



Waste Management Improvement at KRMU

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Introduction

KRMU produces large amounts of waste daily due to its dense student population and multiple campus activities. Overflowing bins, mixed waste disposal, and inconsistent collection schedules contribute to visible litter and poor hygiene. The objective is to understand the structural and behavioural issues behind ineffective waste management and propose solutions that are practical, scalable, and sustainable.

- Continuous waste generation across campus zones
- Overflowing bins, mixed waste, inconsistent collection
- Goal: Diagnose causes + design practical solution



Problem Breakdown

The waste issue at KRMU is systemic, rooted in collection inefficiencies, lack of segregation, and behavioural neglect. Collection schedules often do not match peak waste hours, causing bins to overflow. Students frequently mix wet and dry waste, making recycling impossible. Even in the presence of bins, littering persists because convenience overrides responsibility.

- Collection mismatch with peak hours
- Segregation failure makes recycling impossible
- Behavioural neglect creates systemic loop



Why It Matters

Poor waste management poses health risks, attracting pests and spreading bacteria. Environmentally, mixed waste ends up in landfills, increasing methane emissions and contributing to soil pollution. A dirty campus negatively affects university reputation and student morale. The institution also incurs higher expenses due to emergency cleaning and pest control.

- Health risks from pests & odor
- Environmental cost: landfill + methane + plastics
- Campus reputation & student experience impacted



Cognitive Biases

Several psychological biases worsen the situation. Normalcy bias causes students to ignore recurring mess. Diffusion of responsibility leads individuals to assume someone else will clean. Status quo bias makes them resist new segregation systems. Optimism bias makes them believe staff will handle waste soon, even if bins are overflowing. Together, these biases fuel inaction.

- Normalcy bias normalizes dirt
- Diffusion of responsibility
- Status quo bias & optimism bias
- Availability heuristic hides long-term issues



Root Cause

Using the 5 Whys technique, the root cause is traced back to the absence of a structured campus-wide waste-management policy. Without real-time monitoring or adaptive collection schedules, bins overflow frequently. The system is understaffed and static, lacking flexibility to respond to peak loads. Behavioural factors further worsen the underlying structural inefficiencies.



Hybrid Solution Model

The proposed hybrid model integrates segregation stations, smart-bin sensors, composting systems, and vendor regulations. Segregation stations ensure wet, dry, and recyclable waste are separated at the source. Smart-bin sensors prevent overflow through real-time alerts. Biodegradable packaging is enforced to reduce plastic waste. A composting unit converts cafeteria waste into manure for campus gardens.

- Segregation Stations: Wet/Dry/Recyclable
- Smart-bin sensors to prevent overflow
- Vendor regulation: biodegradable only
- Composting for cafeteria waste



Implementation Timeline (2 Months)

The solution is deployed in phases over two months. Phase 1 sets up bins and segregation stations. Phase 2 installs IoT-based smart-bin sensors. Phase 3 introduces vendor rules banning single-use plastics. Phase 4 constructs a compost unit for cafeteria waste. Continuous awareness campaigns and monthly audits ensure long-term compliance and improvement.

- Phase 1: Bins + Segregation + Audit
- Phase 2: Smart Bins + Alerts
- Phase 3: Vendor Rules
- Phase 4: Compost Unit
- Phase 5/6: Awareness + Monthly Audits