ELECTRONIC WASTE MANAGEMENT SYSTEM

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This report is submitted in partial fulfillment of the requirements for the Bachelor of [Computer Science (Software Development)] with Honours.

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
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2024

DECLARATION

I hereby declare that this project report entitled

[ELECTRONIC WASTE MANAGEMENT SYSTEM]

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT : _____NUR ATIHRA BINTI SAFUAN_____ Date : 18/6/2024

I hereby declare that I have read this project report and found this project report is sufficient in term of the scope and quality for the award of Bachelor of [Computer Science (Software Development)] with Honours.

SUPERVISOR : _____ Date : 1/9/2024

(TS DR UMMI RABA'AH HASHIM)

DEDICATION

I would like to dedicate this final year project to my supervisor Ts.Dr.Ummi Rabaah, for her continuous support throughout the completion of this project. His patience in guiding me to the end and his motivation during this journey have been invaluable. I deeply appreciate all the help I have received from him. This project would not have been possible without her insightful advice and continuous motivation. I would also like to dedicate this project to my beloved parents. They have always given me a moral support, for giving all I needs during the time I developed the system. Lastly, I would like to dedicate this project to my dear friends, who have always been supportive, assisted me in my studies, and given me plenty of encouragement.

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I am very thankful towards the people who have supported me throughout this journey to the completion of the project. I especially would like to thank my supervisor Ts.Dr.Ummi Rabaah who has always given me guidance and motivation to complete the project.

I would also like to take this opportunity to show gratitude towards my fellow classmates and friends for they have always encourage and helped me along the way of completing this project. I feel blessed to have such wonderful classmates and friends in University Teknikal Malaysia Melaka.

I also would like express wholehearted gratitude towards my family for the continuous support they have given me. They have been there for me no matter what and that has helped me tremendously in encouraging me to complete this project.

ABSTRACT

The Electronic Waste Management System (EWMS) project aims to revolutionize e-waste management by providing a user-friendly web-based platform that connects e-waste generators with recycling organizations. As the proliferation of electronic devices continues, the proper disposal of electronic waste has become a pressing environmental concern. The EWMS will help people responsibly dispose of electronic devices by providing a user-friendly web platform.

The project will streamline the process of e-waste disposal by allowing users to list details of their electronic products for recycling and schedule pickups for collection. Administrators will oversee the platform, managing user accounts, product listings, and pickup requests, while staff members will conduct inspections and coordinate collection activities. The key objectives of the EWMS project are to enhance environmental sustainability, promote responsible e-waste disposal practices, and streamline e-waste collection and recycling processes. By providing a centralized platform for e-waste management, the project aims to increase awareness of proper e-waste disposal methods, reduce environmental pollution caused by improper disposal practices, and provide a convenient solution for individuals looking to dispose of their electronics safely.

ABSTRAK

Projek Sistem Pengurusan Sisa Elektronik (EWMS) bertujuan untuk merevolusikan pengurusan e-sisa dengan menyediakan platform berasaskan web mesra pengguna yang menghubungkan penjana e-sisa dengan organisasi kitar semula. Apabila percambahan peranti elektronik berterusan, pelupusan sisa elektronik yang betul telah menjadi kebimbangan alam sekitar yang mendesak. EWMS akan membantu orang ramai melupuskan peranti elektronik secara bertanggungjawab dengan menyediakan platform web yang mesra pengguna.

Projek itu akan menyelaraskan proses pelupusan e-waste dengan membenarkan pengguna menyenaraikan butiran produk elektronik mereka untuk dikitar semula dan menjadualkan pengambilan untuk pengumpulan. Pentadbir akan menyelia platform, mengurus akaun pengguna, penyenaraian produk dan permintaan pengambilan, manakala ahli kakitangan akan menjalankan pemeriksaan dan menyelaraskan aktiviti pengumpulan. Objektif utama projek EWMS adalah untuk meningkatkan kelestarian alam sekitar, menggalakkan amalan pelupusan e-sisa yang bertanggungjawab, dan menyelaraskan proses pengumpulan dan kitar semula e-sisa. Dengan menyediakan platform terpusat untuk pengurusan e-waste, projek ini bertujuan untuk meningkatkan kesedaran tentang kaedah pelupusan e-waste yang betul, mengurangkan pencemaran alam sekitar yang disebabkan oleh amalan pelupusan yang tidak betul, dan menyediakan penyelesaian yang mudah untuk individu yang ingin membuang elektronik mereka dengan selamat.

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LIST OF ABBREVIATIONS

FYP	**-**	**Final Year Project**
EWMS	**-**	**Electronic Waste Management System**
SDLC	**-**	**Software Development Life Cycle**
UTeM	**-**	**Universiti Teknikal Malaysia Melaka**
HTML	**-**	**Hypertext Markup Language**
CSS	**-**	**Cascading Style Sheets**
PHP	**-**	**Hypertext Preprocessor**
XAMPP	**-**	**Cross-Platform, Apache, MySQL, PHP, and Perl**
MYSQL	**-**	**Structured Query Language**
GHz	**-**	**Gigahertz**
FR	**-**	**Functional Requirement**
PK	**-**	**Primary Key**
FK	**-**	**Foreign Key**

LIST OF ATTACHMENTS

CHAPTER 1: INTRODUCTION

1.1 Introduction

The Electronic Waste Management System (EWMS) is a web-based application designed to manage the growing problem of electronic waste. As technology advances quickly, electronic devices become outdated and are discarded at a high rate. This leads to a large amount of e-waste, which is harmful to the environment and health due to toxic materials like lead, mercury, and cadmium. These substances can contaminate soil and water if not disposed of properly. Additionally, e-waste contains valuable materials that can be recycled, reducing the need for new raw materials and minimizing environmental damage.

The EWMS provides a solution by making it easy for people to dispose of their electronic waste responsibly. The system allows users to list their unwanted electronic items and schedule pickups for recycling, ensuring that these items are handled in an environmentally friendly manner. The project aims to simplify the e-waste disposal process and encourage sustainable practices.

The system includes features such as a user-friendly interface for listing electronic waste items, scheduling pickups, managing user accounts, and generating reports on e-waste collections. Administrators can oversee the system, while staff members can inspect and collect the items. The main goal of EWMS is to promote environmental sustainability by providing a clear and efficient way to manage e-waste. With accurate data on e-waste items and their collection status, administrators can make better decisions about resource use and process improvements.

By making the disposal and recycling process easier, EWMS can improve user experience and encourage responsible e-waste disposal. The main objective is to provide a simple solution for people who want to dispose of their electronics safely and efficiently. The system will save time and effort by streamlining the entire process from listing items to recycling them.

This project addresses the lack of a systematic approach to e-waste disposal, the environmental risks of improper disposal, and the need for better awareness about e-waste recycling. EWMS will solve these problems by offering an integrated platform that simplifies the disposal process, promotes environmental awareness, and ensures proper recycling practices.

In conclusion, the EWMS project aims to create a more sustainable environment by making e-waste management more organized and efficient. Users will benefit from an easier disposal process, while the environment will benefit from reduced pollution and resource conservation

1.2 Problem statement

The rapid increase in electronic devices has caused a significant rise in electronic waste (e-waste), leading to serious environmental and health hazards. Improper disposal of electronic products allows toxic chemicals such as lead, mercury, and cadmium to leach into the soil and water, contaminating natural resources and posing risks to human health. Additionally, when these hazardous materials are incinerated or left in landfills, they can release harmful pollutants into the air, further contributing to environmental degradation.

Another issue is the inefficient and cumbersome process of managing e-waste, which discourages individuals and organizations from recycling their electronic devices. Without a streamlined and accessible system, people often resort to disposing of e-waste in regular trash, leading to improper handling and increased environmental harm.

Furthermore, there is a lack of centralized data and tracking for e-waste management, making it difficult for authorities and recycling companies to monitor and optimize the recycling process. This results in missed opportunities for recovering valuable materials and reducing the need for new raw materials, ultimately impacting the overall sustainability efforts.

Lastly, public awareness and education on the importance of e-waste recycling are insufficient. Many people are unaware of the potential dangers of e-waste and the benefits of proper recycling. This lack of knowledge contributes to low participation rates in e-waste recycling programs and hinders efforts to mitigate the environmental and health risks associated with electronic waste.

1.3 Objective

- To facilitate Efficient and transparent e-waste management process, from product listing to recycling

- To streamline the e-waste collection process and ensure proper recycling practices.

- To promote environmental awareness and sustainability through educational resources and initiatives.

1.4 Scope

There are several module to be developed in the electronic management systm involving three stakeholder which are admin, staff and customer

1.4.1 Admin Module

- The admin page functions as verifying the authenticity of staff members by requiring them to input their username and password.
- The admin can view can total registered customer, total staff , total listed product, manage product, view report
- Admin can assign a staff member to handle the customer request

1.4.2 Staff Module

- The staff page functions as verifying the authenticity of staff members by requiring them to input their username and password.

- Staff can view the details of assign products and have right to take decision to reject or collect the product.
- Evaluate product listings, schedule pickups, and update the status of collected items.

1.4.3 Customer module

- Customers must register on the website first before using this system
- Customer can manage their electronic waste products, request pickup services, and track the status of their disposal requests.

1.5 Project Significance

The primary beneficiaries of the EWMS project are individuals and organizations looking to dispose of their electronic waste responsibly. The system will provide them with an easy and convenient way to list their unwanted electronic items, schedule pickups, and track the recycling process. This enhances their experience by saving time, reducing the hassle of e-waste disposal, and offering a user-friendly platform for managing electronic waste.

The local community and businesses in the surrounding area also stand to benefit from the EWMS. The system allows community members to engage with the e-waste recycling process, making it easier to dispose of old electronics safely. The online scheduling feature enables them to book pickups at their convenience, extending the reach of the e-waste management service beyond just the immediate users of the system.

By incorporating features such as item listing, pickup scheduling, and real-time tracking, the EWMS significantly improves the overall user experience. Users can easily navigate the system, list their electronic waste, schedule convenient pickup

times, and monitor the status of their disposal requests. This enhances convenience and satisfaction, ensuring that the process is straightforward and efficient.

The functionalities of EWMS, such as automated scheduling and status tracking, streamline the e-waste collection process. This allows the system to manage pickups more efficiently, reducing errors and minimizing delays. By automating key processes, EWMS optimizes resources, ensuring quicker and more reliable service for all users.

1.6 Expected Output

The EWMS project aims to achieve several important goals to improve how we manage electronic waste. The system will have a user-friendly interface, making it easy for people to list their old electronics, schedule pickups, and track the progress of their disposal requests. This simple design ensures that users can quickly and easily navigate the system, making e-waste disposal less complicated and more accessible.

For administrators, EWMS offers detailed reports and data insights, helping them to manage and enhance the e-waste collection process. These reports will provide information on the amount and types of waste collected, the efficiency of collection schedules, and trends over time. This data is vital for making better decisions, optimizing collection routes, and improving the overall system's efficiency.

The system will also support staff by making it easier to manage product listings, schedule pickups, and update the status of collected items. Staff can quickly review product details, confirm pickup times, and track each collection request in real time. This reduces errors, cuts down on paperwork, and speeds up the entire process, making operations smoother and more efficient.

1.7 Conclusion

In conclusion, the EWMS project is designed to significantly enhance the management of electronic waste. By providing a user-friendly platform, the system makes it easy for individuals and organizations to dispose of their old electronics responsibly, streamlining the entire process from listing items to scheduling pickups and tracking disposal requests. This simplicity not only improves user experience but also

encourages more people to participate in e-waste recycling, helping to reduce the environmental impact of electronic waste.

To ensure the success of the EWMS, it is essential to focus on key aspects such as system usability, data accuracy, and effective scheduling. Providing clear and easy-to-use features will help users navigate the platform effortlessly, while detailed reports and real-time tracking will support administrators and staff in managing the collection process efficiently. Additionally, promoting public awareness and education on the importance of e-waste recycling will further boost participation rates and enhance community engagement.

Implementing sustainable practices, such as ensuring proper recycling and reducing electronic waste pollution, is crucial. By automating processes and optimizing collection routes, the EWMS minimizes the environmental impact of e-waste disposal, conserving valuable resources and reducing the need for new materials. These practices not only protect the environment but also contribute to a more sustainable future.

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CHAPTER 2: LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

A literature review is a type of research that involves analyzing and evaluating existing literature related to a specific topic or research question. The purpose of a literature review is to identify gaps in knowledge and to synthesize and summarize the current state of research in a particular area.The process of conducting a literature review involves searching academic databases, journals, books, and other sources of information for relevant research studies and publications. Once relevant literature has been identified, it is carefully evaluated and analyzed to determine its quality, credibility, and relevance to the research question. The literature is then synthesized and summarized to provide a comprehensive overview of the current state of research in the field.

Literature reviews are commonly used in academic research to support the development of research proposals, to identify areas for further research, and to provide a foundation for evidence-based practice. They can also be used to inform policy decisions, to provide context for historical or theoretical research, and to support professional development in various fields. Overall, literature reviews play an important role in advancing knowledge and understanding in various fields of research by synthesizing and summarizing existing literature, identifying gaps in knowledge, and providing a foundation for further research.

Project methodology is the systematic approach and process of executing a project. It involves a series of activities, tasks, and tools that are designed to ensure that the project is completed successfully and meets its objectives. A project methodology

can be broken down into several key phases, each with its own set of tasks and objectives. A well-defined project methodology helps to ensure that the project is completed on time, within budget, and to the satisfaction of all stakeholders. It provides a framework for managing and executing complex projects, and helps to mitigate risks and address issues as they arise. The project will be managed using Agile methodology, with regular sprint reviews and retrospectives to ensure continuous improvement and alignment with project goals. The project will be managed using Agile methodology, with regular sprint reviews and retrospectives to ensure continuous improvement and alignment with project goals.

2.2 Facts and finding

2.2.1 Domain

The domain of the Electronic waste management project is centered around electronic waste management, which involves the collection, recycling, and disposal of electronic devices. This field is crucial due to the rapid growth in electronic waste (e-waste) worldwide. E-waste includes discarded items like smartphones, computers, and other electronics, which contain hazardous materials such as lead and mercury that can harm the environment if not properly managed. This domain is critical due to the increasing volume of electronic waste generated globally, which poses significant environmental and health risks. The EWMS is designed to address these challenges by providing a systematic approach to e-waste disposal. Key aspects of this domain include understanding the types of electronic waste, the environmental hazards associated with improper disposal, and the benefits of recycling valuable materials found in e-waste. Key aspects of this domain include understanding the different types of e-waste and their specific disposal needs. It also involves recovering valuable materials like gold and copper through recycling, which reduces the demand for new resources and lessens environmental impact. Technological advancements in recycling methods, such as mechanical and chemical processes, improve the efficiency of recovering materials from e-waste. Digital innovations like IoT and blockchain enhance transparency in the e-waste supply chain, making it easier to track and manage recycling processes.

Socially, the domain includes raising awareness about the importance of recycling e-waste and educating communities on its environmental impacts. It also considers economic factors, promoting business models that support sustainable e-waste management practices while balancing environmental and financial benefits.

2.2.2 Existing System

Based on my research , there are currently several existing system that are being used for electronic waste management system.some of these system include:

Manual system: Some areas still rely on manual processes for e-waste collection and disposal, which are often inefficient and prone to errors. This system lacks the necessary tracking and management capabilities to handle e-waste effectively.

Computerized Systems: Many organizations use computerized systems to manage e-waste. These systems often include databases for tracking e-waste inventory, scheduling pickups, and generating reports. However, they may lack integration with modern technologies, reducing their effectiveness in managing the e-waste lifecycle.

Mobile Apps and Web Portals: Several mobile applications and web portals have been developed to facilitate e-waste management. These systems allow users to schedule pickups, track e-waste disposal status, and access recycling information. Examples include RecycleTrack, Waste Management's e-Waste Solutions, and local government portals for e-waste collection.

2.2.3 Technique

The waterfall methodology that can be used for the development of the Electronic Waste Management System:

Requirements Gathering: In this phase, gather detailed requirements for the Electronic Waste Management System. This includes understanding the needs of users, administrators, and staff members, as well as the features and functionalities required for the system. Document the requirements clearly to serve as a foundation for the subsequent phases.

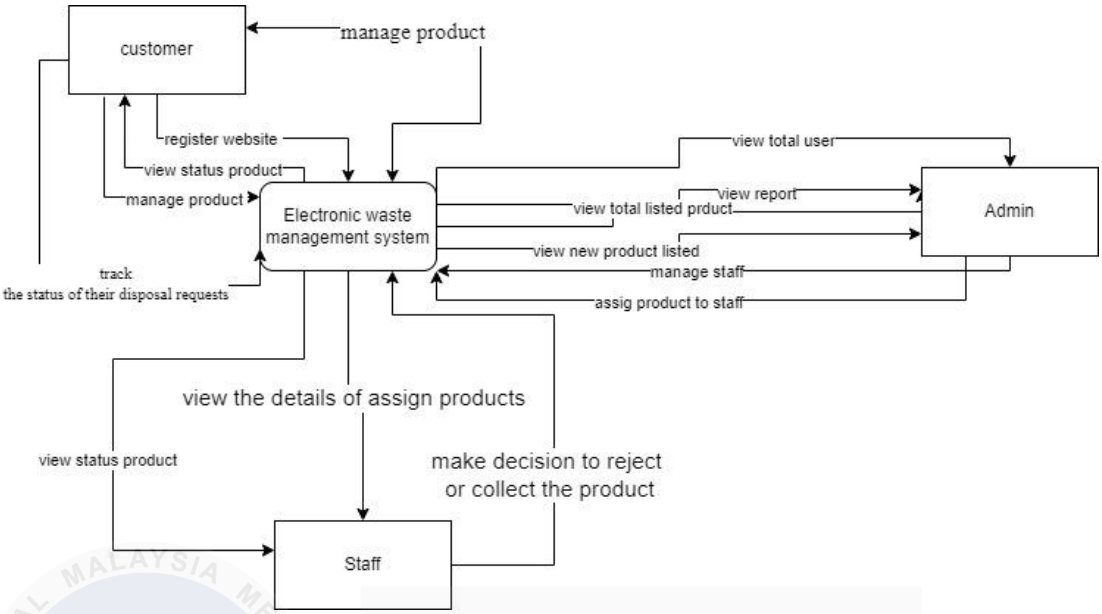


Figure : 3.2.2 Context Diagram for Electronic Waste Management System

System Design: Based on the gathered requirements, create a comprehensive design for the Electronic Waste Management System. This includes designing the user interface, database schema, architectural components and the technical specifications for each module. The design should be detailed enough for implementation.

Implementation In this phase, the actual coding and development of the system take place. Developers write the code based on the design documents and implementing the Electronic Waste Management System according to the specifications outlined in the previous phases. This involves developing the front-end interface, back-end functionality, and any necessary integrations with external systems.

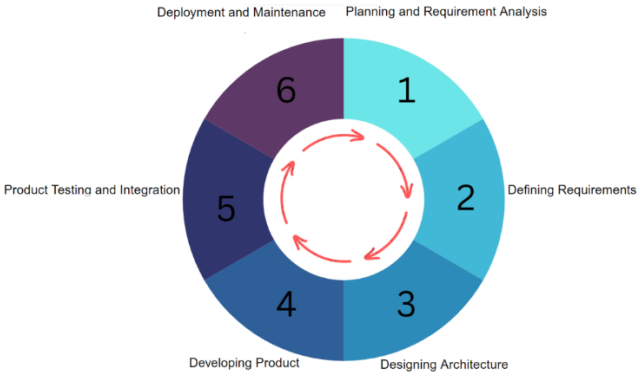
Testing: Once the implementation is complete, perform thorough testing of the Electronic Waste Management System. This includes unit testing, integration testing, system testing, and user acceptance testing. Test cases should be designed to validate the system against the defined requirements.

Deployment: After successful testing, prepare the Electronic Waste Management System for deployment. This involves packaging the software, configuring the required infrastructure, and ensuring the system is ready to be used by users and administrators.

Maintenance: Once deployed, the system enters the maintenance phase. Address any reported issues, provide updates and enhancements as needed, and ensure ongoing support and maintenance to keep the system running smoothly.

2.3 Project Methodology

The selected approach for the Electronic Waste Management System is Software Development Life Cycle (SDLC). SDLC is a well-known methodology used to design, develop and maintain software applications. It ensures a systematic and disciplined approach to software development, leading to high-quality and reliable systems. The key phases in SDLC include Planning, Defining, Development, Testing, Deployment, and Maintenance. The process begins with the Planning phase, where the project's scope, objectives, and feasibility are established. This is followed by the Defining phase, which involves gathering detailed requirements and specifications for the system. In the Development phase, the actual coding and creation of the system take place, based on the defined requirements. The Testing phase ensures that the system functions correctly and meets all specified requirements through various levels of testing such as unit, integration, and system testing. Once the system passes testing, it moves to the Deployment phase, where it is released for use in a live environment. Finally, the Maintenance phase involves ongoing support, updates, and enhancements to ensure the system remains functional, secure, and up-to-date with any new requirements. This structured approach ensures that each phase of development is completed thoroughly, leading to a reliable and efficient system.



Figures 2.3 Software Development Life Cycle (SDLC)

Planning: In the planning phase, the project's objectives and scope are defined. This involves identifying the resources required, setting a timeline, and estimating the costs. Detailed project planning ensures that all stakeholders have a clear understanding of the project goals and the steps needed to achieve them.

Defining: During the defining phase, detailed requirements for the Electronic Waste Management System are gathered and documented. This includes understanding the specific features, functionalities, and user needs. Clear and precise requirement definitions serve as the foundation for all subsequent phases and ensure that the system meets user expectations.

Development: In the development phase, the actual coding and creation of the system take place. Based on the design and requirements, developers build the front-end interface, back-end logic, and any necessary integrations. This phase transforms the detailed designs and plans into a working software system.

Testing: Once the development phase is complete, thorough testing is conducted to ensure the system works as intended. This includes unit testing, integration testing, system testing, and user acceptance testing. Testing helps identify and fix any bugs or issues, ensuring the system is reliable and meets the defined requirements.

Deployment: After successful testing, the system is prepared for deployment. This involves setting up the necessary infrastructure, installing the software, and making the system available to users. The deployment phase ensures that the system is fully functional in the live environment and ready for use.

Maintenance: Once deployed, the system enters the maintenance phase. This involves ongoing support to address any issues that arise, implementing updates and enhancements, and ensuring the system remains operational and secure. Regular maintenance helps keep the system up-to-date with changing requirements and technological advancements.

2.4 Project requirement

2.4.1 Software Requirement

- Development Tools: Sublime text 3

  Sublime Text 3 is a sophisticated text editor known for its simplicity and powerful features. It supports a wide range of programming languages with syntax highlighting, multi-selection, and a command palette. Sublime Text 3 also boasts extensive plugin support through

Package Control, enhancing its functionality for coding, markup, and writing. Its user-friendly interface and powerful features make it a preferred choice for developers.

- Operating system/ Server : XAMPP

  XAMPP stands for Cross-Platform, Apache, MySQL, PHP, and Perl. It is a free and open-source web server solution stack package developed by Apache Friends. XAMPP provides an easy-to-install and comprehensive development environment for Windows, Linux, and Mac OS. It includes Apache for web serving, MySQL for database management, and PHP and Perl for server-side scripting, enabling developers to create and test web applications locally.

- Database : Phpmyadmin

  phpMyAdmin is a free and open-source web-based interface for managing MySQL. It simplifies database administration with features like SQL query execution, database design, and user management through an intuitive graphical interface. phpMyAdmin also supports importing and exporting data in various formats, making database management straightforward and efficient for developers.

2.4.2 Hardware Requirement

- Laptop
  - Device name : Lenovo ideapad 3i
  - Processor : 11th Gen Intel(R) Core(TM) i7-1165G7 @ 2.80GHz 2.80 GHz
  - Installed Ram : 8.00 GB
  - System Type : 64-bit operating system, x64-based processor

2.5 Project Schedule and Milestones

No	Activity/Task	Start Date	End Date
1	PROPOSAL	11 March 2024	22 March 2024

2	PROJECT PROGRESS 1	25 March 2024	29 March 2024
3	REPORT WRITING PROGRESS 1	1 April 2024	12 April 2024
4	PROJECT PROGRESS 2	15 April 2024	26 April 2024
5	REPORT WRITING PROGRESS 2	6 May 2024	14 June 2024
6	DEMONSTRATION	17 June 2024	21 June 2024
7	PRESENTATION	17 June 2024	21 June 2024
8	REPORT EVALUATION	24 June 2024	28 June 2024

2.6 Conclusion

In this chapter, the literature review highlighted the importance of understanding existing research in electronic waste management (EWM) and project methodology. EWM involves the collection, recycling, and disposal of electronic devices, addressing environmental and health risks posed by electronic waste . The project methodology chosen for developing the Electronic Waste Management System (EWMS) is Waterfall, emphasizing iterative development and stakeholder collaboration. The hardware and software requirements specified ensure the system's compatibility and performance. The project schedule outlines key milestones and activities to ensure timely completion and deliverables. Overall, this chapter provides a foundation for implementing an effective EWMS to manage e-waste efficiently.

CHAPTER 3: ANALYSIS

3.1 Introduction

In the context of managing electronic waste (e-waste), many organizations currently rely on manual systems for collecting, recycling, and disposing of electronic devices. This manual approach often involves cumbersome processes where individuals and organizations must manually track e-waste, schedule pickups, and ensure proper disposal, which can lead to inefficiencies and potential environmental hazards. For instance, without an integrated system, managing e-waste can be chaotic, making it difficult to maintain accurate records, monitor the disposal process, and ensure compliance with environmental regulations.

To address these challenges, an Electronic Waste Management System (EWMS) will be developed. This system aims to streamline the management of e-waste by automating various processes, improving tracking capabilities, and enhancing overall efficiency. With the EWMS, organizations and individuals can manage e-waste more effectively, reducing the manual workload and minimizing the risk of environmental contamination. This system will enable stakeholders to track e-waste from collection to recycling, ensuring that valuable materials are recovered and hazardous substances are disposed of safely. By implementing this system, we aim to enhance the sustainability and efficiency of e-waste management practices, contributing to a cleaner and safer environment.

3.2 Problem Analysis

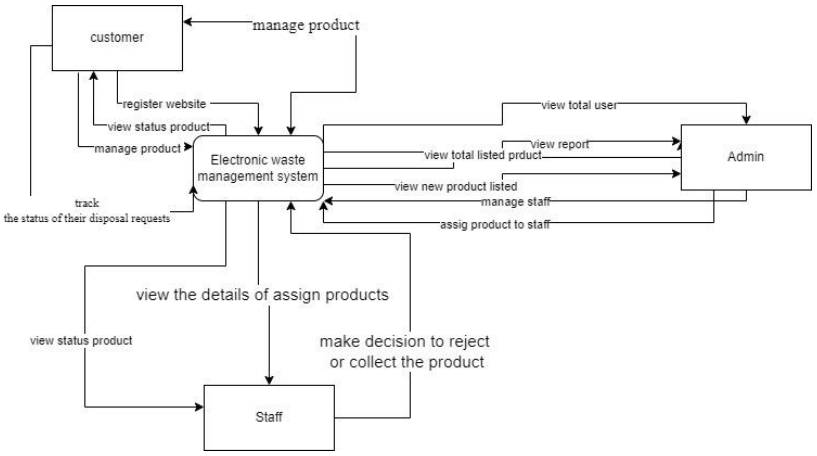
Managing electronic waste (e-waste) currently faces several significant challenges that hinder efficient operations and environmental safety. One major issue is the lack of coordinated efforts and oversight in handling e-waste, resulting in inconsistencies and inefficiencies across the collection, recycling, and disposal processes. Additionally, the reliance on manual methods for tracking and documenting each stage of e-waste management is prone to errors, making it difficult to maintain accurate records of e-waste movements and disposal methods. This manual tracking increases the risk of environmental contamination, as hazardous materials like lead and mercury found in electronic devices can pose serious environmental and health risks if not disposed of properly.

3.2.1 Current system Analysis (Manual system)

The current Electronic Waste Management System relies heavily on manual processes for handling e-waste. This involves using paper-based records to track the collection, sorting, and disposal of electronic waste. There is no integrated system for monitoring the movement and processing of e-waste, leading to inefficiencies and a lack of transparency. Staff manually schedule pickups and maintain logs of e-waste, which are prone to errors and difficulties in tracking. This approach makes it challenging to ensure compliance with regulations and to maintain accurate records of e-waste disposal. Consequently, the system is not effective in preventing environmental contamination or in optimizing the recovery of valuable materials from e-waste.

3.2.2 To-Be system Analysis

A data flow diagram is a picture of the movement of data between entities external and processes and data storage in a system. This diagram too is one of the notations known as structured analysis techniques diagram The data flow for the existing system is drawn using four main elements which are entities external, process, data flow and data storage.



3.3 Requirement analysis

The proposed Electronic Waste Management System (EWMS) aims to address the inefficiencies inherent in the current manual system for managing electronic waste. By automating and streamlining the entire process of e-waste collection, recycling, and disposal, the EWMS is expected to significantly improve operational efficiency and transparency. Key features of the EWMS include an online submission platform, allowing users to submit details of their e-waste and schedule pickups without the need for physical visits or paper-based forms. Real-time tracking enables users to monitor the status of their e-waste submissions from pickup to final disposal, enhancing user engagement and transparency.

A centralized dashboard for administrators facilitates the efficient management of all e-waste submissions, allowing for quick approval and effective resource management. The system also includes inventory management to maintain accurate records stages of e-waste items, ensuring proper tracking and timely recycling or disposal. Automated notifications improve communication by informing users and administrators at key of the e-waste management process, thereby reducing delays and enhancing overall efficiency. Implementing this automated system is anticipated to contribute to more effective and environmentally friendly waste management practices

3.3.1 Data Requirement

he data requirements specify the particular information that must be captured and stored within the system. These requirements are organized according to the roles of the users, ensuring that each role has access to the necessary data to perform their functions effectively.

The conceptual and logical database design for the EWMS involves creating an Entity-Relationship Diagram (ERD) and a detailed data dictionary. The ERD outlines the relationships between different entities within the EWMS, including Users, E-Waste Items, Pickup Requests, Recycling Centers, and Notifications. The Users entity captures information about all users of the system, such as administrators, collectors, and regular users. The E-Waste Items entity records all e-waste items submitted for recycling or disposal, including their types, conditions, and submission dates. The Pickup Requests entity manages details of pickup requests made by users, including scheduled dates, pickup status, and assigned collectors. The Recycling Centers entity maintains information about the recycling centers involved in processing e-waste. The Notifications entity handles all automated notifications sent to users and administrators at different stages of the e-waste management process.

3.3.1.1 Admin

Admins have a comprehensive role that involves overseeing the entire system and managing various aspects such as users, categories, products, and tracking histories. The data requirements for admins are extensive, encompassing personal information and management capabilities. Admins need to store their personal details, including AdminName, UserName, MobileNumber, Email, Password, and AdminRegdate. Furthermore, they require the capability to manage categories, cities, and states, which involves adding, updating, or deleting these entities. Admins also need to view and manage staff and customer information, oversee product listings, and track histories. Additionally, admins must have access to contact messages, with the

ability to mark them as read. This comprehensive access ensures that admins can effectively manage the system and address any issues that arise.

3.3.1.2 Staff

Staff members, or employees, play a crucial role in handling specific tasks related to products and customer inquiries. The data requirements for staff focus on personal information and task management capabilities. Staff members need to store their personal details, such as EmployeeID, Name, Email, ContactNumber, Address, Password, Status, and JoiningDate. In terms of task management, staff members must have the ability to view and update product details assigned to them, access product tracking histories, and add remarks or update the status of products. This level of access ensures that staff members can efficiently manage their assigned tasks and contribute to the overall functionality of the system.

3.3.1.3 Customer

Customers interact with the system primarily to list their products and make inquiries. Their data requirements focus on personal information, product listings, and inquiry handling. While the detailed personal information for customers is typically linked through UserID in the product listings, the critical data revolves around their product details. Customers need to provide comprehensive information for each product, including ProductID, ProductName, ModelorType, Description, ExpectedPrice, PickupDate, PickupAddress, StateName, CityName, ContactPerson, CPMobNumber, Image1, Image2, CreationDate, Remark, Status, AssignTo, ValuedAmount, and UpdationDate. Additionally, customers need the ability to submit inquiries through the contact form, which captures details such as FirstName, LastName, Email, Phone, Message, EnquiryDate, and IsRead. This information enables customers to list their products accurately and ensure their inquiries are addressed promptly.

3.4 Conclusion

The requirement analysis provides a detailed understanding of the data needs for the various user roles within the system, namely admins, staff, and customers. By delineating these data requirements, the system can be designed to capture and manage all necessary information effectively. This structured approach ensures that the system supports the operational needs of all stakeholders, facilitating smooth interactions and efficient management. The insights gained from this analysis form the foundation for the subsequent design and implementation phases, ensuring that the system is robust, user-friendly, and capable of meeting the specified requirements.

CHAPTER 4: DESIGN

4.1 Introduction

In this chapter, the results of the analysis of the preliminary design and the outcome of the detailed design will be defined. The analysis phase aimed to evaluate and refine the initial design concept, while the detailed design phase focused on providing a comprehensive and well-defined plan for the Electronic Waste Management System. This chapter provides an overview of the key findings and decisions made during these stages, highlighting the design choices and considerations that have shaped the final product. By examining the results of the analysis and detailed design, readers will gain insight into the evolution and development of the system, setting the stage for the subsequent chapters that delve into specific aspects of its implementation.

4.2 High-Level Design

4.2.1 System Architecture

For the Electronic Waste Management System, the web application interface would allow users to manage and track electronic waste disposal and recycling. Notifications could be sent via email to inform users of scheduled pickups or important updates. The presentation layer would display the user interface and handle user inputs. The application layer consists of the backend server, which contains the application's functionality. The database layer comprises a SQL-based database, which stores user input data and retrieves it when necessary.

4.2.2 User Interface Design

(a) Navigation Design

(b) Input Design

User

Figures 4.3 main page

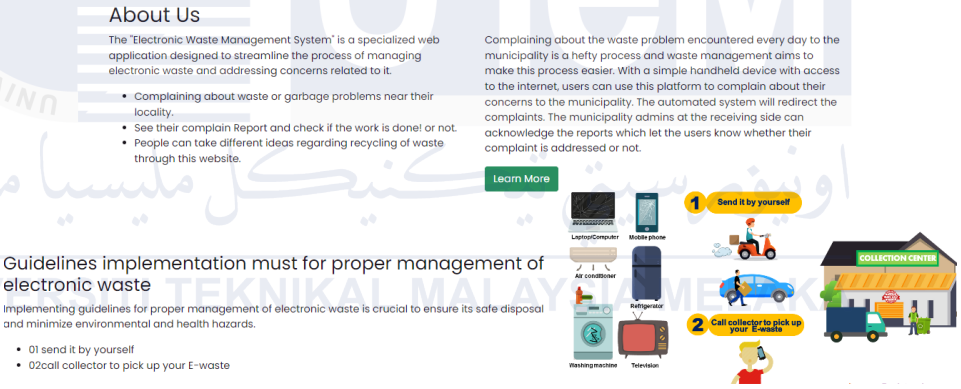


Figure 4.4 main page

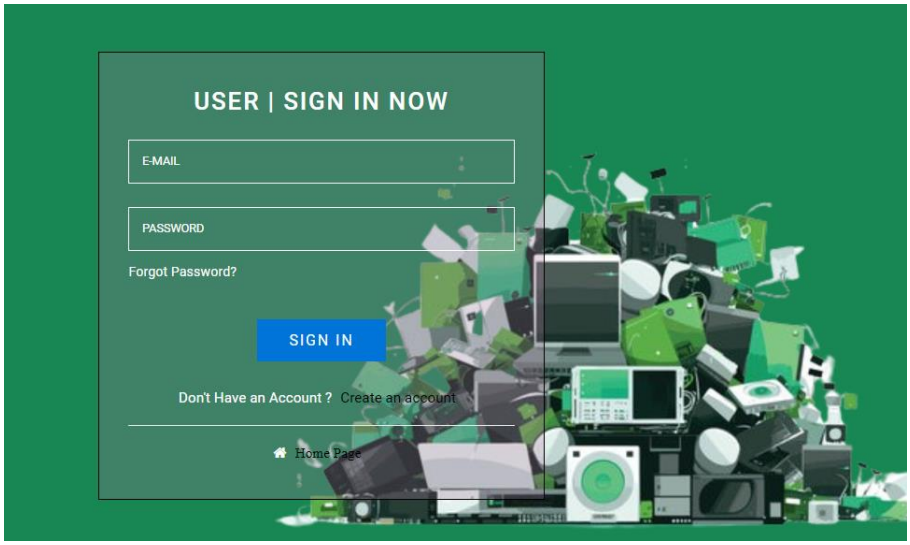


Figure 4.5 user sign in

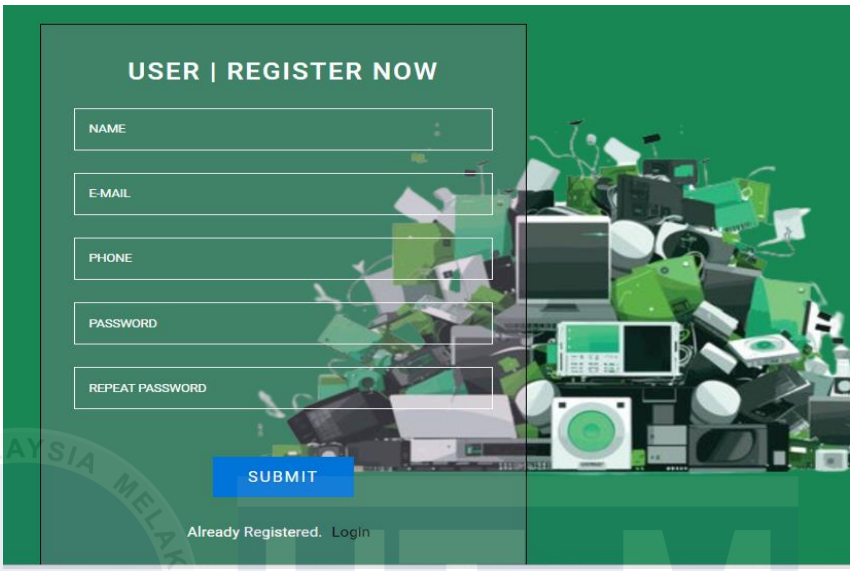


Figure 4.6 user register

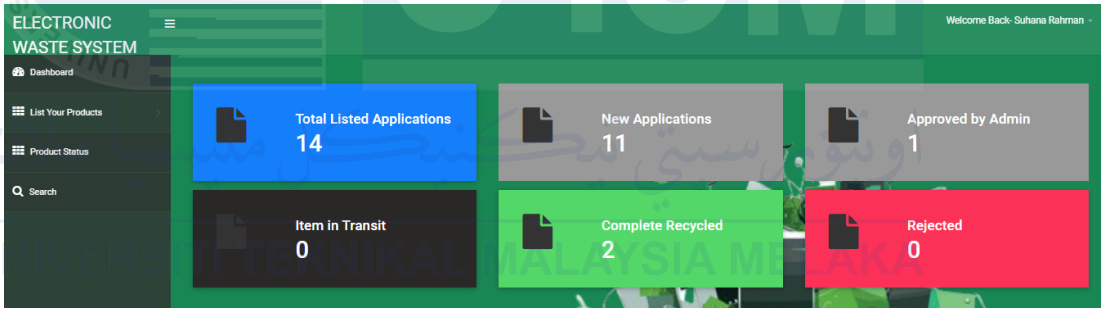


Figure 4.7 user dashboard

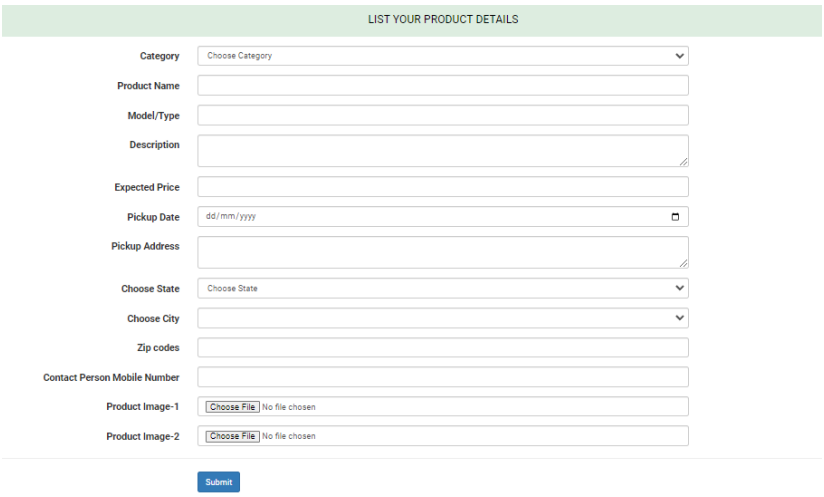
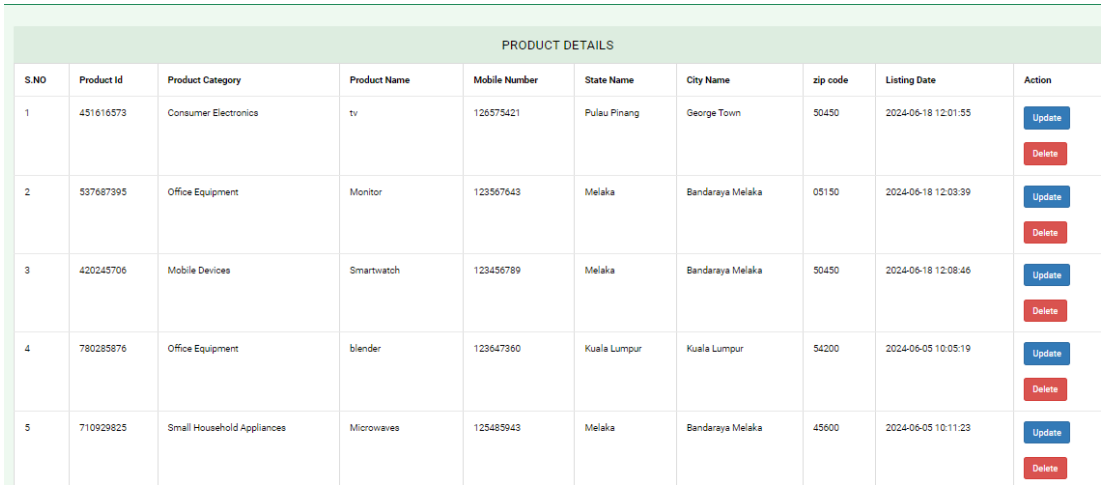


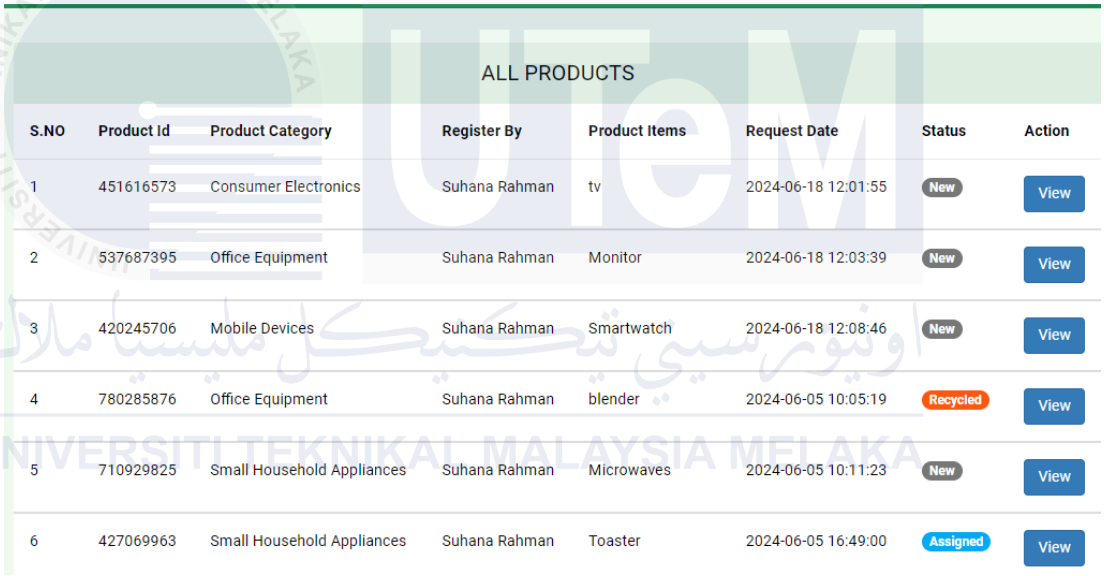
Figure 4.8 list product details



PRODUCT DETAILS

S.NO	Product Id	Product Category	Product Name	Mobile Number	State Name	City Name	zip code	Listing Date	Action
1	451616573	Consumer Electronics	tv	126575421	Pulau Pinang	George Town	50450	2024-06-18 12:01:55	Update Delete
2	537687395	Office Equipment	Monitor	123567643	Melaka	Bandaraya Melaka	05150	2024-06-18 12:03:39	Update Delete
3	420245706	Mobile Devices	Smartwatch	123456789	Melaka	Bandaraya Melaka	50450	2024-06-18 12:08:46	Update Delete
4	780285876	Office Equipment	blender	123647360	Kuala Lumpur	Kuala Lumpur	54200	2024-06-05 10:05:19	Update Delete
5	710929825	Small Household Appliances	Microwaves	125485943	Melaka	Bandaraya Melaka	45600	2024-06-05 10:11:23	Update Delete

figures 4.9 manage product



ALL PRODUCTS

S.NO	Product Id	Product Category	Register By	Product Items	Request Date	Status	Action
1	451616573	Consumer Electronics	Suhana Rahman	tv	2024-06-18 12:01:55	New	View
2	537687395	Office Equipment	Suhana Rahman	Monitor	2024-06-18 12:03:39	New	View
3	420245706	Mobile Devices	Suhana Rahman	Smartwatch	2024-06-18 12:08:46	New	View
4	780285876	Office Equipment	Suhana Rahman	blender	2024-06-05 10:05:19	Recycled	View
5	710929825	Small Household Appliances	Suhana Rahman	Microwaves	2024-06-05 10:11:23	New	View
6	427069963	Small Household Appliances	Suhana Rahman	Toaster	2024-06-05 16:49:00	Assigned	View

Figure 4.10 user listed product

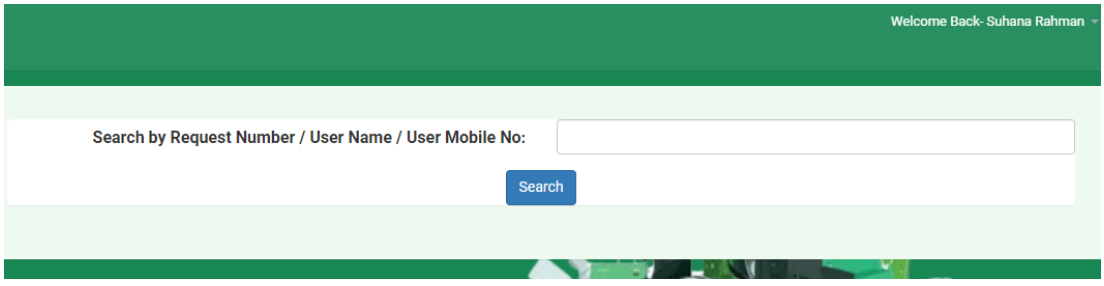


Figure 4.11 user search

Admin

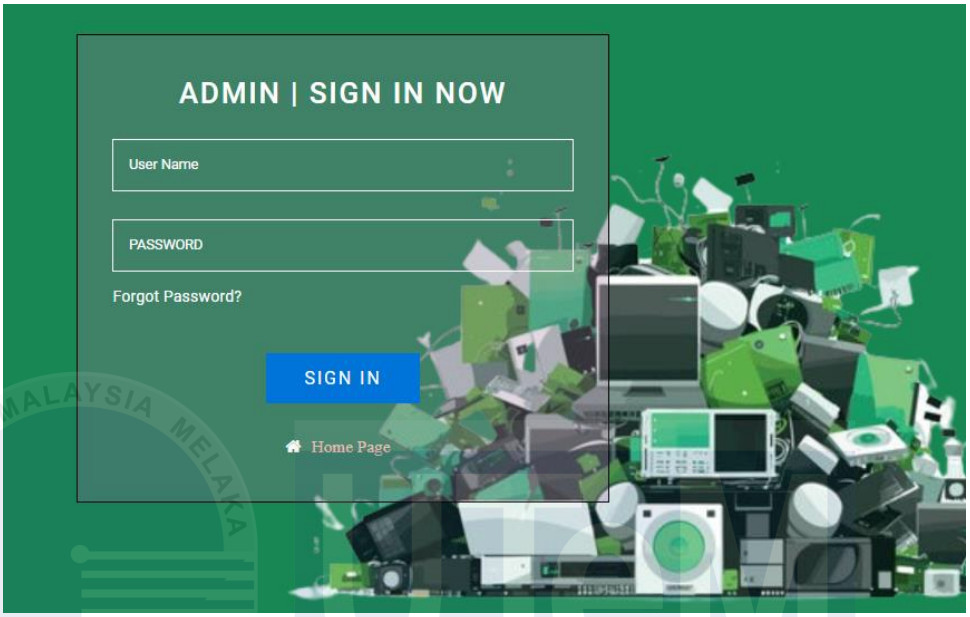


Figure 4.12 admin sign in

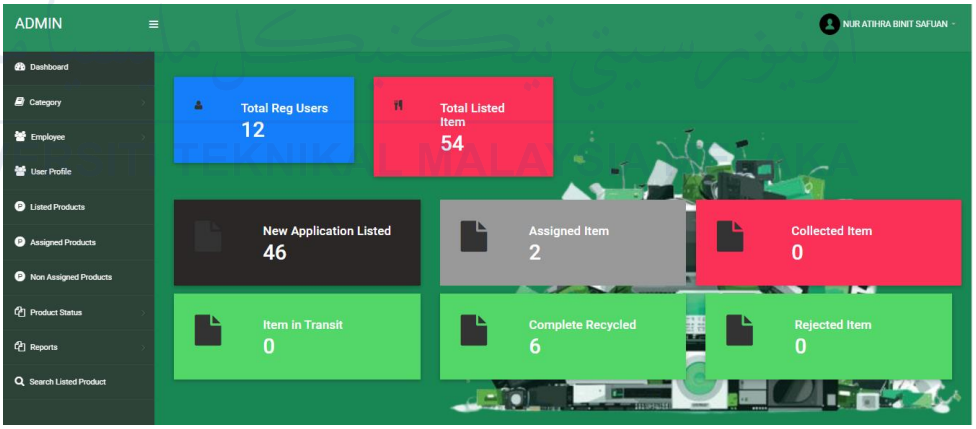


Figure 4.13 admin dashboard

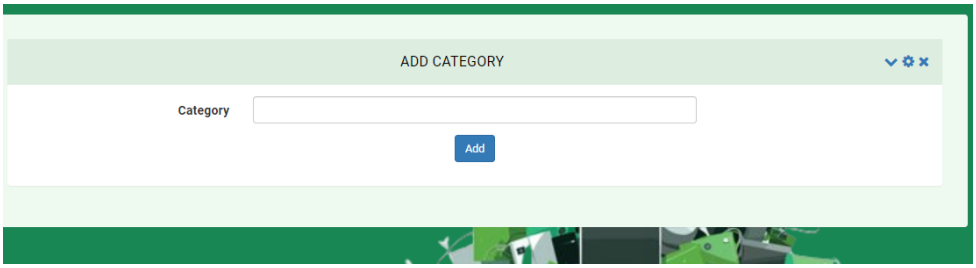
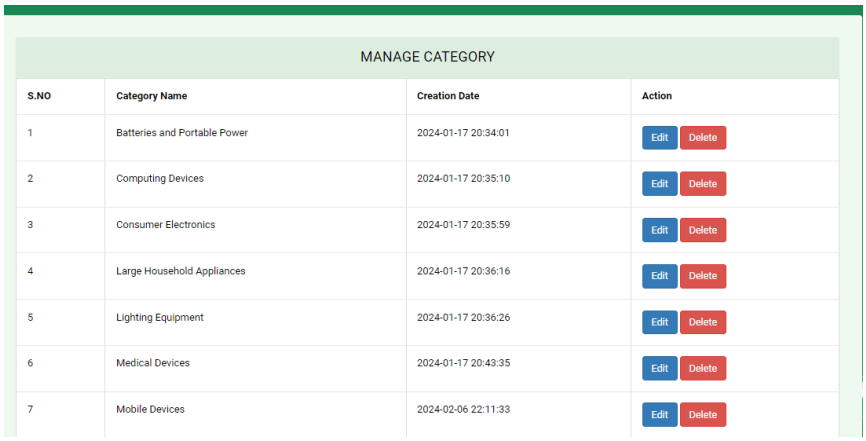


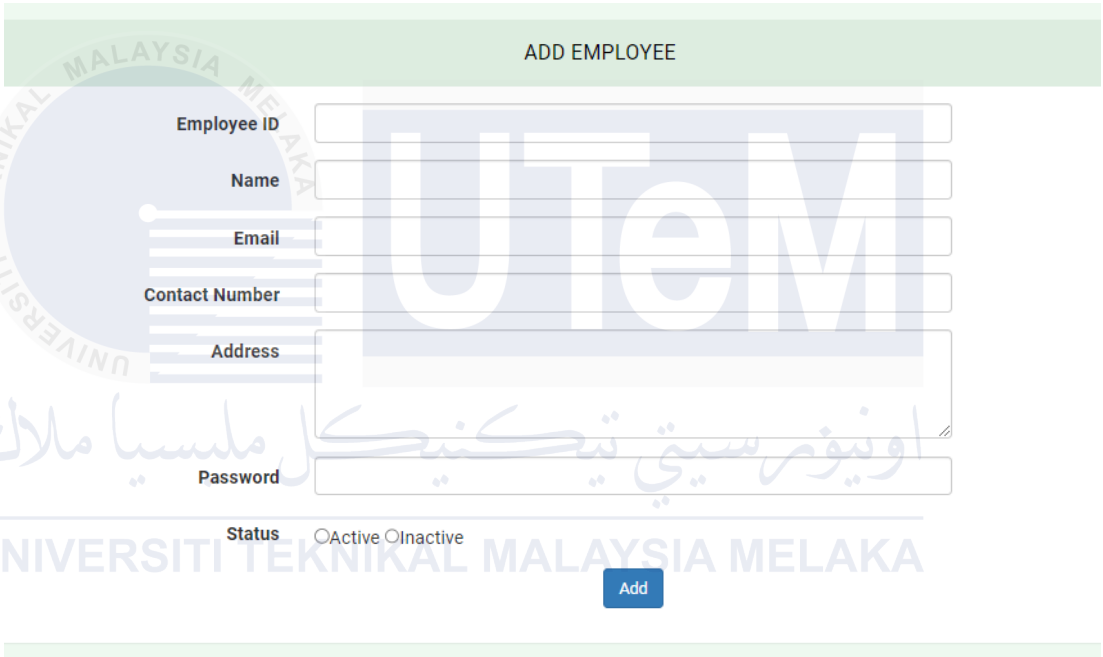
Figure 4.14 admin can add category



MANAGE CATEGORY

S.NO	Category Name	Creation Date	Action
1	Batteries and Portable Power	2024-01-17 20:34:01	Edit Delete
2	Computing Devices	2024-01-17 20:35:10	Edit Delete
3	Consumer Electronics	2024-01-17 20:35:59	Edit Delete
4	Large Household Appliances	2024-01-17 20:36:16	Edit Delete
5	Lighting Equipment	2024-01-17 20:36:26	Edit Delete
6	Medical Devices	2024-01-17 20:43:35	Edit Delete
7	Mobile Devices	2024-02-06 22:11:33	Edit Delete

Figure 4.15 admin manage category



ADD EMPLOYEE

Employee ID

Name

Email

Contact Number

Address

Password

Status ○Active ○Inactive

Add

Figure 4.16 admin can add staff

MANAGE EMPLOYEE

S.NO	Employee ID	Employee Name	Employee Email	Status	Joining Date	Action
1	E_260601	NURUL IZZATI NAJWA BINTI ANWAR	izzati@gmail.com	Active	2024-06-05 16:35:02	Edit Delete Assigned Products
2	E_120201	NOOR HANIM FAHIRA BINTI NOOR HISYAM	hanim@gmail.com	Active	2024-06-06 00:34:32	Edit Delete Assigned Products
3	E_030305	NUR ALEEYA NATASHA BINTI SAFUAN	aleeya@gmail.com	Active	2024-06-06 00:36:18	Edit Delete Assigned Products
4	E_170601	SITI NURUL NURHAFIZAH BINTI ROZAIMI	hafizah@gmail.com	Active	2024-06-06 00:38:45	Edit Delete Assigned Products

Figure 4.17 admin manage staff

REGISTERED USERS DETAILS

S.NO	Full Name	Mobile Number	Email	Registration Date	Listed Product
1	Arina	134738643	arina@gmail.com	2024-06-06 00:55:53	View
2	Nurul Azieyati Asyiqin	188445180	azieyati@gmail.com	2024-06-06 00:56:41	View
3	diaya aleeya	123456789	aleeya@gmail.com	2024-06-06 00:58:08	View
4	Ahmad Faris Aiman bin Roslan	137603120	fariss@gmail.com	2024-06-06 00:58:56	View
5	Muhammad Fikri bin Zulkifli	164836621	fikri@gmail.com	2024-06-06 00:59:42	View
6	Kurk Wei Yi	187219019	kurk@gmail.com	2024-06-06 01:00:28	View
7	Lim Kok Sing	183731811	lim@gmail.com	2024-06-06 01:01:01	View

Figure 4.18 admin can view user details

S.NO	Product Id	Product Category	Register By	Product Items	Request Date	Status	Action
1	553342008	Small Household Appliances	Arina	blender	2024-06-18 06:16:39	Recycled	View
2	836583969	Large Household Appliances	Arina	refrigerator	2024-06-18 06:20:20	New	View
3	645448758	Lighting Equipment	Arina	blub	2024-06-18 06:22:48	New	View
4	409322590	Large Household Appliances	Arina	washing machine	2024-06-18 06:26:21	New	View
5	897240165	Mobile Devices	Arina	Smartwatch	2024-06-18 06:28:08	New	View
6	147284500	Large Household Appliances	Nurul Azieyati Asyiqin	Air Conditioner	2024-06-18 11:22:14	New	View
7	146094950	Large Household Appliances	Nurul Azieyati Asyiqin	Microwave Oven	2024-06-18 11:27:51	New	View

Figure 4.19 admin view all product

ALL ASSIGNED PRODUCT

S.NO	Product Id	Product Category	Register By	Product Items	Request Date	Status	Action
1	553342008	Small Household Appliances	Arina	blender	2024-06-18 06:16:39	Recycled	View
2	780285874	Office Equipment	Ahmad Faris Aiman bin Roslan	blender	2024-06-05 10:05:19	Recycled	View
3	427069964	Small Household Appliances	Ahmad Faris Aiman bin Roslan	Toaster	2024-06-05 16:49:00	Assigned	View
4	407759466	Mobile Devices	Kurk Wei Yi	Smartwatch	2024-06-05 19:24:54	Recycled	View
5	553342005	Small Household Appliances	Lim Kok Sing	blender	2024-06-18 06:16:39	Recycled	View
6	780285876	Office Equipment	Suhana Rahman	blender	2024-06-05 10:05:19	Recycled	View
7	427069963	Small Household Appliances	Suhana Rahman	Toaster	2024-06-05 16:49:00	Assigned	View

Figure 4.20 admin view all assigned product

NON ASSIGNED PRODUCTS

S.NO	Product Id	Product Category	Register By	Product Items	Request Date	Status	Action
1	836583969	Large Household Appliances	Arina	refrigerator	2024-06-18 06:20:20	New	View
2	645448758	Lighting Equipment	Arina	blub	2024-06-18 06:22:48	New	View
3	409322590	Large Household Appliances	Arina	washing machine	2024-06-18 06:26:21	New	View
4	897240165	Mobile Devices	Arina	Smartwatch	2024-06-18 06:28:08	New	View
5	147284500	Large Household Appliances	Nurul Azieyati Asyiqin	Air Conditioner	2024-06-18 11:22:14	New	View
6	146094950	Large Household Appliances	Nurul Azieyati Asyiqin	Microwave Oven	2024-06-18 11:27:51	New	View
7	942469042	Computing Devices	Nurul Azieyati Asyiqin	Desktop Computer	2024-06-18 11:29:32	New	View

Figure 4.21 admin view all non assigned product

ALL ASSIGNED PRODUCTS

S.NO	Product Id	Product Category	Register By	Product Items	Request Date	Status	Action
1	427069964	Small Household Appliances	Ahmad Faris Aiman bin Roslan	Toaster	2024-06-05 16:49:00	Assigned	View
2	427069963	Small Household Appliances	Suhana Rahman	Toaster	2024-06-05 16:49:00	Assigned	View

Figure 4.22 admin view all assigned product

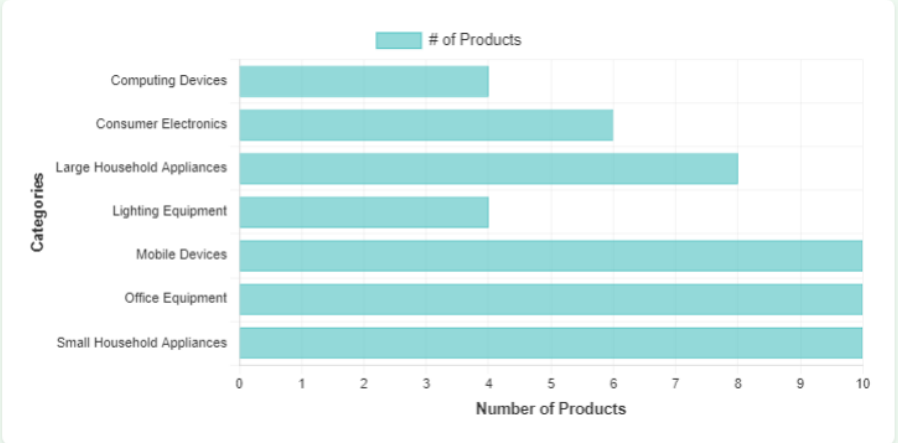


Figure 4.23 admin view report

Employee

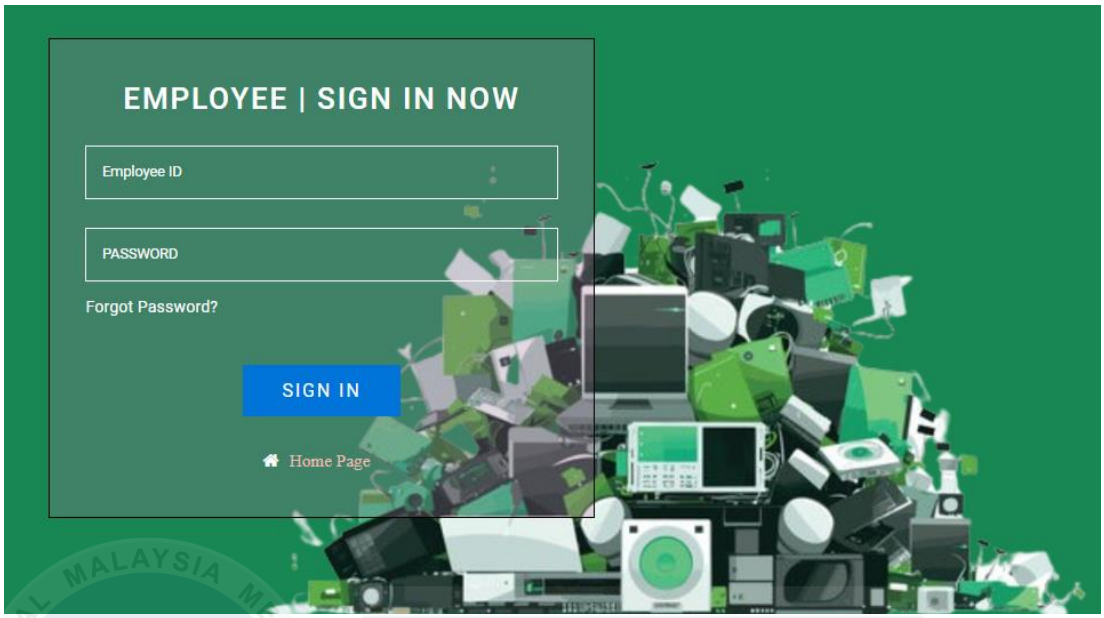


Figure 4.24 staff sign in

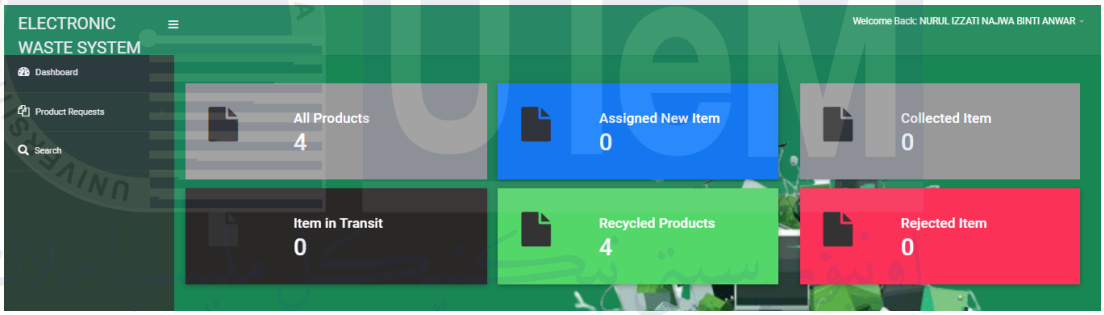
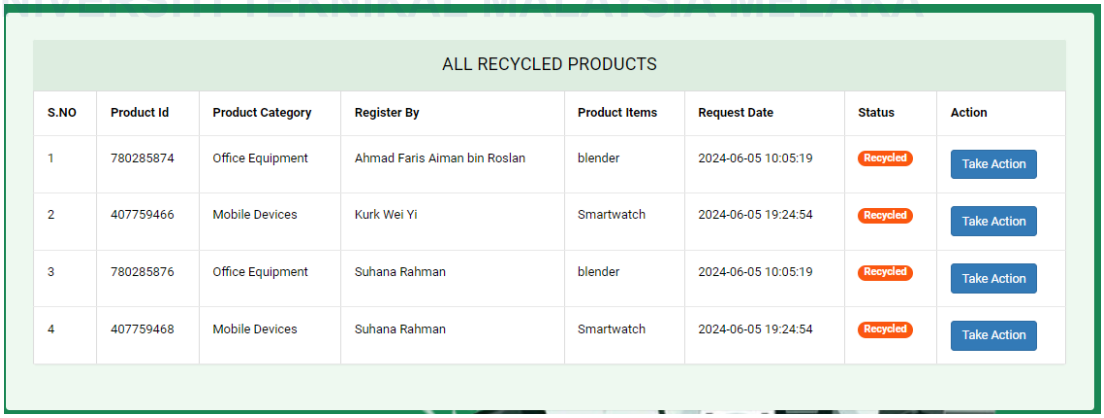


Figure 4.25 staff dashboard



ALL RECYCLED PRODUCTS

S.NO	Product Id	Product Category	Register By	Product Items	Request Date	Status	Action
1	780285874	Office Equipment	Ahmad Faris Aiman bin Roslan	blender	2024-06-05 10:05:19	Recycled	Take Action
2	407759466	Mobile Devices	Kurk Wei Yi	Smartwatch	2024-06-05 19:24:54	Recycled	Take Action
3	780285876	Office Equipment	Suhana Rahman	blender	2024-06-05 10:05:19	Recycled	Take Action
4	407759468	Mobile Devices	Suhana Rahman	Smartwatch	2024-06-05 19:24:54	Recycled	Take Action

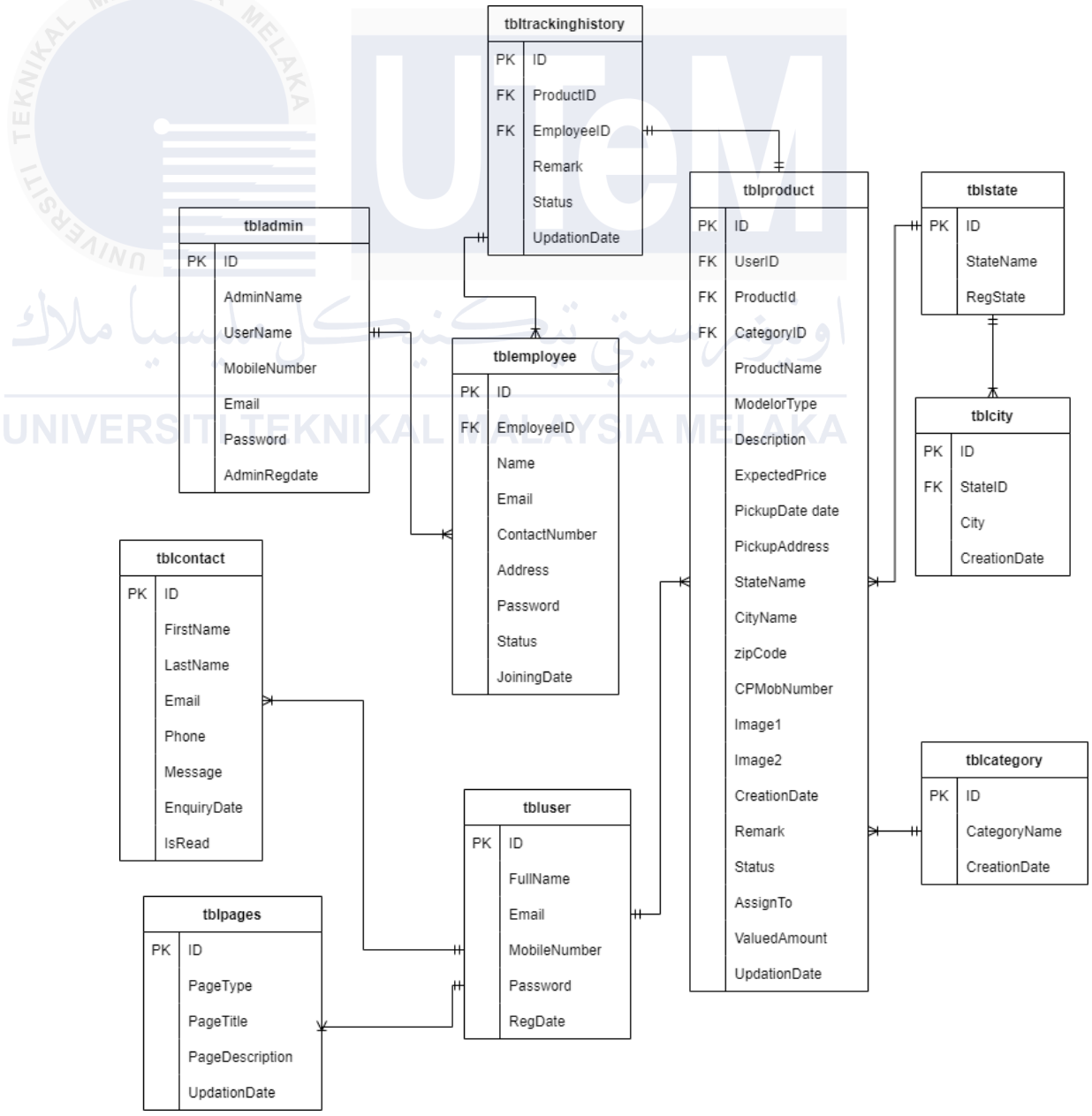
Figure 4.26 staff all recycled product

4.2.3 Database Design

4.2.3.1 Conceptual and Logical Database Design

The database design will discuss about the conceptual and logical design of the system database. Entity Relationship Diagram, business rules, and data dictionary will be included to further discuss the conceptual and logical design required to implement the project.

(a) Entity Relationship Diagram (ERD)



(b) Data Dictionary

Table: tbladmin

No.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	10	Yes	PK	Primary key
2	AdminName	varchar	120	No		Name of the admin
3	UserName	varchar	120	No		Username for the admin
4	MobileNumber	bigint	10	No		Admin's mobile number
5	Email	varchar	120	No		Admin's email address
6	Password	varchar	120	No		Admin's password
7	AdminRegdate	timestamp		No		Registration date of the admin

Table 4.1 : tbladmin

Table: tblcategory

No.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	11	Yes	PK	Primary key
2	CategoryName	varchar	250	No		Name of the category
3	CreationDate	timestamp		No		Date when the category was created

Table4.2: tblcategory

Table: tblcity

No.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	10	Yes	PK	Primary key
2	StateID	int	10	No	FK	Foreign key referencing tblstate
3	City	varchar	120	No		Name of the city
4	CreationDate	timestamp		No		Date when the city record was created

Table 4.3: tblcity

Table: tblcontact

No.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	10	Yes	PK	Primary key
2	FirstName	varchar	200	No		First name of the contact
3	LastName	varchar	200	No		Last name of the contact
4	Email	varchar	200	No		Email address of the contact
5	Phone	bigint	10	No		Phone number of the contact
6	Message	mediumtext		No		Message content from the contact
7	EnquiryDate	timestamp		Yes		Date of the enquiry
8	IsRead	int	5	No		Status indicating if the enquiry is read

Table 4.4: tblcontact

Table: tblemployee

No.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	10	Yes	PK	Primary key
2	EmployeeID	varchar	250	No		Unique employee ID
3	Name	varchar	250	No		Name of the employee
4	Email	varchar	255	No		Email address of the employee
5	ContactNumber	bigint	20	No		Contact number of the employee
6	Address	mediumtext		No		Address of the employee
7	Password	varchar	200	No		Password for the employee
8	Status	varchar	50	No		Employment status
9	JoiningDate	timestamp		No		Date when the employee joined

Table 4.5 : tblemployee

Table: tblpages

o.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	11	Yes	PK	Primary key
2	PageType	varchar	200	No		Type of the page
3	PageTitle	mediumtext		No		Title of the page
4	PageDescription	mediumtext		No		Description of the page
5	UpdationDate	timestamp		No		Last update date of the page

Table 4.6 : tblpages

Table: tblproduct

No.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	10	Yes	PK	Primary key
2	UserID	int	10	No	FK	Foreign key referencing tbluser
3	ProductId	int	10	No		ID of the product
4	CategoryID	int	10	No	FK	Foreign key referencing tblcategory
5	ProductName	varchar	255	No		Name of the product

6	ModelorType	varchar	255	No		Model or type of the product
7	Description	mediumtext		No		Description of the product
8	ExpectedPrice	decimal	10,0	No		Expected price for the product
9	PickupDate	date		No		Date of product pickup
10	PickupAddress	mediumtext		No		Address for product pickup
11	StateName	varchar	255	No		State name for pickup location
12	CityName	varchar	255	No		City name for pickup location
13	ContactPerson	varchar	255	No		Name of the contact person
14	CPMobNumber	bigint	20	No		Mobile number of the contact person
15	Image1	varchar	255	No		Image of the product (optional)
16	Image2	varchar	255	No		Additional image of

						the product (optional)
17	CreationDate	timestamp		No		Creation date of the product entry
18	Remark	varchar	250	No		Remark for the product
19	Status	varchar	250	No		Status of the product
20	AssignTo	varchar	250	No		Assigned person for the product
21	ValuedAmount	decimal	10,0	No		Valued amount of the product
22	UpdationDate	timestamp		No		Last update date of the product entry

Table 4.7 : tblproduct

Table: tblstate

o.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	10	Yes	PK	Primary key
2	StateName	varchar	120	No		Name of the state
3	RegState	timestamp		No		Registration date of the state

Table 4.8 : tblstate

Table: tbluser

No.	Name	Type of Data	Length	Required	PK/FK	Description
1	ID	int	10	Yes	PK	Primary key
2	FullName	varchar	120	No		Full name of the user
3	Email	varchar	200	No		Email address of the user
4	Password	varchar	120	No		Password for the user
5	MobileNumber	bigint	10	No		Mobile number of the user
6	Address	mediumtext		No		Address of the user
7	RegDate	timestamp		No		Registration date of the user

Table 4.9 : tbluser

Table structure for table `tbladmin`

```
CREATE TABLE `tbladmin` (
  `ID` int(10) NOT NULL,
  `AdminName` varchar(120) DEFAULT NULL,
  `UserName` varchar(120) DEFAULT NULL,
  `MobileNumber` bigint(10) DEFAULT NULL,
  `Email` varchar(120) DEFAULT NULL,
  `Password` varchar(120) DEFAULT NULL,
  `AdminRegdate` timestamp NULL DEFAULT current_timestamp()
)
```

Table structure for table `tblcategory`

```
CREATE TABLE `tblcategory` (
```

```
  `ID` int(11) NOT NULL,
  `CategoryName` varchar(250) DEFAULT NULL,
  `CreationDate` timestamp NULL DEFAULT current_timestamp()
)

 Table structure for table `tblcity`
CREATE TABLE `tblcity` (
  `ID` int(10) NOT NULL,
  `StateID` int(10) DEFAULT NULL,
  `City` varchar(120) DEFAULT NULL,
  `CreationDate` timestamp NULL DEFAULT current_timestamp()
)

 Table structure for table `tblcontact`
CREATE TABLE `tblcontact` (
  `ID` int(10) NOT NULL,
  `FirstName` varchar(200) DEFAULT NULL,
  `LastName` varchar(200) DEFAULT NULL,
  `Email` varchar(200) DEFAULT NULL,
  `Phone` bigint(10) DEFAULT NULL,
  `Message` mediumtext DEFAULT NULL,
  `EnquiryDate` timestamp NOT NULL DEFAULT current_timestamp(),
  `IsRead` int(5) DEFAULT NULL
)

 Table structure for table `tblemployee`
CREATE TABLE `tblemployee` (
  `ID` int(10) NOT NULL,
  `EmployeeID` varchar(250) DEFAULT NULL,
  `Name` varchar(250) DEFAULT NULL,
  `Email` varchar(255) DEFAULT NULL,
  `ContactNumber` bigint(20) DEFAULT NULL,
  `Address` mediumtext DEFAULT NULL,
  `Password` varchar(200) DEFAULT NULL,
```

```
  `Status` varchar(50) DEFAULT NULL,
  `JoiningDate` timestamp NULL DEFAULT current_timestamp()
)


 Table structure for table `tblpages`
CREATE TABLE `tblpages` (
  `ID` int(11) NOT NULL,
  `PageType` varchar(200) DEFAULT NULL,
  `PageTitle` mediumtext DEFAULT NULL,
  `PageDescription` mediumtext DEFAULT NULL,
  `UpdationDate` timestamp NULL DEFAULT NULL ON UPDATE
current_timestamp()
)

 Table structure for table `tblproduct`
CREATE TABLE `tblproduct` (
  `ID` int(10) NOT NULL,
  `UserID` int(10) DEFAULT NULL,
  `ProductId` int(10) DEFAULT NULL,
  `CategoryID` int(10) DEFAULT NULL,
  `ProductName` varchar(255) DEFAULT NULL,
  `ModelorType` varchar(255) DEFAULT NULL,
  `Description` mediumtext DEFAULT NULL,
  `ExpectedPrice` decimal(10,0) DEFAULT NULL,
  `PickupDate` date DEFAULT NULL,
  `PickupAddress` mediumtext DEFAULT NULL,
  `StateName` varchar(255) DEFAULT NULL,
  `CityName` varchar(255) DEFAULT NULL,
  `ContactPerson` varchar(255) DEFAULT NULL,
  `CPMobNumber` bigint(20) DEFAULT NULL,
  `Image1` varchar(255) DEFAULT NULL,
  `Image2` varchar(255) DEFAULT NULL,
  `CreationDate` timestamp NULL DEFAULT current_timestamp(),
```

```
  `Remark` varchar(250) DEFAULT NULL,
  `Status` varchar(250) DEFAULT NULL,
  `AssignTo` varchar(250) DEFAULT NULL,
  `ValuedAmount` decimal(10,0) DEFAULT NULL,
  `UpdationDate` timestamp NULL DEFAULT NULL ON UPDATE
current_timestamp()
)
 Table structure for table `tblstate`
CREATE TABLE `tblstate` (
  `ID` int(10) NOT NULL,
  `StateName` varchar(120) DEFAULT NULL,
  `RegState` timestamp NULL DEFAULT current_timestamp()
)

 Table structure for table `tbltrackinghistory`
CREATE TABLE `tbltrackinghistory` (
  `ID` int(10) NOT NULL,
  `ProductID` int(10) DEFAULT NULL,
  `EmployeeID` varchar(250) DEFAULT NULL,
  `Remark` varchar(250) DEFAULT NULL,
  `Status` varchar(250) DEFAULT NULL,
  `UpdationDate` timestamp NULL DEFAULT current_timestamp()
)

Table structure for table `tbluser`
CREATE TABLE `tbluser` (
  `ID` int(10) NOT NULL,
  `FullName` varchar(200) DEFAULT NULL,
  `Email` varchar(200) DEFAULT NULL,
  `MobileNumber` bigint(10) DEFAULT NULL,
  `Password` varchar(120) DEFAULT NULL,
  `RegDate` timestamp NULL DEFAULT current_timestamp()
)
```

CHAPTER 5: IMPLEMENTATION

5.1 Introduction

This chapter provides a comprehensive overview of the activities involved during the implementation phase of the Electronic Waste Management System (EWMS), as well as the expected outcomes following its completion. The chapter begins by outlining the prerequisites necessary for setting up the software development environment crucial for the project's success. It then delves into the details of managing the software project's configuration. The chapter further explores the continuous monitoring of implementation progress. Finally, it concludes with a discussion of the final stages of the implementation phase.

5.2 Software Development Environment Setup

The Software Development Environment Setup involves configuring the necessary tools, software, and resources to facilitate the efficient creation, testing, and maintenance of the EWMS application. This setup includes components such as integrated development environments (IDEs), version control systems, programming languages, testing frameworks, and collaboration tools. By establishing this environment, the development process is streamlined, quality assurance is maintained, and effective teamwork is encouraged—factors critical to the successful development of the EWMS.

1. XAMPP Control Panel v3.3.0

The XAMPP server is utilized to host the user, administrator, and other related modules of the EWMS on a local server. The XAMPP software package includes support for the Apache web server, PHP, MySQL database, and phpMyAdmin, providing an all-in-one solution for local development.

5.3 Software Configuration Management

5.3.1 Configuration Environment Setup

In the realm of Software Configuration Management (SCM), setting up the configuration environment for the EWMS involves creating a controlled and well-coordinated space for the development, testing, and deployment of the system. This setup includes various aspects such as implementing a version control system for managing the code, setting up different development environments for both individual and team efforts, automating builds and continuous integration, designing a structured deployment process, using configuration management tools, managing databases, creating a data recovery strategy, maintaining comprehensive documentation, and following a systematic change management process. This configuration ensures precision, consistency, and efficiency throughout the development cycle, enhancing collaboration, reducing errors, and speeding up the delivery of high-quality software.

5.3.2 Version Control Procedure

The Version Control Procedure within SCM for the EWMS includes systematically managing and tracking changes made to the system's codebase. This procedure establishes an organized, well-documented, and developer-friendly structure for handling various code versions, fostering collaboration and minimizing errors. Key steps in this process include choosing an appropriate version control system, setting up repositories for different components of the system, developing branching strategies, committing code changes, conducting code reviews, merging changes while testing for integration issues, tagging versions, documenting commits, resolving conflicts, maintaining updates, and ensuring backup via remote repositories. By following this procedure, the EWMS can effectively manage its codebase, facilitate collaboration among developers, and maintain a historical record of changes, ultimately ensuring smooth operations and the production of high-quality software.

5.4 Implementation Status

Table 5.4 shows the implementation status for each module of the project:

Table 5.4 Implementation status of modules

Module/Function	Description	Duration to complete (week)
Interface Design	Design and develop the user interface system	2
Database Design	Design and develop the database architecture	1
Admin Module	Develop the admin module (web application)	4
User Module	Develop the user module (web application)	5
Disposal Module	Develop the employee module (web application)	5

5.5 Conclusion

In conclusion, effective version control and configuration management are essential for maintaining the stability and functionality of the EWMS during both testing and the implementation of new features. By carefully managing the configuration environment, developers can avoid unexpected errors when deploying the software across different devices and similar environments. The following chapter will discuss system testing, covering aspects such as test planning, test strategy, test design, and the analysis of test outcomes.

CHAPTER 6: TESTING

6.1 Introduction

Software testing is crucial to ensure the quality and reliability of the EWMS by verifying and validating its features throughout development. This chapter will detail the system testing process for the EWMS, with a particular focus on involving target users in the testing process to assess their respective roles within the system. The testing phase is divided into six key areas: unit testing, integration testing, functional testing, system testing, acceptance testing, and regression testing. To thoroughly evaluate the system, a combination of white-box and black-box testing methods will be utilized in the testing strategy.

6.2 Test Plan

6.2.1 Test Organization

he test organization for the EWMS comprises a team responsible for executing various tests. The team includes the software developer Nur Atihra and the project supervisor, Dr. Ummi.

To ensure comprehensive testing, specific users are assigned to evaluate the functions related to the modules they frequently interact with. For example, administrators will assess the user management functions, including user authentication and managing roles.

End users, such as e-waste collectors and disposal facility managers, will focus on testing modules related to managing e-waste collection requests, processing disposal orders, and generating reports on e-waste management activities.

The software developer, Nur Atihra is responsible for conducting thorough testing of the entire system, documenting any errors and results encountered by testers, particularly when the system fails to perform as expected. The project supervisor, Dr,. Ummi provides essential feedback and suggests improvements for specific modules to enhance the overall quality of the project.

6.2.2 Test Environment

The test environment for the EWMS is a locally hosted web development setup on the developer's personal computer. This environment typically consists of a web server (such as Apache or Nginx), a database system (like MySQL or PostgreSQL), and scripting languages (e.g., PHP, Python, or JavaScript). This setup enables the developer to create, test, and debug the EWMS web application locally before deploying it to a production server.

Users interact with the EWMS through a web browser, with the web server processing requests and the database storing and retrieving data as needed. This local test environment offers a controlled and secure space for development and testing, minimizing the risk of issues arising in the live production environment.

6.2.3 Test Schedule

There are a total of five task required in the testing phase. The following table below will describe each task and duration of to complete for each task.

Table 6.2.3 Test Schedule

Testing Task	Description	Duration(days)	Start Date	End Date
Unit Testing	Testing on the smallest testable parts of the system	8	16/7/2024	23/7/2024
Integrating Testing	Testing on integration of	9	25/7/2024	2/8/2024

	several modules			
Functional Testing	Testing based on test cases designed	11	5/8/2024	16/8/2024
Acceptance Testing	Testing based on the requirements	5	17/8/2024	21/8/2024
Regression testing	Testing for modules that have new updates or feature to ensure system runs smothly	5	22/8/2024	26/8/2024

6.3 Test Strategy

In the context of the Electronic Waste Management System (EWMS), the test strategy incorporates both white-box and black-box testing methodologies to ensure comprehensive evaluation of the system's performance and functionality.

White-box testing is a technique used to evaluate the internal functionalities of the EWMS. This method is typically conducted by software developers who have in-depth knowledge of the system's architecture and code. White-box testing is employed during several phases of the testing process, including unit testing, integration testing, and regression testing, to ensure that the internal operations of the EWMS are functioning as expected.

Black-box testing, on the other hand, focuses on testing the EWMS based on its external behaviors and outputs. This method does not require any understanding of the system's internal code, making it accessible to a broader range of testers, including end-users and non-developers. Black-box testing is applied in various phases of the

testing process, such as functional testing, system testing, and acceptance testing, to validate that the system performs correctly according to its specifications without needing to inspect the underlying code.

6.3.1 Classes of Tests

For the EWMS, two primary classes of tests are utilized, as outlined in the test strategy section (6.1): **Black-box testing** and **White-box testing**. The testing descriptions for both classes are provided below in Tables 6.2 and 6.3.

1. White-box Testing Class

Table 6.3.1 Classes of test (White box)

White box testing	Description
Performance	The website should load and display the requested content within 10 seconds after a user clicks or selects a button. This performance benchmark ensures a responsive and user-friendly experience, minimizing delays that could frustrate users.
Internet connectivity	The web application can only be accessed with an active internet connection. This ensures that users can interact with the live database and utilize all the functionalities of the EWMS in real-time.
Data integrity	All data displayed in the web application must accurately reflect the data stored in the MySQL database. This ensures consistency and reliability of the information, preventing

	discrepancies between what users see and the actual data.

2. Black-box Testing Class

Table 6.3.1.2 Classes of test (Black box)

BlackBox Testing (Funtional)	Description
Interface	The user interface of the EWMS must be fully responsive and compatible across all major web browsers, including Microsoft Edge, Firefox, Google Chrome, and others. This ensures a consistent and seamless user experience, regardless of the browser used.
Regression	After implementing any new features or updates to the EWMS, all related functions must be thoroughly tested to ensure that existing functionalities continue to operate without errors. This helps maintain the system's stability and reliability.
Output of correctness	The system must correctly process the input data provided by users, resulting in accurate and expected output. This ensures that the data returned by the EWMS meets user expectations and is reliable for decision-making.

6.4 Test Design

6.4.1 Test Description

This section details the test case identification, description, and the expected result. The test cases are based on each of the modules within the system.

1. Test Cases for Admin

Table 6.4 Admin user test cases

Module	Test Case ID	Description	Expected Result
Login	AEW_1.1	To validate that the user can log in with the correct admin ID and password	The user successfully logs in.
	AEW_1.2	To validate that the user login fails with an incorrect admin ID	The system denies access and displays an error message 'Invalid Details.'
	AEW_1.3	To validate that the user login fails with an incorrect password.	The system denies access and displays an error message' Invalid Details.'
	AEW_1.4	To validate that the user reset password	The user can reset the password and regain access.
	AEW_1.5	To validate that the system logs the user out after a password change.	The user is required to log in again with the new password
Manage User/Customer	AEW_2.1	Validate that the admin can view	User profile displays all

		detailed user profiles	relevant information like Full Name, Mobile Number, Email and Registration Date
	AEW_2.2	Validate that the admin can view user e-waste submission history.	Display a history of e-waste submissions.
	AEW_2.3	Validate that the admin can view the user activity log.	User activity log displays accurate records of user actions.
	AEW_2.4	Validate that the admin can search for users by username or email	Search results display the correct user(s) matching the search criteria.
Manage Employee	AEW_3.1	Validate that the admin can create a new employee account	New employee account is successfully created and appears in the employee list.
	AEW_3.2	Validate that the admin can edit an existing employee's information	Employee information is successfully updated in the database and reflected in the system

	AEW_3.3	Validate that the admin can delete an employee account	Employee account is successfully deleted and no longer appears in the employee list
	AEW_3.4	Validate that the admin can deactivate an employee account.	Employee account is deactivated and the employee cannot log in
	AEW_3.5	Validate that the admin can reactivate a deactivated employee account.	Employee account is reactivated and the employee can log in again.
	AEW_3.6	Validate that the admin can view detailed employee profiles, including task assignments and performance history.	Employee profile displays all relevant information, including assigned tasks and performance records.
	AEW_3.7	Validate that the admin can assign an employee to handle a customer's form.	Employee is successfully assigned, and the assignment is reflected in the employee's task list.
Manage product	AEW_4.1	Validate that the admin can create a new category of	New category is successfully created and

		electronic products.	appears in the category list.
	AEW_4.2	Validate that the admin can manage (edit or delete) existing categories of electronic products.	Category updates or deletions are successfully reflected in the category list.
	AEW_4.3	Validate that the admin can view the total number of listed items.	Total listed items are accurately displayed.
	AEW_4.4	alidate that the admin can view new applications listed for product disposal.	New applications are displayed in the application management section.
	AEW_4.5	Validate that the admin can view assigned items for collection.	Assigned items are correctly listed in the admin's view.
	AEW_4.6	Validate that the admin can view collected items.	Collected items are correctly displayed in the collected items list.
	AEW_4.7	Validate that the admin can view items that are in transit.	Items in transit are correctly listed in the admin's view.
	AEW_4.8	Validate that the admin can view rejected items.	Rejected items are accurately listed in

			the rejected items section.
	AEW_4.9	Validate that the admin can view the report of products.	Product report is correctly generated and visible to the admin.
	AEW_4.10	Validate that the admin can search for listed products.	Search results correctly display matching products.
	AEW_4.11	Validate that the admin can search for users.	Search results correctly display matching users.
Admin profile	AEW_5.1	Validate that the admin can view edit their profile.	Admin profile details are accurately displayed.
Change password	AEW_6.1	Validate that the admin can change their password.	Password is successfully changed and admin can log in with the new password.
Logout	AEW_7.1	To validate that the admin can logout of the system	The admin will be logout and redirect to the login screen.

2. Test Cases for Employee

Table 6.5 Employee user test cases

Module	Tes Case ID	Description	Expected Result
Login	EEW_1.1	Validate that an employee can log in with their Employee ID and password.	Employee successfully logs in with valid credentials.
	EEW_1.2	Validate that an employee receives an error message with invalid Employee ID or password.	Error message is ‘Invalid Details.’
	EEW_1.3	Validate that an employee can reset their password by clicking the "Forgot Password" link.	Password reset process is initiated successfully.
	EEW_1.4	Validate that an employee can sign in again after resetting their password.	Employee successfully logs in with the new password
	EEW_1.5	Validate that an employee can change their password from the change password.	Password is successfully changed from profile settings.
	EEW_1.6	Validate that an employee can update their contact	Contact information is successfully updated in the profile.

		information from their profile.	
	EEW_1.7	Validate that an employee receives a notification when a new request comes in	Notification is received by the employee for new requests.
Manage Product	EEW_2.1	Validate that an employee can view all products assigned to them.	Assigned products are listed and viewable by the employee.
	EEW_2.2	Validate that an employee can view all collected items that have been updated.	Collected items are listed and viewable by the employee.
	EEW_2.3	Validate that an employee can view all items in transit that have been updated.	Items in transit are listed and viewable by the employee.
	EEW_2.4	Validate that an employee can view all recycled products that have been updated.	Recycled products are listed and viewable by the employee.
	EEW_2.5	Validate that an employee can view all rejected items that have been updated.	Rejected items are listed and viewable by the employee.
	EEW_2.6	Validate that an employee can	Price list is accessible and

		access the price list for reference on the minimum and maximum prices of items to be recycled.	displays accurate price information.
	EEW_2.7	Validate that an employee can search by Request Number.	Search results accurately display items matching the Request Number.
	EEW_2.8	Validate that an employee can search by User Name.	Search results accurately display items matching the User Name.
	EEW_2.9	Validate that an employee can search by User Mobile Number.	Search results accurately display items matching the User Mobile Number.
Logout	EEW_3.1	To validate that the employee can logout of the system	The employee will be logout and redirect to the login screen.

3. Test Cases for Student

Table 6.6 Student user test cases

Module	Tes Case ID	Description	Expected Result
Login	UEW_1.1	Validate that a customer can log in with their email and password.	Customer successfully logs in with valid credentials.

	UEW_1.2	Validate that a customer can sign up if they don't have an account.	Customer successfully creates a new account.
	UEW_1.3	Validate that a customer can reset their password by clicking the "Forgot Password" link.	Password reset process is initiated successfully.
	UEW_1.4	Validate that a customer can sign in again after resetting their password.	Customer successfully logs in with the new password.
	UEW_1.5	Validate that a customer can view their profile after logging in.	Customer profile is accessible and displays correct information.
	UEW_1.6	Validate that a customer can change their password from the profile settings.	Password is successfully changed from profile settings.
Manage product	UEW_2.1	Validate that a customer receives a notification when the product status is updated.	Notification is received by the customer for product status update.
	UEW_2.2	Validate that a customer can add a	New product application is successfully added.

		new product application.	
	UEW_2.3	Validate that a customer can manage their products by editing or deleting the form.	Products can be edited or deleted successfully.
	UEW_2.4	Validate that a customer can view their tracking history.	Tracking history is displayed accurately for the customer.
	UEW_2.5	Validate that a customer can view the status of their products.	Product status is displayed accurately for the customer.
	UEW_2.6	Validate that a customer can view the total number of listed products.	Total listed products are displayed correctly.
	UEW_2.7	Validate that a customer can view new products listed.	New products are displayed correctly to the customer.
	UEW_2.8	Validate that a customer can view assigned product requests.	Assigned product requests are displayed correctly.
	UEW_2.9	Validate that a customer can view products sent for recycling.	Products sent for recycling are displayed correctly.

	UEW_2.10	Validate that a customer can view recycled products.	Recycled products are displayed correctly.
	UEW_2.11	Validate that a customer can view rejected products.	Rejected products are displayed correctly.
Logout	UEW_2.12	To validate that the emploee can logout of the system	The admin will be logout and redirect to the login screen.

6.4.2 Test Data

This section discuss what are the inputs used for testing for the test cases.

1. Test Case for Admin

Table 6.7 Test Data for Admin test case

Test Case ID	Precondition	Test Data	Step/Flow
AEW_1.1	Open Electronic waste management system Admin website	Username : A_290901 Password : Atihra299	1. Enter the given admin id and password Click “SIGN IN” button
AEW_1.2		username: A_290900 Password: Atihra299	
AEW_1.3		username: A_290901 Password: ATIHRA299	
AEW_1.4	Open Electronic waste management system Admin website	Email : tihrasafuan29@gmail.com Phone Number: 0133456186	1. Click “Forgot Password” 2. Enter the given email and phone number 3. Click “RESET”
AEW_2.1		No input	

AEW_2.2 AEW_2.3	Admin logged into website		Click “User Profile” to view all user profile , submission history and log activity
AEW_2.4	Admin logged into website	Search by Request Number / User Name / User Mobile No: arina	1. Click the search page 2. select the Number or User Name or User Mobile No that want to search 3. the list will be shown
AEW_3.1	Admin logged into website	Employee ID : E_260601 Name :NURUL IZZATI Email : izzati@gmail.com Contact Number : 0133457425 Address : KUALA LUMPER (ZON TENGAH) Password : Izzati2606 Status : active	1. Enter the given details 2. click “Add” button
AEW_3.2 AEW_3.3 AEW_3.4	Admin logged into website	No input	1. Click “Employee” 2. Click “Manage Employee” 3. Click “Edit” for edit profile employee

			4. Click “Delete” for delete employee account
AEW_3.5	Admin logged into website	Assign To : NURUL IZZATI NAJWA BINTI ANWAR (E_260601(KUALA LUMPUR (ZONE TENGAH) Remark : check	1. click “NON ASSIGNED PRODUCTS” 2. click “view” button 3. Enter the given details 4. Click “Update” button
AEW_4.1	Admin logged into website	Category : Gaming	1. Click “Category” 2. click “Add Category ” 3. Enter the given details 4. click “Add” button
AEW_4.2	Admin logged into website	No input	1. Click “Category” 2. click “Manage Category ” 3. Click “Edit” button for edit Category 4. Click “Delete” button for Delete Category

AEW_4.3 AEW_4.4 AEW_4.5 AEW_4.6 AEW_4.7 AEW_4.8	Admin logged into website	No input	1. click “product status” to view all information about product status
AEW_4.9	Admin logged into website	No input	1. Click “Report” to view all product report
AEW_5.1	Admin logged into website	Current Password:Atihra299 New Password:Atihra2909 Confirm Password:Atihra2909	1. Click “change password” 2. Enter the given details 3. click button “Change”
AEW_6.1		No input	Click “Logout” button

2. Test Case for Employee

Table 6.8 Test Data for Employee test case

Test Case ID	Precondition	Test Data	Step/Flow
EEW_1.1	Open Electronic waste management system Employee website	Username : E_260601 Password : Izzati2606	1. Enter the given username and password 2.Click “SIGN IN” button
EEW_1.2		Username : 260601 Password : izzati2606	
EEW_1.3	Open Electronic waste	Email : izzati@gmail.com	1. Click “Forgot Password”

	management system Employee website	Phone Number: 0111510500	2. Enter the given email and phone number 3. Click “RESET”
EEW_1.4		New password : Izzati266 Confirm your password :Izzati266	1. Enter the given email and phone number 2. Click “RESET”
EEW_1.5	Employee logged into website	Current Password: izzati2606 New Password: Izzati266 Confirm Password: Izzati266	1. Click “change password” 2. Enter the given details 3.Click button “Change”
EEW_1.6	Employee logged into website	No input	1. Click notification icon to view all new request
EEW_2.1	Employee logged into website	No input	1. Click “product request” for view all data fr product
EEW_2.2			
EEW_2.3			
EEW_2.4			
EEW_2.5			
EEW_2.6	Employee logged into website	No input	1. Click “listed product” to view all list price
EEW_2.7	Employee logged into website	Search by Request Number / Use Name / User	1. Click the search page

		Mobile No: 938572401	2. select the Number or User Name or User Mobile No that want to search 3. the list will be shown
EEW_2.8		Search by Request Number / Use Name / User Mobile No: arina	
EEW_2.9		Search by Request Number / Use Name / User Mobile No: 0123456789	
EEW_3.1		No input	Click "Logout" button

3. Test Case for Customer

Table 6.9 Test Data for Customer test case

Test Case ID	Precondition	Test Data	Step/Flow
UEW_1.1	Open Electronic waste management system Customer website	Email : arina@gmail.com Password : Arina1234	1. Enter the given username and password 2. Click "SIGN IN" button
UEW_1.2	Open Electronic waste management	Name : erina natasha E-mail : erina@gmail.com	1. click "Create an account" 2. Enter the given details

	system Customer website	Phone : 01254676942 Password : Erina06 Repeat Password : Erina06	3. Click “Submit”
UEW_1.3	Open Electronic waste management system Customer website	Email : erina@gmail.com Phone Number: 01254676942	1. Click “Forgot Password” 2. Enter the given email and phone number 3. Click “RESET”
UEW_1.4	Customer logged into website	No input	1. Click “Profile”
UEW_1.5	Customer logged into website	Current Password: Erina06 New Password: ErinaNatasha06 Confirm Password: ErinaNatasha06	1. Click “change password” 2. Enter the given details 3.Click button “Change”
UEW_2.1	Customer logged into website	No input	1. Click notification icon to view all new request
UEW_2.2	Customer logged into website	Category : Mobile devices Product Name : tablet Model/Type : samsung	1. Click “List Your product” 2. Click “Add product” 3. Enter the given details

		Description : rosak Expected Price : 150 Pickup Date : 29/8/2024 Pickup Address : taman laksamana Choose State : Kuala Lumpur Choose City : Kuala Lumpur Contact Person : erina Contact Person Mobile Number : 01254676942 Product Image-1 Product Image-2	4.click button “Submit”
UEW_2.3	Customer logged into website	Category : Mobile devices Product Name : tablet Model/Type : samsung Description : rosak Expected Price : 180	1. Click “List Your product” 2. Click “Manage product” 3. Enter the given details 4.click button “Update”

		Pickup Date : 29/8/2024 Pickup Address : taman laksamana Choose State : Kuala Lumpur Choose City : Kuala Lumpur Contact Person : erina Contact Person Mobile Number : 01254676942 Product Image-1 Product Image-2	
UEW_2.4	Customer logged into website	No input	1. Click “Product status” 2. Click “view” to view tracking history
UEW_2.5	Customer logged into website	No input	1. Click”Product status “ to view all data
UEW_2.6			
UEW_2.7			
UEW_2.8			
UEW_2.9			
UEW_2.10			

UEW_2.11			
UEW_3.1		No input	Click “Logout” button

6.5 Test Result and Analysis

Based on the test description in the previous section, the following table shows the test result for all of the test cases.

1. Test Result for Admin Test Case

Table 6.10 Test Result for Admin test case

Test Case ID	Actual Result	Success (S) / Fail (F)	Explanation
EW_1.1	User successfully logs in.	S	User successfully logged in.
AEW_1.2	System denies access and displays "Invalid Details."	F	System displayed a different error message: "Account not found."
AEW_1.3	System denies access and displays "Invalid Details."	S	System correctly denied access and displayed "Invalid Details."
AEW_1.4	User can reset the password and regain access.	S	Password reset was successful, and user regained access.
AEW_1.5	User is required to log in again with the new password.	S	System logged the user out, requiring re-login with the new password.

AEW_2.1	User profile displays all relevant information.	S	User profile displayed correct information.
AEW_2.2	Display a history of e-waste submissions.	S	E-waste submission history displayed correctly.
AEW_2.3	User activity log displays accurate records of user actions.	S	User activity log was accurate and up-to-date.
AEW_2.4	Search results display the correct user(s) matching the search criteria.	S	Search returned accurate results.
AEW_3.1	New employee account is successfully created.	S	New employee account created successfully.
AEW_3.2	Employee information is successfully updated in the database.	S	Employee information was updated correctly.
AEW_3.3	Employee account is successfully deleted.	S	Employee account deleted and removed from the list.
AEW_3.4	Employee account is deactivated, and the employee cannot log in.	S	Employee account was deactivated as expected.

AEW_3.5	Employee account is reactivated, and the employee can log in again.	S	Employee account reactivated successfully.
AEW_3.6	Employee profile displays all relevant information, including tasks.	S	Employee profile showed all relevant details.
AEW_3.7	Employee is successfully assigned, and the task is reflected.	S	Task assignment was successful and reflected in the system.
AEW_4.1	New category is successfully created and appears in the category list.	S	New category created and displayed correctly.
AEW_4.2	Category updates or deletions are successfully reflected in the list.	S	Category management functioned as expected.
AEW_4.3	Total listed items are accurately displayed.	S	Total number of items was displayed correctly.
AEW_4.4	New applications are displayed in the application management section.	S	New applications appeared correctly.
AEW_4.5	Assigned items are correctly listed in the admin's view.	S	Assigned items were listed as expected.

AEW_4.6	Collected items are correctly displayed in the collected items list.	S	Collected items were displayed correctly.
AEW_4.7	Items in transit are correctly listed in the admin's view.	S	Items in transit were listed correctly.
AEW_4.8	Rejected items are accurately listed in the rejected items section.	S	Rejected items appeared correctly in the list.
AEW_4.9	Product report is correctly generated and visible to the admin.	S	Product report was generated and displayed correctly.
AEW_4.10	Search results correctly display matching products.	S	Product search functioned as expected.
AEW_4.11	Search results correctly display matching users.	S	User search functioned as expected.
AEW_5.1	Admin profile details are accurately displayed.	S	Admin profile was displayed correctly.
AEW_6.1	Password is successfully changed, and the admin can log in with the new password.	S	Password was changed successfully, and login was smooth.

AEW_7.1	Admin is logged out and redirected to the login screen.	S	Admin successfully logged out and was redirected.

2. Test Result for Employee Test Case

Table 6.11 Test Result for Employee test case

Test Case ID	Actual Result	Success (S) / Fail (F)	Explanation
EEW_1.1	Employee successfully logs in with valid credentials.	S	Employee successfully logged in.
EEW_1.2	Error message is "Invalid Details."	S	System displayed the correct error message.
EEW_1.3	Password reset process is initiated successfully.	S	Password reset was initiated and completed successfully.
EEW_1.4	Employee successfully logs in with the new password.	S	Employee logged in with the new password successfully.
EEW_1.5	Password is successfully changed from profile settings.	S	Password change was successful via profile settings.
EEW_1.6	Contact information is successfully updated in the profile.	S	Contact information was updated correctly.

EEW_1.7	Notification is received by the employee for new requests.	S	Employee received notification as expected.
EEW_2.1	Assigned products are listed and viewable by the employee.	S	Assigned products were correctly listed.
EEW_2.2	Collected items are listed and viewable by the employee.	S	Collected items were listed as expected.
EEW_2.3	Items in transit are listed and viewable by the employee.	S	Items in transit were listed correctly.
EEW_2.4	Recycled products are listed and viewable by the employee.	S	Recycled products were displayed correctly.
EEW_2.5	Rejected items are listed and viewable by the employee.	S	Rejected items appeared correctly in the list.
EEW_2.6	Price list is accessible and displays accurate price information.	S	Price list was accessible and accurate.
EEW_2.7	Search results correctly display matching products.	S	Product search returned accurate results.
EEW_3.1	Employee profile is successfully updated.	S	Employee profile was updated successfully.

EEW_4.1	Employee is logged out and redirected to the login screen.	S	Employee logged out and was redirected as expected.

3. Test Result for Customer Test Case

Table 6.12 Test Result for Customer test case

Test Case ID	Actual Result	Success (S) / Fail (F)	Success (S) / Fail (F)
UEW_1.1	User successfully logged in with the provided credentials.	S	The customer was able to log in with the given email and password, as expected.
UEW_1.2	New account was created successfully with the provided details.	S	The system correctly processed the account creation request with the given details.
UEW_1.3	Password reset process was initiated successfully.	S	The system accepted the email and phone number and initiated the password reset process.
UEW_1.4	Profile page was accessed successfully after login.	S	The customer was able to access their profile page after logging in.

UEW_1.5	Password changed successfully with the new details.	S	The system successfully updated the password with the new details provided.
UEW_1.6	Contact information updated successfully.	S	The system correctly updated the contact information as requested.
UEW_2.1	Notifications were accessed and displayed correctly.	S	The customer was able to view notifications for new requests as expected.
UEW_2.2	Product listing was successful with all details submitted correctly.	S	The customer was able to list their product with all required details and submit it without issues.
UEW_2.3	Product update was successful with new details applied.	S	The customer was able to update their product listing with new details successfully.
UEW_2.4	Tracking history was viewed successfully.	S	The customer was able to view the tracking history of their product as expected.

UEW_2.5	All product data was viewed correctly through "Product status."	S	The customer was able to view all product data accurately through the "Product status" feature.
UEW_2.6	All product data was viewed correctly through "Product status."	S	The customer was able to view all product data accurately through the "Product status" feature.
UEW_2.7	All product data was viewed correctly through "Product status."	S	The customer was able to view all product data accurately through the "Product status" feature.
UEW_2.8	All product data was viewed correctly through "Product status."	S	The customer was able to view all product data accurately through the "Product status" feature.
UEW_2.9	All product data was viewed correctly through "Product status."	S	The customer was able to view all product data accurately through the "Product status" feature.
UEW_2.10	All product data was viewed	S	The customer was able to view all product data

	correctly through "Product status."		accurately through the "Product status" feature.
UEW_2.11	All product data was viewed correctly through "Product status."	S	The customer was able to view all product data accurately through the "Product status" feature.
UEW_3.1	User logged out successfully and redirected to the login screen.	S	the customer was able to log out and was redirected to the login page as expected.

6.6 Conclusion

This chapter is vital as it wraps up the system testing phase, a necessary step to confirm system requirements before deployment. It also serves as a helpful guide for performing post-implementation testing when adding new features. The next chapter will present a thorough summary of the whole project, evaluating its strengths and weaknesses, and suggesting ways to improve the system further.

CHAPTER 7: PROJECT CONCLUSION

7.1 Introduction

This chapter provides a comprehensive evaluation of the Electronic Waste Management System (EWMS), focusing on its strengths and weaknesses. By analyzing these aspects, the chapter aims to offer valuable insights into the system's overall effectiveness and areas for enhancement. Additionally, this chapter will propose potential improvements that can be implemented to further optimize the system's performance and user experience. Finally, the chapter will outline the significant contributions of the EWMS project, highlighting its impact on environmental sustainability, user engagement, and operational efficiency in managing electronic waste. Through this analysis, the chapter seeks to present a balanced view of the EWMS, acknowledging its achievements while identifying opportunities for growth and refinement.

7.2 Observation on Weakness and Strength

The Electronic Waste Management System (EWMS) has been designed to streamline and enhance the process of managing electronic waste, with the primary goal of promoting environmental sustainability and responsible e-waste disposal. While the system offers significant advantages, it also presents certain challenges. Below is an elaboration on the observed weaknesses and strengths of the EWMS.

7.2.1 Weaknesses

Technical Issues: Like any digital system, the EWMS may encounter technical problems, such as server downtime, software bugs, or issues with data synchronization. These technical challenges can disrupt the smooth operation of the system, potentially causing delays in e-waste collection or inaccurate data reporting. Such disruptions could frustrate users, especially if they rely heavily on the system for timely disposal and collection of electronic waste.

User Training: Although the EWMS is designed to be user-friendly, users—especially those unfamiliar with digital platforms—might require training to utilize the system effectively. This includes understanding how to schedule e-waste pickups, navigate the user interface, and interpret system-generated reports. Without proper training, users might find the system challenging, which could lead to underutilization or incorrect usage.

User Experience and Interface Design: The success of the EWMS largely depends on delivering a seamless and intuitive user experience. If the interface is not well-designed—being either too complex or not responsive enough—it could deter users from engaging with the system. A non-intuitive design might lead to user frustration, especially if users struggle to complete tasks such as scheduling pickups or accessing important information.

Integration Challenges: Integrating the EWMS with existing waste management systems and local government databases can be a complex task. Ensuring seamless communication and data exchange between the EWMS and other systems is crucial for its effective operation. Any integration issues could result in data discrepancies, delayed processing of e-waste collections, or challenges in coordinating with other waste management initiatives.

Scalability Concerns: As the use of EWMS grows, scalability becomes a concern. The system must be able to handle an increasing number of users, transactions, and data without compromising performance. If the system isn't designed

with scalability in mind, it may struggle to perform efficiently under heavy usage, leading to slow response times and potential system crashes.

7.2.2 Strengths

Environmental Impact: The EWMS significantly contributes to environmental sustainability by promoting responsible e-waste disposal. By facilitating the collection and proper handling of electronic waste, the system helps reduce the amount of hazardous materials that might otherwise end up in landfills, thus minimizing environmental pollution.

Convenience and Accessibility: The EWMS provides users with a convenient platform to schedule e-waste pickups, track the status of their requests, and access information on proper e-waste disposal. This convenience reduces the barriers to responsible e-waste management, making it easier for individuals and organizations to participate in environmental conservation efforts.

Operational Efficiency: By digitizing the e-waste management process, the EWMS improves operational efficiency for both users and waste management organizations. Automated scheduling, real-time updates, and digital record-keeping reduce the likelihood of errors and miscommunication, ensuring a smoother process from start to finish.

Data-Driven Insights: The system generates valuable data that can be used for analyzing e-waste trends, understanding user behavior, and improving waste management strategies. These insights can help waste management organizations optimize their operations, plan future initiatives, and develop targeted campaigns to increase awareness about the importance of e-waste recycling.

Enhanced Public Awareness: The EWMS serves as an educational tool by providing users with information about the importance of e-waste recycling and how to do it properly. By increasing public awareness and encouraging responsible behavior, the system contributes to broader efforts to reduce electronic waste and its harmful impacts on the environment.

User Engagement: The system is designed to engage users actively in the e-waste disposal process, fostering a sense of responsibility and participation in environmental conservation. Features such as reminders for upcoming pickups, educational content, and feedback mechanisms help keep users involved and motivated to use the system regularly

7.3 Proposition for Improvement

To enhance the effectiveness of the EWMS, the development of an Android or iOS application should be considered. This would allow anyone with a smartphone to access the system more easily. Currently, without mobile app support, users with Android or iPhone devices may find it less convenient to use the EWMS. Given that a significant portion of users rely on mobile devices, developing a mobile application would greatly improve the accessibility and effectiveness of the system.

7.4 Project Contribution

The EWMS project will contribute significantly to the broader community involved in e-waste management. E-waste collectors and recycling facility managers can use the system to better manage their operations, gain valuable analytics on e-waste trends, and improve their workflow efficiency. The general public, including environmentally-conscious individuals and households, can use the system to make responsible e-waste disposal more convenient and efficient. By promoting responsible e-waste management, the EWMS contributes to environmental sustainability and public awareness.

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Appendix A : Snippet of program

CSS Coding

```css
table {
    width: 100%;
    border-collapse: collapse;
    margin-bottom: 20px;
}

th, td {
    border: 1px solid #ccc;
    padding: 15px; /* Adjust padding as needed */
    text-align: center;
    width: 33%; /* Ensures all columns have the same width */
    height: 60px; /* Adjust height as needed */
    vertical-align: middle;
}

th {
    background-color: #f2f2f2;
    font-weight: bold;
}

h2 {
    color: #333;
    margin-top: 30px;
}
```

```css
.sticky-note {
  position: absolute;
  top: 13px;
  right: 1px;
  background: #F5F5DC;
  padding: 15px;
  border: 1px solid #F5F5DC;
  border-radius: 5px;
  box-shadow: 0 4px 6px rgba(0, 0, 0, 0.1);
  font-family: 'Roboto', sans-serif;
  z-index: 1000;
  max-width: 500px; /* Adjust the width as needed */
  max-height: 1000px; /* Adjust the height as needed */

}
.sticky-note table {
  width: 100%;
  border-collapse: collapse;
  font-size: 14px; /* Adjust font size of table text */
}
.sticky-note th, .sticky-note td {
  padding: 8px; /* Adjust padding inside table cells */
  text-align: left;
}
.sticky-note th {
  background-color: #F0F0F0;
  color: #000;
}
.sticky-note tr:nth-child(even) {
  background-color: #FAFAD2;
}
.sticky-note tr:nth-child(odd) {
  background-color: #fff;
}
```

PHP Coding

```php
<?php
include('includes/dbconnection.php');

if(isset($_POST['catid'])) {
    $catid = $_POST['catid'];
    $query = mysqli_query($con, "SELECT ItemName, MinPrice, MaxPrice FROM tblitems WHERE CategoryID='$catid'");
    $items = array();
    while($row = mysqli_fetch_assoc($query)) {
        $items[] = $row;
    }
    echo json_encode($items);
}
?>
```

```php
<?php
session_start();
error_reporting(0);
include('includes/dbconnection.php');
if (strlen($_SESSION['ewsuid']==0)) {
  header('location:logout.php');
  } else{
if($_GET['action']=='delete'){
$bsid=intval($_GET['bsid']);
$query=mysqli_query($con,"delete from tblproduct where ID='$bsid'");
if($query){
unlink($ppicpath);
echo "<script>alert('Product details deleted successfully.');</script>";
echo "<script type='text/javascript'> document.location = 'manage-product-details.php'; </script>";
} else {
echo "<script>alert('Something went wrong. Please try again.');</script>";
}

}
?>
```

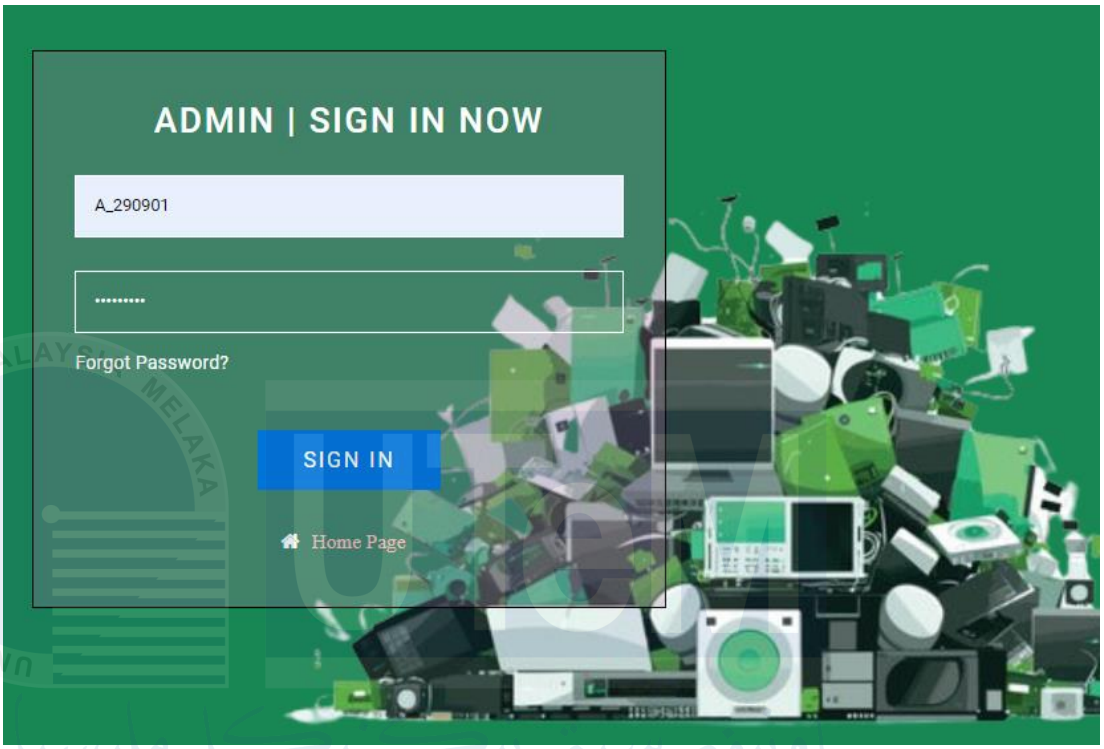
HTML Coding


```php
<section id="container">
<!--header start-->
<?php include_once('includes/header.php');?>
<!--header end-->
<!--sidebar start-->
<?php include_once('includes/sidebar.php');?>
<!--sidebar end-->
<!--main content start-->
<section id="main-content">
  <section class="wrapper">
    <div class="table-agile-info">
 <div class="panel panel-default">
    <div class="panel-heading">
     New Assigned Products
    </div>
    <div>
      <table class="table table-bordered">
        <thead>
          <tr>
            <th data-breakpoints="xs">S.NO</th>
            <th>Product Id</th>
            <th>Product Category</th>
            <th>Register By</th>

            <th>Product Items</th>
            <th>Request Date</th>
            <th>Status</th>
            <th data-breakpoints="xs">Action</th>
          </tr>
        </thead>
        <?php
       $eid= $_SESSION['empid'];

$ret=mysqli_query($con,"select tblproduct.ID as pid,tblproduct.ProductId,tblproduct.Status,tblproduct.ContactPerson,tblproduct.CPM
obNumber,tblproduct.CreationDate,tblproduct.ProductName,tblcategory.ID,tblcategory.CategoryName,tbluser.FullName,tbluser.MobileNum
ber from  tblproduct join tbluser on tblproduct.UserID=tbluser.ID join tblcategory on tblproduct.CategoryID=tblcategory.ID where
  tblproduct.Status='Assigned' && tblproduct.AssignTo='$eid'");
$cnt=1;
$count=mysqli_num_rows($ret);
if($count>0){
while ($row=mysqli_fetch_array($ret)) {

?>
```

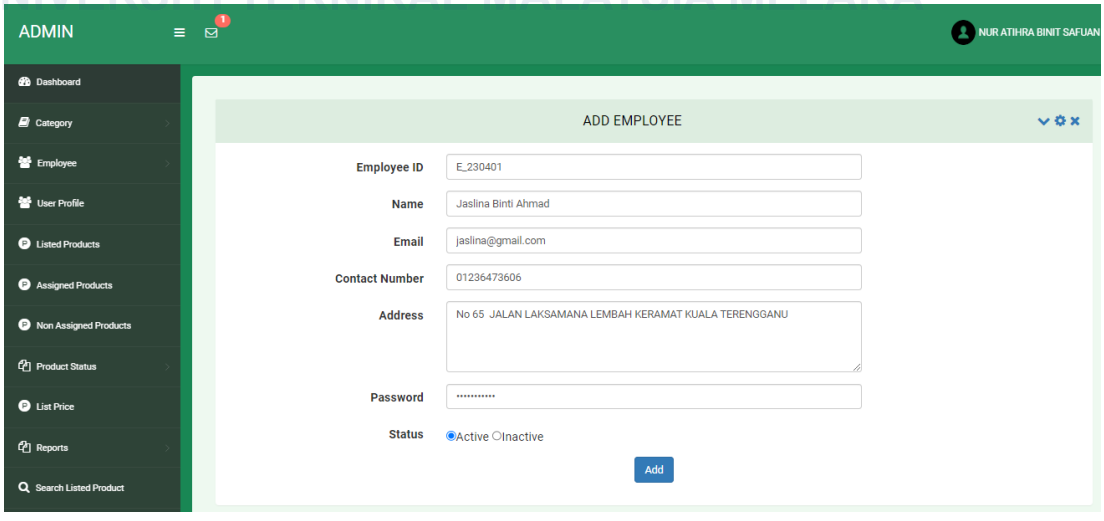
```
<!DOCTYPE html>
<head>
<title>Electronic Waste System|| Add Category  </title>
</head>
<body>
<section id="container">
<!--header start-->
<?php include_once('includes/header.php');?>
<!--header end-->
<!--sidebar start-->
<?php include_once('includes/sidebar.php');?>
<!--sidebar end-->
<!--main content start-->
<section id="main-content">
    <section class="wrapper">
        <div class="form-w3layouts">
            <!-- page start-->


            <div class="row">
                <div class="col-lg-12">
                    <section class="panel">
                        <header class="panel-heading">
                            Add Category
                            <span class="tools pull-right">
                                <a class="fa fa-chevron-down" href="javascript:;"></a>
                                <a class="fa fa-cog" href="javascript:;"></a>
                                <a class="fa fa-times" href="javascript:;"></a>
                             </span>
                        </header>
                        <div class="panel-body">
                            <div class="form">



                                <form class="cmxform form-horizontal " method="post" action="">
                                    <div class="form-group ">
                                        <label for="adminname" class="control-label col-lg-3">Category</label>
```

Appendix B: Sample of data

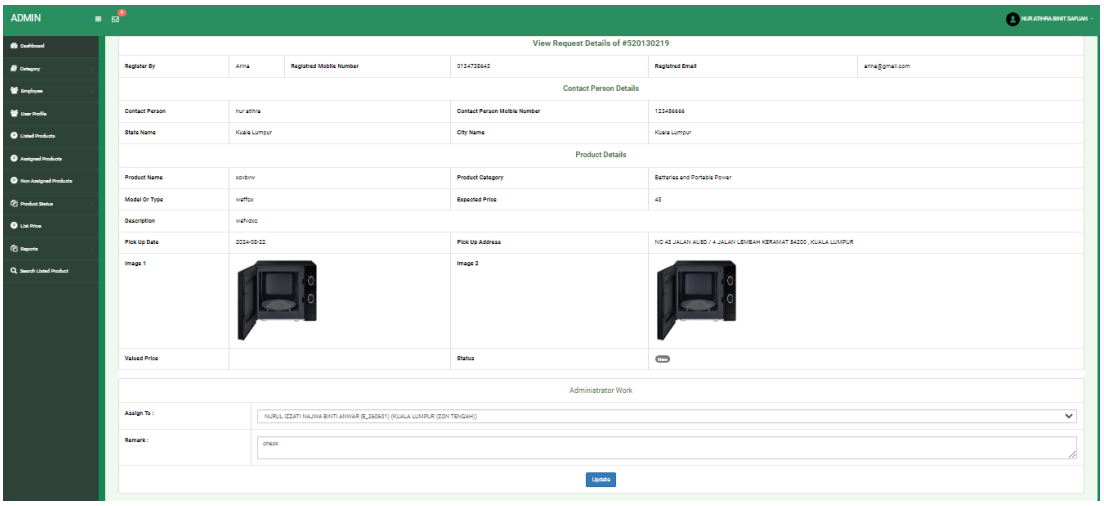
Admin login



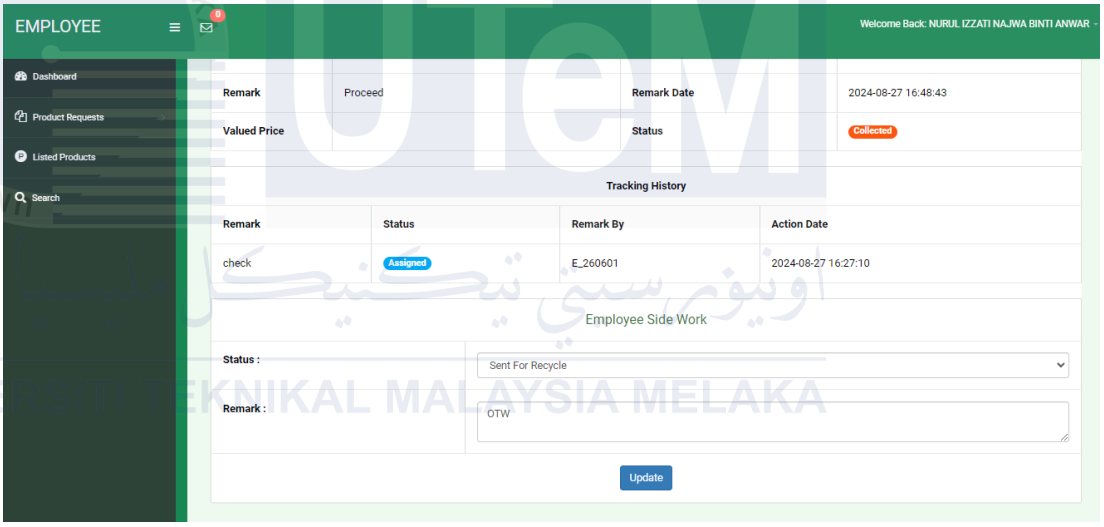
Admin add employee



Admin assign form to employee



Employee update status collected to sent for recyle



Appendix C: Sample of test case

Test Cases for Admin

Table 6.4 Admin user test cases

Module	Tes Case ID	Description	Expected Result
Login	AEW_1.1	To validate that the user can log in with the correct admin ID and password	The user successfully logs in.
	AEW_1.2	To validate that the user login fails with an incorrect admin ID	The system denies access and displays an error message 'Invalid Details.'
	AEW_1.3	To validate that the user login fails with an incorrect password.	The system denies access and displays an error message' Invalid Details.'
	AEW_1.4	To validate that the user reset password	The user can reset the password and regain access.
	AEW_1.5	To validate that the system logs the user out after a password change.	The user is required to log in again with the new password
Manage User/Customer	AEW_2.1	Validate that the admin can view detailed user profiles	User profile displays all relevant information like Full Name,

			Mobile Number, Email and Registration Date
	AEW_2.2	Validate that the admin can view user e-waste submission history.	Display a history of e-waste submissions.
	AEW_2.3	Validate that the admin can view the user activity log.	User activity log displays accurate records of user actions.
	AEW_2.4	Validate that the admin can search for users by username or email	Search results display the correct user(s) matching the search criteria.
Manage Employee	AEW_3.1	Validate that the admin can create a new employee account	New employee account is successfully created and appears in the employee list.
	AEW_3.2	Validate that the admin can edit an existing employee's information	Employee information is successfully updated in the database and reflected in the system
	AEW_3.3	Validate that the admin can delete an employee account	Employee account is successfully deleted and no

			longer appears in the employee list
	AEW_3.4	Validate that the admin can deactivate an employee account.	Employee account is deactivated and the employee cannot log in
	AEW_3.5	Validate that the admin can reactivate a deactivated employee account.	Employee account is reactivated and the employee can log in again.
	AEW_3.6	Validate that the admin can view detailed employee profiles, including task assignments and performance history.	Employee profile displays all relevant information, including assigned tasks and performance records.
	AEW_3.7	Validate that the admin can assign an employee to handle a customer's form.	Employee is successfully assigned, and the assignment is reflected in the employee's task list.
Manage product	AEW_4.1	Validate that the admin can create a new category of electronic products.	New category is successfully created and appears in the category list.
	AEW_4.2	Validate that the admin can manage	Category updates or deletions are

		(edit or delete) existing categories of electronic products.	successfully reflected in the category list.
	AEW_4.3	Validate that the admin can view the total number of listed items.	Total listed items are accurately displayed.
	AEW_4.4	alidate that the admin can view new applications listed for product disposal.	New applications are displayed in the application management section.
	AEW_4.5	Validate that the admin can view assigned items for collection.	Assigned items are correctly listed in the admin's view.
	AEW_4.6	Validate that the admin can view collected items.	Collected items are correctly displayed in the collected items list.
	AEW_4.7	Validate that the admin can view items that are in transit.	Items in transit are correctly listed in the admin's view.
	AEW_4.8	Validate that the admin can view rejected items.	Rejected items are accurately listed in the rejected items section.
	AEW_4.9	Validate that the admin can view	Product report is correctly generated and

		the report of products.	visible to the admin.
	AEW_4.10	Validate that the admin can search for listed products.	Search results correctly display matching products.
	AEW_4.11	Validate that the admin can search for users.	Search results correctly display matching users.
Admin profile	AEW_5.1	Validate that the admin can view edit their profile.	Admin profile details are accurately displayed.
Change password	AEW_6.1	Validate that the admin can change their password.	Password is successfully changed and admin can log in with the new password.
Logout	AEW_7.1	To validate that the admin can logout of the system	The admin will be logout and redirect to the login screen.