



Integrated Real-Life Solutions for Solid Waste Management and Recycling

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Abstract: Waste management has become a major environmental issue due to rapid population growth, urbanization, and increasing daily waste generation. Improper disposal leads to pollution, health risks, and inefficient waste collection. This project proposes a web-based Waste Management System (WMS) that allows users to report waste complaints, categorize waste types, and track complaint status. An admin dashboard helps manage users and complaints efficiently while promoting waste segregation, recycling, and eco-friendly practices for a cleaner and healthier environment.

Keywords: Waste Management, Real-Life Solutions, Waste Segregation, Smart Waste System, Sustainable Environment, Public Health

I. INTRODUCTION

Waste management is one of the major environmental challenges faced by modern society. Rapid population growth, urbanization, and increased consumption have significantly increased the amount of waste generated every day. Improper waste disposal leads to serious environmental problems such as land pollution, water contamination, air pollution, and health risks for humans and animals.

Traditional waste management systems often lack proper monitoring and efficient waste segregation, which results in delayed waste collection and poor handling of waste materials. To address these issues, digital technology can play an important role in improving waste management processes.

A Waste Management System (WMS) is a web-based platform that allows users to report waste-related complaints, categorize waste types such as dry waste, wet waste, and e-waste, and track the status of their requests. The system also enables administrators to manage complaints, monitor activities, and update waste collection status through an admin dashboard.

The main objective of this project is to develop a simple and user-friendly system that enhances waste management efficiency, reduces environmental pollution, and promotes responsible waste disposal for a cleaner and healthier community.

II. PROBLEM STATEMENT

A. Challenges in Waste Management

Despite the increasing importance of proper waste disposal for environmental sustainability, waste management systems

face significant challenges in maintaining efficient waste collection and disposal processes. These challenges include improper waste segregation, lack of citizen participation in responsible waste disposal, and inefficient monitoring of waste collection activities. Furthermore, the absence of a centralized complaint tracking system results in delays in resolving waste-related issues such as uncollected garbage or illegal dumping, which can negatively impact public health and the environment. Additionally, many waste management services operate independently, leading to inefficiencies in coordinating waste collection and managing different types of waste such as dry waste, wet waste, and electronic waste.

B. Proposed Solution

The implementation of a Waste Management System is intended to address these challenges by integrating an automated and centralized digital platform. The system will allow citizens, waste management authorities, and administrators to interact seamlessly, enabling better coordination and faster response to waste-related complaints. Features such as complaint registration, waste type categorization, and complaint status tracking will enhance efficiency. Moreover, the system will provide awareness information about recycling, composting, and eco-friendly waste practices, helping to reduce pollution and promote responsible waste disposal within communities.

III. OBJECTIVES AND SCOPE OF THE SYSTEM

A. Objectives

The main objective of the Waste Management System is to develop a user-friendly digital platform that helps improve the efficiency of waste management activities. The system

provides citizens with an easy way to report waste-related complaints such as uncollected garbage or illegal dumping through an online interface. This helps ensure that waste problems are reported quickly and addressed by the responsible authorities.

Another objective of the system is to promote proper waste segregation practices. The platform allows users to categorize waste into different types such as dry waste, wet waste, and electronic waste. Proper segregation helps improve recycling processes and reduces the amount of waste that is sent to landfills. The system also aims to enhance communication between citizens and waste management authorities. By providing a centralized platform for reporting and tracking complaints, the system ensures that waste-related issues can be monitored and resolved efficiently. In addition, the Waste Management System helps administrators manage waste complaints effectively through an admin dashboard. Administrators can track complaints, update their status, and monitor waste collection activities, which improves the overall efficiency of waste management services.

Finally, the system aims to promote environmental awareness by providing information about recycling, composting, waste segregation, and eco-friendly lifestyle practices. This encourages people to adopt responsible waste disposal habits and contributes to maintaining a cleaner and healthier environment

B Scopes

The scope of the Waste Management System includes providing a digital platform that helps manage waste-related complaints and improve waste handling practices. The system allows users to submit complaints, select waste categories, and track the status of their requests. Administrators can monitor complaints, manage users, and update the progress of waste collection tasks. The platform also aims to increase awareness about sustainable waste management practices such as recycling, composting, and eco-friendly living. By integrating complaint management and educational resources, the system contributes to improving waste management efficiency and maintaining a cleaner environment

IV. LITERATURE REVIEW

A. Traditional Waste Management Systems

Traditional waste management systems mainly rely on manual processes for waste collection, monitoring, and disposal activities. In many cities, waste collection is performed through fixed schedules without proper tracking or monitoring of waste-related issues. These systems often lead to problems such as delayed waste collection, improper waste segregation, and inefficient use of waste management resources (Sharma et al., 2017). Moreover, manual systems lack the ability to provide real-time information about waste complaints or collection status, which results in delays in resolving waste-related problems and increases environmental pollution (Verma et al., 2018). These limitations have encouraged researchers and organizations to explore digital waste management systems that can improve efficiency and monitoring.

B. Automation and Digital Waste Management Systems

The development of digital technology has significantly improved waste management practices by introducing automated and web-based systems. Modern Waste Management Systems (WMS) provide centralized platforms that allow citizens to report waste-related issues, monitor complaint status, and improve communication between citizens and waste management authorities (Patel & Singh, 2019). These systems include features such as complaint registration, waste categorization, and real-time updates for waste collection activities. Digital platforms also help authorities manage waste collection schedules, monitor waste complaints, and maintain proper records efficiently (Kumar et al., 2020). Studies show that automated waste management systems help reduce operational delays, improve waste segregation practices, and enhance overall efficiency in waste collection and disposal processes (Rathi et al., 2021).

V METHODOLOGY

The methodology of the Waste Management System is based on a structured flow of complaint management between the user, system, admin, and database. First, the user (citizen) submits a complaint related to waste issues through the system interface. The complaint is then processed by the Waste Management System, which stores the complaint data in the database as a complaint record. The admin (administrator) accesses the complaint details from the system and reviews the submitted issue. After verification, the admin can view and update the complaint status, and the updated information is stored back in the database. This process ensures proper complaint tracking, management, and timely resolution.

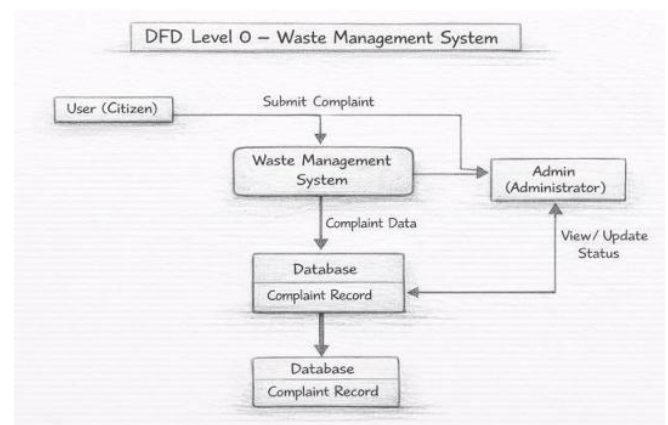


Figure 5.1: DFD Level 0 of Waste Management System

VI IMPLEMENTATION

The Waste Management System is implemented as a web-based platform that allows users to submit waste complaints and select waste types such as dry, wet, and e-waste. The admin dashboard monitors complaints, updates their status, and manages waste collection activities efficiently.



Figure 6.1: Home Page User Interface

The Home Page is the main interface of the Waste Management System and serves as the first point of interaction for users. It provides easy navigation through options like Home, About Us, Complain, Preview Complain, FAQ, and Logout. The page displays the main objective of the system through the heading “Better Solutions For The Waste Around You!” along with an awareness message “Keep our Environment Healthy.” It also includes action buttons such as Get Started and Watch Video for user interaction.

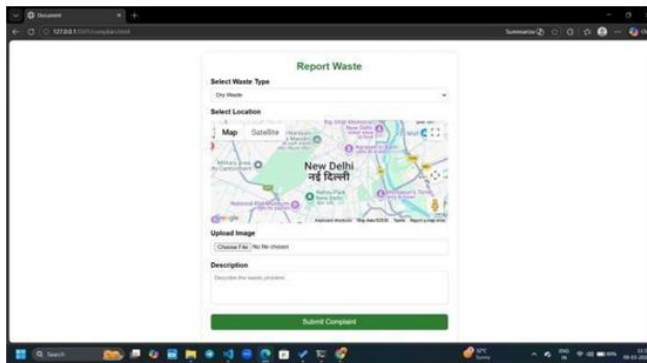


Figure 6.2: Complaint Registration Page

The Complaint Registration Page allows users to report waste-related issues. Users can select the waste type, choose the location through the map, upload an image as proof, and provide a short description of the problem. After filling in the required details, the complaint is submitted to the system for further . System

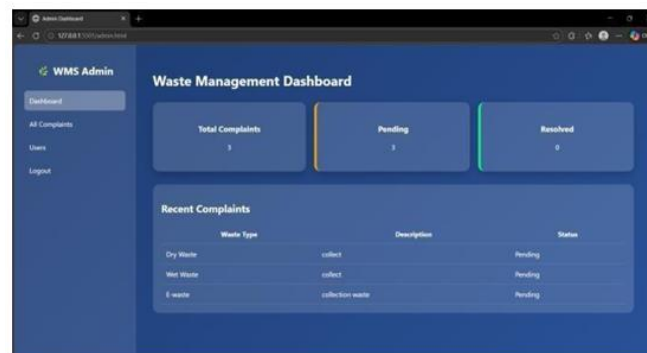


Figure 6.3: Admin Dashboard of Waste Management System

The Admin Dashboard is designed for administrators to monitor and manage all complaints. It provides a summary of

total complaints, pending complaints, and resolved complaints. It also displays recent complaint details, enabling the admin to update the complaint status and maintain efficient waste issue management.

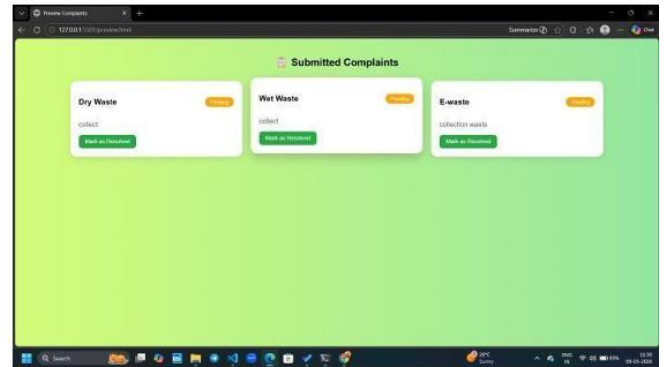


Figure 6.4: Complaint Preview Page

The Complaint Preview Page is designed to display all the complaints submitted by users in an organized manner. It helps users view the details of their complaints and monitor their current status. This page shows important information such as the waste type, description of the issue, and the status of the complaint, which may be Pending or Resolved. Different waste categories like dry waste, wet waste, and e-waste are clearly displayed for easy understanding. The main purpose of this page is to help users track the progress of their submitted complaints and stay updated on whether the issue has been addressed by the waste management authority. It improves transparency and makes the system more user-friendly. The page also includes a “Mark as Resolved” option, which helps in updating the complaint status after the waste issue has been successfully resolved.

VII, RESULTS

The implementation of the Waste Management System has shown significant improvement in the efficiency of waste management processes. The system provides a user-friendly interface that allows citizens to easily report waste-related complaints such as uncollected garbage, illegal dumping, and improper waste disposal. This reduces the communication gap between citizens and waste management authorities.

The admin dashboard plays an important role in managing the overall system. Administrators can monitor all complaints, categorize them based on waste type, and update their status as pending, in progress, or resolved. This improves the speed and accuracy of complaint resolution and ensures better tracking of waste collection activities.

The system also encourages proper waste segregation by allowing users to select categories such as dry waste, wet waste, and electronic waste, which helps improve recycling efficiency. In addition, the awareness section provides useful information about composting, recycling, and eco-friendly practices, leading to increased public awareness and participation. Overall, the system enhances transparency, reduces delays, improves waste collection maintaining a cleaner and healthier environment.

VIII CONCLUSION

The Waste Management System is an effective and user-friendly solution for managing waste-related complaints and improving waste collection processes. The system helps citizens easily report issues such as uncollected garbage, illegal dumping, and improper waste disposal through an online platform. By enabling proper waste segregation, improving communication between citizens and authorities, and providing real-time complaint tracking, the system enhances the overall efficiency of waste management operations. The admin dashboard ensures effective monitoring and management of complaints, leading to faster resolution and better service delivery. In addition, the system promotes awareness about recycling, composting, and eco-friendly waste disposal methods, which encourages public participation in maintaining cleanliness and environmental sustainability. Overall, this system contributes to creating a cleaner, healthier, and more sustainable environment and can be further expanded with advanced features such as GPS tracking, notification systems, and AI-based waste analysis in the future.

IX REFERENCES

The study of real-life solutions for waste management is supported by various research papers and review articles. Previous studies explain the use of smart waste management systems to improve waste collection and recycling processes. Research also highlights the importance of waste segregation, sustainable disposal methods, and public awareness in maintaining a clean environment. Several authors have discussed how modern technologies help in monitoring waste levels, reducing overflow issues, and improving recycling efficiency. These references provide the theoretical foundation and support for the proposed Waste Management System.

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