environmental challenges. This underscores the need for strategies that preserve cultural practices while promoting sustainability, indicating a critical need for alternatives to floral boards that are both environmentally responsible and culturally meaningful.

Ideate

The Ideate stage in Design Thinking is where creative ideas are generated to address the defined problem. One of the key techniques used in this phase is SCAMPER (Substitute, Combine, Adapt, Magnify, Modify, Put to another use, Eliminate, and Rearrange/Reverse), which helps in generating new concepts by modifying existing elements. According to Boonpracha et al. (2024), SCAMPER encourages the exploration of possibilities by challenging the status quo and considering alternative solutions, thereby facilitating innovative thinking to solve the problem at hand.

Table 1. Idea selection by the SCAMPER method

Checklist	Question	Answer/Idea
(S) Substitute	What other product could replace it?	Tree seedlings, live plants
(C) Combine	What can be combined with the function of the floral board or its	Organic flowers are processed into compost and distributed to local farmers

	processing?	as a form of Corporate Social Responsibility (CSR).
(A) Adapt	Which ideas or concepts from other sectors can be adapted to this waste management context?	Collaboration with waste banks for processing inorganic materials. Collaboration with florists to rent floral boards at a very low cost.
(M) Modify	What if the product's form/appearance is changed?	Small-sized floral boards. Floral boards in the form of a frame/picture frame.
(P) Put to other uses	Can this product be used in other sectors?	Flowers and foliage for compost fertilizer or animal feed.
(E) Eliminate	Which parts, features, or processes can be eliminated or minimized?	Styrofoam
(R) Reverse	Can the procurement/ disposal process be reversed or rearranged?	Formal appeal stating that congratulatory messages are expected not to be in the form of floral boards.

The Ideate stage generated a series of comprehensive solution candidates aimed at resolving the conflict between maintaining external relations and the institutional zero-waste commitment. These solutions were grouped by functional strategy: (a). Official Appeal for Substitution and Elimination (Upstream Prevention): Proactively issuing an appeal to substitute single-use arrangements with sustainable alternatives (e.g., seedlings or digital greetings). This strategy directly mitigates the logistical burden and eliminates the risk of waste at the overloaded Cipeucang Landfill. (b) Design Modification and Re-use: Mitigation through modifying board size or, more importantly, adapting to a circular economy model by using reusable, rented boards from partner florists (replacing Styrofoam with reusable frames). (c) Standardized Handling Protocol (Downstream Management): Strengthening post-event handling via a clear Standard Operating Procedure (SOP) and strategic MoUs with Waste Banks to manage any "leakage" or inorganic waste that still enters the campus. (d) Transformation of Organic Waste: Diversifying the economic value of residual organic waste by processing flowers and foliage into compost fertilizer or exploring potential uses like animal feed to support the zero-waste target.

To ensure a holistic solution, this study determined that a single intervention is insufficient. Therefore, a Dual-Strategy Approach was selected for the Prototype stage: Primary Strategy (Preventive): The "Official Appeal" (Point 1) was prioritized as the core intervention to eliminate the waste source. Secondary Strategy (Curative): The "Handling Protocol" (Point 3) was selected as a supporting contingency system to manage operational risks.

Prototype

The Prototype stage converts ideated solutions into initial, testable representations. Guided by the Dual-Strategy Approach determined in the Ideate phase, this study developed two distinct prototypes: a Service Prototype (The Official Appeal) for prevention and an Operational Prototype (The SOP) for management. The strategic priority was first determined through a multi-criteria feasibility analysis, focusing on achieving the highest impact with the lowest implementation risk and investment. The four main indicators considered were implementation cost, resource availability, time-to-market (speed of adoption), and strategic alignment.

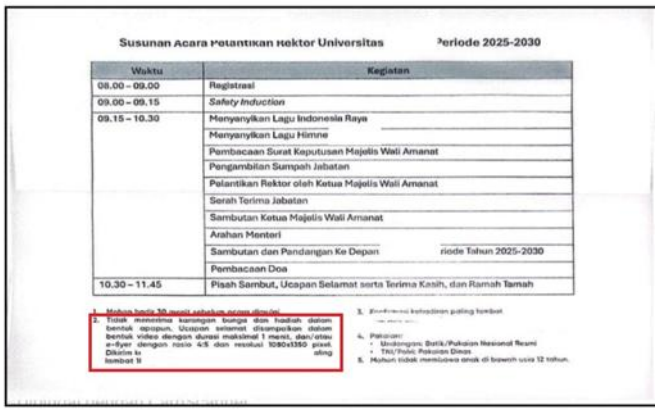
Table 2. Prototype feasibility analysis

Feasibility Indicator	Analysis	Comparison	Conclusion
Implement-ation Cost	The intervention is non-physical (communication/circular). The projected cost is <1% of the total logistical and cleanup costs for previous post-event floral arrangements.	Superior to the "Value Chain Partnership & Recycling" idea (which requires costs for MoU negotiation and Waste Bank operational fees) and the "Waste Transformation" idea (which requires investment in composting equipment and HR training).	Very Low
Resource Availability	Implementation only requires reconciliation among units (Rectorate, Directorate of Marketing and Public Relation, and Facilities and Infrastructure Unit). Projected to reduce operational working hours for Facilities staff post-event by > 70%, which was previously allocated for floral waste handling.	Superior to the "Design Modification and Post-Event Recycling" idea because it does not burden Facilities and cleaning staff with complex waste sorting tasks, where the empathize data revealed a pain point in the sorting process.	Available
Speed of Adoption	The adoption and dissemination process can be done instantaneously (*real-time*) following leadership approval. The initial implementation time is < 1 week (for drafting the circular) prior to a major event.	Significantly faster and has a superior *time-to-market* compared to physical solutions or external partnerships (MoUs) which require > 6 months for full implementation.	Fast

Strategic Alignment	This is the only solution focused on upstream prevention. By eliminating the waste source from the start, this solution completely mitigates the risk of inorganic waste accumulation. The target for reducing the volume of single-use floral board deliveries is 100% (total elimination) for official internal events.	This solution fundamentally addresses the problem statement through total elimination, whereas the "Design Modification" idea only reduces waste volume and the "Recycling" idea only handles waste after it has occurred.	Aligned

Based on the feasibility matrix, the "Official Appeal for Substitution and Elimination of Waste Sources" was selected as the Minimum Viable Product (MVP) due to its upstream elimination strategy, which offers high core value with minimal operational effort and very low investment risk. However, to address the practical need to handle potential non-compliance ("leakage"), a draft Standard Operating Procedure (SOP) was also developed as a contingency measure. The prototypes are detailed as follows:

Primary Prototype: Official Appeal Communication Protocol (Prevention) This prototype functions as the "front-stage" intervention. It was implemented not merely as a rule, but as a persuasive visual campaign embedded in official invitation media. The protocol explicitly links the appeal to the Green University vision and provides meaningful alternatives.


Susunan Acara Pelantikan Rektor Universitas Periode 2025-2030

Waktu	Kegiatan
08.00 – 09.00	Registrasi
09.00 – 09.15	*Safety Induction*
09.15 – 10.30	Menyanyikan Lagu Indonesia Raya
	Menyanyikan Lagu Himne
	Pembacaan Surat Keputusan Majelis Wali Amanat
	Pengambilan Sumpah Jabatan
	Pelantikan Rektor oleh Ketua Majelis Wali Amanat
	Serah Terima Jabatan
	Sambutan Ketua Majelis Wali Amanat
	Arahan Menteri
	Sambutan dan Pandangan Ke Depan riode Tahun 2025-2030
	Pembacaan Doa
10.30 – 11.45	Pisah Sambut, Ucapan Selamat serta Terima Kasih, dan Ramah Tamah

Figure 2. Formal advisory for a major internal university event - the Rector's Inauguration Ceremony

Figure 3. Congratulatory message in the form of a live plant

Figure 4. Digital/reusable greeting alternative

Secondary Prototype: Waste Handling Standard Operating Procedure (Management) This prototype functions as the "back-stage" contingency plan. A draft SOP was designed to guide Facilities (Sarpras) and Security staff in managing floral boards that might still arrive despite the appeal. Proposed Standard Operating Procedure (SOP) for Floral Board Management

objective & scope

To maintain event areas free from floral board waste and ensure that any residual materials are handled in accordance with Circular Economy principles, this SOP applies to the Security Unit, Facilities and Infrastructure (Sarpras), and Cleaning Units. Procedure 1 (Gatekeeping Screening) assigns the Security Unit to intercept all floral board couriers at the main entrance or security post and to deliver a standardized, polite refusal statement emphasizing the university's strict Zero-Waste Zone policy, which prohibits styrofoam and plastic floral boards and encourages digital greetings or the donation of tree seedlings instead. In cases of forced delivery, such as courier abandonment, the boards must be redirected to a designated Hidden Drop Zone (logistics or back parking area), with a strict prohibition on their presence along main ceremonial or VIP routes. Procedure 2 (Zoning and Documentation) mandates that ceremonial venues and VIP guest routes remain completely sterile from floral boards. At the same time, non-compliant deliveries are photographed and recorded, including sender details, for inclusion in the Partner Compliance Evaluation Report. Procedure 3 (Circular Disposal/Rapid Sorting) is executed by the Cleaning and Gardening

Units within a maximum of two hours post-event, involving the separation of structural materials (wood or bamboo) for reuse by partner florists or upcycling by local communities, inorganic materials (styrofoam or foam) for recycling through waste banks, and organic materials (flowers and foliage) for composting via campus biopores or composting facilities. While the "Official Appeal" (Primary Prototype) was considered ready for immediate field testing during the Rector's Inauguration to assess behavioral change, the SOP (Secondary Prototype) was prepared for conceptual validation and internal review, functioning as a strategic blueprint for future institutional ratification.

Test

The final testing phase focused on the field implementation of the Primary Prototype, the "Official Appeal," during the Rector's Inauguration Ceremony to measure compliance and behavioral shifts. The Formal Appeal Communication Protocol demonstrated a significant, measurable impact, achieving a 100% waste-prevention rate. The intervention eliminated floral board deliveries from a historical baseline of more than 300 units to zero, thereby validating the "Upstream Prevention" strategy. Stakeholders successfully adapted to the policy, substituting traditional gifts with approximately 317 tree seedlings and numerous digital greetings, thereby enhancing the institution's green reputation without compromising stakeholder relations.

Consequently, the Secondary Prototype, the "Waste Handling SOP," was not executed during this testing phase. This non-execution was a direct positive outcome of the primary solution's success: because the Official Appeal prevented all floral board deliveries, the operational triggers for the SOP, such as the gatekeeping rejection script or rapid sorting mechanisms, were never activated. The SOP document, therefore, remained in the standby phase as a valid contingency protocol for future events in which compliance might fluctuate, or for external events in which the reduction was significant but not absolute, as seen in subsequent trials in which deliveries dropped to 13 units.

However, the testing revealed an unintended operational outcome regarding the sustainable alternatives. While the waste problem was effectively resolved, the successful adoption of "Biological Substitution" introduced a new bottleneck for the Facilities Unit (Sarpras): the scarcity of immediately available vacant land for planting the 317 seedlings received. This indicates that, although the solution has been validated as highly effective for waste elimination, future iterations must refine the seedling-handling mechanism—potentially through external partnerships—to address the logistical challenges of mass planting fully.

Managerial Implications

The research findings provide a sound rationale for the institution to effectively shift its operational focus from downstream waste handling to

upstream waste prevention, proving that altering inputs significantly reduces the logistical and financial burden of waste processing. The Directorate of Marketing and Public Relations is positioned to play a strategic operational role by proactively integrating the "Green Invitation" campaign into the initial event negotiation phase, serving as an educational tool to align external stakeholders with the Green University vision. The implementation of the substitution policy strengthens the university's brand equity by sending a consistent signal that the commitment to sustainability is actionable, thereby attracting like-minded strategic partners. The full implementation of the "Dual-Strategy" approach requires cross-functional readiness, with Facilities (Sarpras) and Security units equipped with the drafted contingency protocol (SOP) to manage sporadic compliance failures.

CONCLUSION

This study reveals that the principal challenge in implementing Green University initiatives lies not in technical waste management, but in a cultural conflict between the long-standing tradition of sending floral boards and the absence of accessible, sustainable alternatives for expressing appreciation. The field validation of the “Official Appeal” as a Minimum Viable Product (MVP) during the Rector’s Inauguration, which resulted in a 100% reduction in floral board waste, provides a key insight that upstream prevention through formal policy nudging is far more effective than downstream curative approaches. By addressing behavior at its source, the research demonstrates that institutional policies grounded in cultural sensitivity can successfully transform stakeholder practices and achieve genuine zero-waste outcomes in academic event management.

From a scholarly perspective, this research contributes a design-thinking-based governance model that integrates behavioral change, cultural considerations, and circular-economy principles into higher-education sustainability frameworks. The proposed “Dual-Strategy Approach” enriches the academic discourse by combining preventive policy intervention with a contingency waste-handling blueprint, offering both theoretical and practical value. Nevertheless, the study is limited by its single-case context, which may constrain broader generalization, and by the emergence of a new logistical issue related to seedling oversupply following substitution. Future research is therefore encouraged to examine multi-institutional applications of upstream prevention strategies, investigate long-term ecological and managerial impacts of substitution-based sustainability policies, and develop scalable partnerships for managing secondary environmental outcomes.

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