

# Designing of a Waste Management System at Eranad Knowledge City, Manjeri

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**ABSTRACT:** This paper examines the technical, economic and environmental aspects of the waste management techniques in Eranad Knowledge City campus. In this project, encompasses the entire spectrum of waste collection, segregation, re-use, recycle, incineration and landfill. An in-depth analysis of this process has been done as it helps to both emulate and improve these complex yet essential practices. This study involves interaction with people directly associated with this process by which a clear understanding of the technical and management aspect of the entire process can be obtained. Appropriate suggestions and justifications had been put forth to improve the efficiency of the system.

**KEYWORDS:** Waste management system, Re-use, Recycle, Economic

## I. INTRODUCTION

Waste management practices have become challenging due to our consumption behaviour and changing socio-economic conditions. Waste management is a multi-dimensional problem that requires technology, economics, and socio-cultural and political activities to go in hand. This chapter attempts to summarize the key influential aspects in waste management practices, including the interaction of these factors.

The consumption habits and shifting socio-economic conditions have made waste management practices more difficult. The collection, transportation, processing, and recycling or disposal of waste are all parts of waste management advances management techniques are included in sustainable waste management system to safeguard resources.

Recycling and waste management are not new ideas or practices. In fact, they are human communities' oldest and most enduring concerns. Waste management are always been inextricably linked to community development, population growth, and the rise and growth of commerce.

According to the inferences from the researches inside the campus it was clear that there are many types of waste are produced and every individual are responsible for its accumulation.

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Paper is organized as follows. Phase I discusses the implementation of solid waste management system by maximizing resource value, while minimizing and even eliminating environmental impact so that both economy and environment can thrive. The infrastructural capacity of waste water treatment and poor operational maintenance add to the country's water pollution, conservation, recycling, re-use and recharge. Waste water treatment process is given in Phase II.

## II. RELATED WORK

The process of recycling waste into new materials and objects is called recycling [1]. By keeping useful materials out, reducing, re-using, and recycling wastes help save landfill space. Reduced energy and natural resources are required to produce or gather the raw materials and produce the product. A larger part of a circular economy is sustainable waste management [2]. In contrast to the take-make-waste model, this systemic approach to economic development seeks to distinguish growth from resource consumption. Re-using, recycling, waste prevention and water treatment are important waste management strategies that save energy, conserve natural resources and lessen the burden on landfills. In case of water treatment, due to unrestricted entry of waste water into the environment and the transportation of microbial contaminants to humans and organisms, environmental protection requires re-use of appropriate purification systems with the removal of contaminants [3]. There are conventional and non-conventional methods of waste water treatment method and choice of a particular method should be based on the contaminants present in the waste water which the project is considering [3].

The work in this paper is divided in two stages. 1) Solid waste management, 2) Waste water treatment. Solid waste management is done by waste sorting, segregation and treatment methods according to the type of waste. For example; incineration of paper waste, bio-gas implementation for food waste and brick manufacturing with plastic waste. Implementing a proper waste water treatment process for re-using the water for the purpose of gardening and flushing. As the water using for such purposes, there is no need for a deep cleaning process. So the project is considering basic waste water treatment process

## III. METHODOLOGY

Based on the collected data from the designated staff in the campus, classified the sources by the types and management. For this, tried a systematic separation of waste which means waste sorting by bins of different colours. Then selected suitable sites for incinerator and bio-gas plant according to their sizes and most convenient places. Then designed a suitable cost-effective incinerator using the software Sketup.pro. And also selected a suitable bio-gas plant for renewable energy resources from food waste which can later convert into bio-fuel that can be used in our kitchen. By systematic separation we can easily segregate the plastic waste among the other waste which can be re-used for the manufacturing of construction materials like plastic bricks. And for waste water treatment, calculated the amount of water used by each student for various purposes as 1.5 l/head/day. The total wastage of water equals to 52% of the water consumption which makes 0.78 l/head/day of water wastage. These are then multiplied by number of students to get the total water usage and wastage inside the campus and according to this data, installed suitable tanks for preliminary and secondary treatment of waste water and installed tank for collecting the treated water also installed the pipes for the usage of treated water to various parts of the campus.

The whole process of designing waste management system has been done.

## IV. EXPERIMENTAL RESULTS

Figures show the result of designed waste management system. It shows the design of incinerator, size of bio-gas plant and key plan of college after the implementation of waste water collection tanks. Figs. 1, 2, 3 shows suitable sites for implementation of incinerator, bio-gas plant, waste water treatment tanks and their design, size and positions. The capacity of bio-gas plant is around 30 kg ( $3\text{m}^3 \times 3\text{m}^3 \times 3\text{m}^3$ ), dimensions of incinerator is 1.35 m height, 80X80 cm width, chimney height 4 m and diameter 20 cm.

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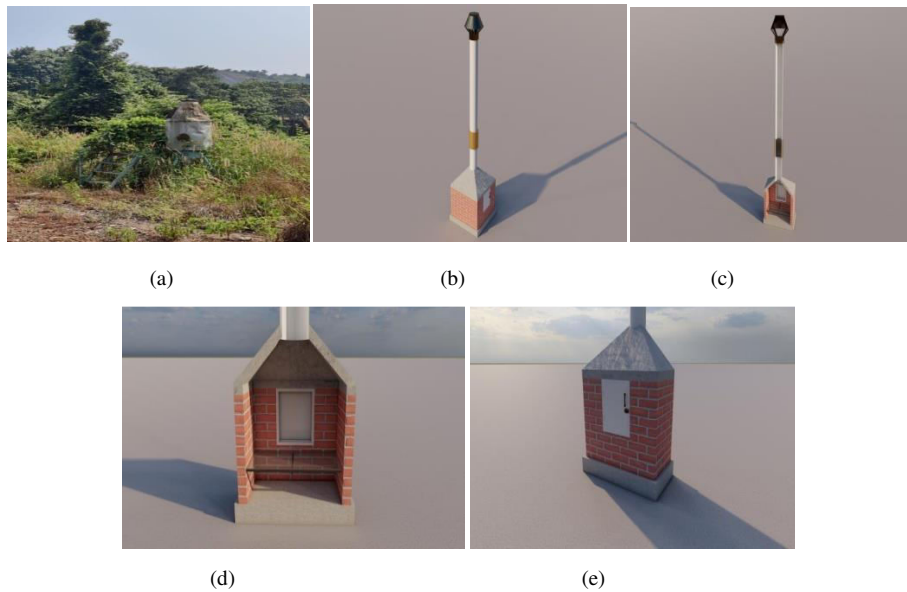


Fig. 1. Design of cost effective Incinerator (a) Selected Site (B) Design Of Incinerator (c) Cross Section Of Incinerator (d) Inside Of Incinerator (e) Front View Of Incinerator

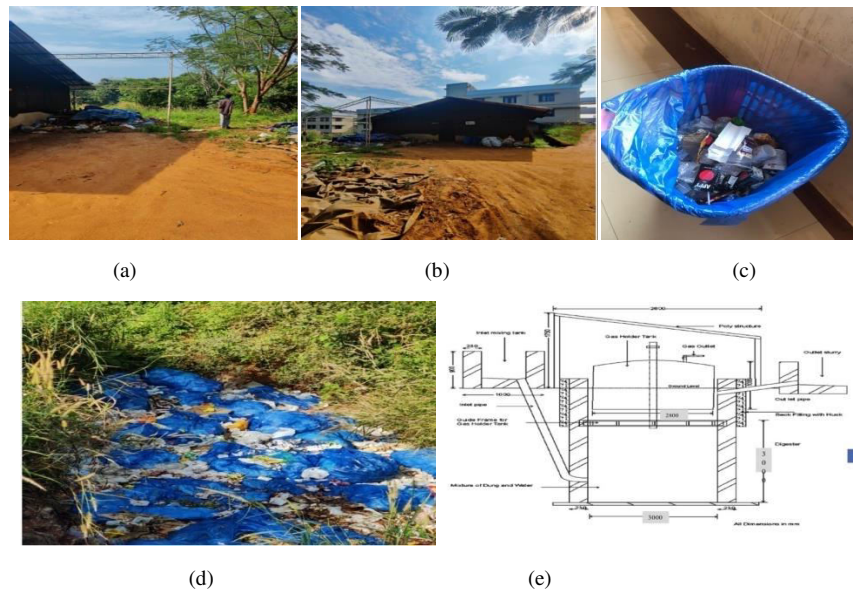


Fig. 2 Food Waste Management (a) Selected site for bio-gas plant (b) Selected site for bio-gas plant (c) Accumulation of waste (d) Dumped Food Waste In Campus (e) Selected Bio-Gas Plant of Size 3m<sup>3</sup>x3m<sup>3</sup>x3m<sup>3</sup>

The study at Eranad knowledge city technical campus focuses on the planning of renewable resources by minimizing the waste and maximizing the utilization.

### V. CONCLUSION

In-order to solve the problem of waste consumption in Eranad Knowledge City Technical Campus, Manjeri, we decided to design a waste management system which will find a solution to manage all kind of waste. Collected the data about all types of waste starting from its origin to its disposal including plastic waste, food waste and paper waste. As a starting for collection and segregation of different types of waste, implemented the system of waste sorting by different colours of waste baskets. After collecting all type of waste, found specific management methods for each kind

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of waste by referring journals and books related to this. For the proper disposal of paper waste, designed a cost-effective incinerator which can reduce or eliminate adverse impacts on the environment through proper disposal. Incinerators can decrease the quantity of waste by as much as 95% and reduce the solid quantity of the original waste by as much as 80-85% depending on the components that were in solid waste. Incineration thus reduces dependency on landfills. For recycling food waste, implemented a biogas plant which is suitable for our college according to the amount of waste produced. Biogas plant which is now a valuable resource that can provide raw materials for production, nutrients for agriculture, and a source of energy. This will help to produce renewable energy sources from the food waste. This can convert into bio-gas which can be used for cooking purposes in the kitchen. Plastic waste in our campus can be separated and re-used. Can use for the manufacturing of new construction materials. For waste water treatment, installed treatment tanks using data according to usage and wastage of water by each student and installed collecting tank for re-using the treated water. Also made a key plan which includes the entire waste management network. So, this project implemented a proper waste management system which is suitable for the institution effectively. This system has so many advantages and aimed to meet all the needs of the present situation which will help minimize the resource extraction that helps in improved quality of the atmosphere.

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