



Thunchath Ezhuthachan
Malayalam University

Waste Audit
Report



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Executive Summary

This waste audit report provides a detailed evaluation of the waste management practices at Thunchath Ezhuthachan Malayalam University. The audit examined various types of waste generated across the campus, including e-waste, food waste, garden waste, paper and plastic waste. The analysis identified several challenges in the current waste management system, such as the absence of material collection facilities for waste collection and segregation, irregular disposal schedules, and underutilized composting units.

Key findings indicate that the university generates significant amounts of paper and plastic waste, which are not being efficiently recycled due to improper segregation and mixing with other waste. E-waste management is also a concern, with obsolete electronic items accumulating due to irregular collection practices. The campus produces large volumes of organic food waste, but existing composting facilities are not fully operational or effectively utilized. Garden waste, similarly, is not being composted in a systematic manner, missing an opportunity for sustainable waste management. Additionally, the current infrastructure for managing sanitary napkin waste is insufficient, necessitating more sanitary napkin incinerators and regular maintenance to ensure hygiene and safety.

To address these issues, the report recommends establishing a Mini Material Collection Facility (MMCF) in the campus for storing the waste till its collection. It also suggests implementing a regular e-waste collection schedule, coupled with partnerships with certified recyclers, to ensure responsible disposal. For food waste, the installation of a biogas plant and improvements in existing composting facilities are advised to enhance waste processing efficiency. The adoption of the Thumboormuzhy composting model is recommended for garden waste management, which would allow for the production of compost for use in campus gardens. Lastly, the report emphasizes the need to increase the number of sanitary napkin incinerators and ensure their proper maintenance to manage menstrual waste effectively.

Overall, the audit highlights the importance of adopting more structured and sustainable waste management practices to reduce the environmental impact of the university's operations. By implementing these recommendations, Thunchath Ezhuthachan Malayalam University can significantly improve its waste management system, contributing to a more sustainable and environmentally responsible campus.

Introduction

Waste management is a critical aspect of sustainability, especially within educational institutions where large populations generate substantial amounts of waste daily. This waste audit report presents the findings from an in-depth analysis of waste generation, composition, and management practices at Thunchath Ezhuthachan Malayalam University. The primary objective of this waste audit was to assess the current state of waste management on Aksharam campus, identify key areas for improvement, and provide actionable recommendations to enhance sustainability efforts. By understanding the types and quantity of waste produced, the university can develop more effective strategies to reduce waste, increase recycling rates, and minimize the environmental impact of its operations.

This audit was conducted over the period from January to March ,2024, covering various buildings and facilities across the campus, including academic buildings, Hostels, Canteen, and administrative offices. The data collected provides a comprehensive overview of the waste streams at the university and highlights opportunities for improvement. Sustainability is a core value at Thunchath Ezhuthachan Malayalam University, and this waste audit aligns with the institution's commitment to reducing its carbon footprint and promoting environmentally responsible practices. The findings of this report are intended to guide future waste management policies and initiatives, ensuring that the university continues to move towards a more sustainable future.

The primary objectives of this waste audit are:

- To assess the current state of waste generation and management at Thunchath Ezhuthachan Malayalam University.
- To identify key sources and types of waste produced within the campus.
- To evaluate the effectiveness of existing waste management practices.
- To recommend practical measures for waste reduction, recycling, and sustainable disposal.

2. Methodology

The waste audit conducted at Thunchath Ezhuthachan Malayalam University involves a thorough examination of various waste streams. Preliminary analysis as part of the audit has identified several types of waste, including e-waste, food waste, plastic waste, paper waste, and bio-medical waste. The methodology employed in this audit is systematically designed to assess and document the quantity, composition, and management of each of these waste types. Below is a detailed explanation of the methodology used for each waste stream:

2.1 E-Waste

- Identification and Categorization: E-waste items such as discarded electronic devices, batteries, and accessories were identified across the campus.
- The damaged equipment's were examined by the IT Cell of the University and the irreparable items are designated as E-Waste.
- Weighting and Estimation: E-waste was weighed using electronic scales to estimate the total quantity generated.
- Assessment of Disposal Practices: Current disposal practices, including storage, recycling, and disposal methods, were reviewed.

2.2 Food Waste

- Waste Generation Points: Separate bins for collecting food waste was placed in various sources such as canteen, hostels, academic block and administrative block etc.
- The collected waste was analysed using a weighing scale.
- A daily log of food waste generation was maintained over a period of 7 days.

3. Plastic Waste

- Separate bins for collecting Plastic waste was placed in various Locations.
- Weighing: Plastic waste collected in these bins were weighed to assess the total volume of plastic waste produced over a period of 7 days.

4. Paper Waste

- Inventory and Classification: Paper waste was inventoried by collecting it from offices, classrooms, libraries.
- Quantitative Analysis: Paper waste was weighed to determine the quantity generated.

5. Bio-Medical Waste

- Sanitary Napkin is the major type of Bio-medical waste produced. Current management practices were examined through the interview with cleaning staffs

Data Analysis and Reporting

The data collected for each waste stream was analyzed using statistical tools to identify trends, patterns, and key areas of concern. The findings were compiled into this report, highlighting the volume of waste generated, the effectiveness of current waste management practices, and the potential for improvement. Recommendations were formulated based on best practices in waste management and the specific needs of Thunchath Ezhuthachan Malayalam University.

3. Findings and Analysis

The audit focused on five major waste streams: E-waste, food waste, plastic waste, paper waste, and bio-medical waste. Each of these categories was analysed in detail, with data collected from various sources across the campus. The findings from this audit are crucial for understanding how waste is generated, managed, and disposed of at the University, and they form the basis for the recommendations outlined in this report.

Waste Collection points

Collection point	Type	Colour	Numbers
Waste bin for plastic waste	Plastic bin	Blue	10
Waste bin for food waste	Plastic bin	Red	10
Waste bin for paper waste	Plastic bin	Black	10
Collection point for E-Waste	Store Room		1
Miscellaneous	Waste Bin (Iron Mesh)		4



Fig 1. Bins for the segregated collection of Paper, Plastic and Food Waste.

4.1 E-waste

4.1.1 Quantification of E-Waste

Types of e-waste and the number of each waste type that is generated during the period from April 2013 to March 2024 is listed below. A total of 708.8 kg of e-waste has been reported in the 11 years.

Table 1: List of Electronic Waste

Sl. No.	Item	Number
1	LCD Monitor	30
2	LCD Television	3
3	Computer Key Board	19
4	Computer CPU	26
5	Laser Printer / Copier	3
6	Class Room Projector	12
7	UPS	3
8	Tubular Battery	3
9	Air Conditioner	3
10	Tube Lights	160

4.1.2 Management Methods

As of now the university has taken a policy to hand over the E-waste to Clean Kerala Company Limited (CKCL) - a government-owned enterprise in the State of Kerala. The company plays a critical role in promoting sustainable waste management practices across the state, with a focus on waste collection, processing, and recycling. It operates under the guidance of the Local Self Government Department (LSGD) of the Government of Kerala to manage and implement various waste management initiatives.



Fig. 2 Clean Kerala Company Limited (CKCL) collecting electronic from the university

4.2 Food waste

Approximately 200 kg of food waste is generated per week from the academic and administrative blocks, ladies hostel and gents hostel of the university. The quantity of food waste estimated from the different sectors of the university are listed in the table below.

Table 2: Details of Food Waste Generated.

Day	Canteen (kg)	Academic block (kg)	Ladies hostel (kg)	Gents hostel (kg)	Total (kg)
1	8.27	5.80	14.20	1.80	30. 07
2	11.5	7.55	16.10	1.67	36. 82
3	7.83	4.45	15.88	3.63	31. 79
4	6.67	6.83	9.88	4.26	27. 64
5	6.77	7.18	11.49	1.95	27. 39
6	9.06	4.36	7.89	4.57	25. 88
7	5.99	5.11	8.67	1.24	21. 01
Total	56.09	41.28	84.11	19.12	200.6

Management methods of Food Waste

The university has two ring compost units for the management of food waste generated in the campus including canteen. Additionally, each hostel is having ring composting units. Apart from this the Food waste generated in the hostels were regularly collected by local vendors for animal feeding.

4.3 Garden waste

Garden waste refers to organic material that is generated from the maintenance and care of gardens, lawns, and outdoor landscapes. This type of waste typically includes: Grass clippings, Leaves, Weeds etc.

Table 3: Details of Garden Waste Generated in the Campus

Day	Garden Waste (kg)
1	8.27
2	12.23
3	12.91
4	9.46
5	5.85
6	7.30
7	1.77
Total	57.79

4.4 Paper and plastic waste

Plastic Waste refers to discarded items made from plastic, This includes: Single-use plastics, Plastic bottles and containers, Packaging materials etc. Paper waste include discarded materials made primarily from paper or paper products.

Table 4: Details of Plastic and Paper waste Generate in the campus.

Day	Plastic Waste	Paper waste
1	3.29	3.87
2	2.09	4.43
3	4.9	5.57
4	2.37	6.27
5	3.42	4.84
6	2.4	2.42
7	2.45	2.65
Total	20.92	30.05

Weekly estimates for paper waste amount to about 30 Kg. It is estimated that 4.2 Kg of paper are produced every day on average. 20.92 Kg plastic waste is generated weekly and approximately 2.9 kg on a daily basis.

Management Method for paper and plastic waste

The plastic and paper waste from the campus as well as the canteen, ladies hostel and gents hostel are collected by Haritha Karma Sena of Vettom Grama Panchayath on a Monthly basis. The university pays Rs. 100 for each collection.



Fig 3: Haritha Karma Sena of Vettom Grama Panchayath collecting paper and plasticwaste from the campus

4.6 Sanitary pads

4.6.1 Management method of Sanitary -pads

Number Ladies toilet block	8
Number of sanitary pad incineration machine in the campus	2



Fig 4. Sanitary pad destroying machine set up in the ladies toilet

5. Recommendations

Based on the findings of the waste audit at Thunchath Ezhuthachan Malayalam University, the following recommendations are proposed for the effective management of e-waste, food waste, and garden waste:

Paper and Plastic Waste Management

- **Mini Material Collection Facility (MMCF):**

Construct a Mini Material Collection Facility (MMCF) in the Campus: This facility would serve as a centralised location where paper and plastic waste from various departments, offices, and classrooms can be collected, segregated, and stored before being sent for recycling or handing over to Haritha Karma Sena. It will help to keep the paper waste away from moisture and improves its recycling value. The MMCF will also help to improve the cleanliness of the campus.

- **Promote Paper Reduction Initiatives:** Encourage the reduction of paper use on campus by promoting digital alternatives, double-sided printing, and reusing single-sided printed paper. These initiatives should be supported by awareness campaigns and clear guidelines on responsible paper usage.
- **Single-Use Plastic Reduction:** Implement campus-wide policies to reduce the use of single-use plastics. This can include banning single-use plastic bottles and bags, promoting the use of reusable alternatives, and organising awareness programs on the environmental impact of plastic waste.

E-Waste Management

- **Periodic Removal:**

- **Scheduled E-Waste Collection:** Implement a regular e-waste collection schedule, such as quarterly pickups, to prevent the accumulation of obsolete and non-functional electronic items across the campus.
- **Partner with Certified Recyclers:** Engage with certified e-waste recyclers like Clean Kerala Company or other authorized entities to ensure that all collected e-waste is safely and responsibly recycled or disposed of.

- **Annual Maintenance Contract (AMC):**

- **Preventive Maintenance Plans:** Establish AMCs with reliable service providers for all electronic equipment on campus. Regular maintenance will prolong the lifespan of devices, reducing the frequency of replacements and the amount of e-waste generated.
- **Inventory Management:** Keep a detailed inventory of all electronic assets under the AMC, tracking their maintenance schedules and operational status to plan for timely upgrades or disposals.

Food Waste Management

- **Biogas Plant:**

- **Install a Biogas Plant:** Set up a biogas plant on campus and hostels to process organic food waste. The biogas plant will convert food waste into biogas, which can be used for cooking or heating, and produce nutrient- rich slurry as a byproduct that can be used as fertilizer.
- **Utilize Biogas Effectively:** Ensure the biogas produced is integrated into the campus energy system to reduce reliance on conventional energy sources, thereby contributing to sustainability goals.

- **Ring Compost:**

- **Improve the efficiency of composting:** Due to lack of awareness and management, the Ring compost facilities in the campus are not meeting the expectations. Therefore, proper training for the maintenance of composting facilities needs to be given to the staff. Additionally suitable inoculums should be made available for the facility. This method is effective for managing wastes that are not suitable for biogas plants.
- **Promote Use of Compost:** Use the compost produced in campus gardens and landscaping projects, promoting a circular waste management system where food waste is returned to the soil.

- **Awareness for Segregation:**

- **Segregation Training Programs:** Conduct awareness campaigns and training sessions for students, staff, and cafeteria workers on the importance of segregating

food waste at the source. Proper segregation will ensure that food waste is efficiently processed in biogas plants or composting units.

- **Clear Signage and Bins:** Install clearly labeled waste bins for organic and non-organic waste in dining areas, with easy-to-understand instructions to encourage proper segregation.

Garden Waste Management

- **Thumboormuzhy Model Composting Facility:**

- **Adopt the Thumboormuzhy Model:** Implement the Thumboormuzhy composting model, a decentralized composting technique ideal for managing garden waste, such as leaves, grass clippings, and small branches. This method involves using composting facilities that allow for aerobic decomposition of organic matter.
- **Compost Utilization:** The compost produced can be used to enrich the soil in campus gardens, reducing the need for chemical fertilizers and promoting sustainable landscaping practices.

Sanitary Napkin Incinerator:

- **Install More Sanitary Napkin Destroyers:** Increase the number of sanitary napkin incinerators across campus restrooms to manage menstrual waste hygienically and efficiently..
- **Maintenance and Safety:** Ensure regular maintenance of the incinerators to guarantee safe operation and compliance with environmental and safety standards.

Conclusion

The waste audit conducted at Thunchath Ezhuthachan Malayalam University has provided valuable insights into the current state of waste management on campus. The findings highlight the need for a more structured and effective approach to managing various types of waste, including e-waste, food waste, garden waste, paper waste, and plastic waste.

To address these challenges and improve overall waste management practices, a series of recommendations have been proposed:

1. **Paper and Plastic Waste Management:** Establishing a Mini Material Collection Facility (MMCF) on campus will centralize the collection and segregation of paper and plastic waste, enhancing recycling efforts and campus cleanliness. Initiatives to reduce paper use and single-use plastics will further support sustainability goals.
2. **E-Waste Management:** Implementing a regular e-waste collection schedule and partnering with certified recyclers will ensure responsible disposal of electronic waste. Additionally, establishing Annual Maintenance Contracts (AMCs) for electronic equipment will help prolong device lifespans and reduce e-wastegeneration.
3. **Food Waste Management:** Installing a biogas plant and improving composting facilities will enable effective management of food waste, converting it into valuable biogas and compost. Promoting proper segregation and conducting awareness programs will enhance the efficiency of food waste processing.
4. **Garden Waste Management:** Adopting the Thumboormuzhy composting model will facilitate the management of garden waste and produce nutrient-rich compost for campus gardens, promoting sustainable landscaping practices.
5. **Sanitary Napkin Waste Management:** Increasing the number of sanitary napkin incinerators and ensuring their proper maintenance will address menstrual waste management in a hygienic and efficient manner.

By implementing these recommendations, Thunchath Ezhuthachan Malayalam University can significantly enhance its waste management practices, reduce environmental impact, and advance its commitment to sustainability. The proposed measures will not only improve waste handling but also foster a culture of environmental responsibility among the university community.