SCSV 2113

HUMAN COMPUTER INTERACTION

(Session 2025/2026 Semester 1)

Faculty of Computing
Universiti Teknologi Malaysia

P1 – PROJECT PROPOSAL

[Project Title: EcoLink]

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1. PROBLEM STATEMENT

Waste management continues to be a major challenge for many urban and suburban residents mainly because there is no centralized and easy-to-use digital solution. People who recently moved into new homes often have trouble finding the right facilities or services for getting rid of bulky items like old furniture, appliances and renovation waste. The lack of clear guidance and accessible information causes frustration that leads to improper disposal practices that can harm the environment and affect neighbourhood cleanliness.

In addition, residents often miss scheduled waste collection days and struggle when they need to dispose of waste unexpectedly or in emergencies. This includes time when they need to remove large amounts of rubbish outside regular collection hours, which causes inconvenience and hygiene issues. After routine yard work, like cutting down trees or trimming branches, many homeowners are also unsure about how to properly dispose of garden debris.

To make things even more complicated, booking Roll-on Roll-off (RoRo) bins and paying related rental or permit fees typically involves using several different platforms controlled by various municipal departments. This divided system creates confusion and slows down the process for both residents and local councils.

There is also a growing concern about how to properly dispose of electronic waste (e-waste). Many residents do not know where the authorized collection points or recycling centers for these materials are, which leads to unsafe disposal practices. Similarly, people who want to recycle or sell recyclable items find it hard to locate nearby collection or buy-back centers.

All these problems emphasize the urgent need for a unified and accessible waste management platform. Without a single system that simplifies disposal, booking and payment processes while also offering reliable information on recycling and e-waste management, residents will continue to feel discouraged from recycling properly. This situation ultimately undermines sustainability efforts, decreases public involvement in environmental initiatives and contributes to problem in urban and suburban cleanliness and waste management.

2. ILLUSTRATION TO PROBLEM & SUSTAINABLE DEVELOPMENT GOALS (SDG)

Problem	Illustration	SDG
When people move to new homes, they often struggle with disposing of old furniture and appliances, leading to illegal dumping that degrades cleanliness.	**Figure 1: Bulky waste dumped improperly.** **(source: freemalaysiatoday.com)**	**SDG 11: SUSTAINABLE CITIES & COMMUNITIES** Our waste management app directly addresses SDG 11 by solving the challenge of improper bulky waste disposal. By providing guidance on disposal facilities and scheduled bulk waste collection.
When residents miss scheduled waste pickups, accumulating garbage creates breeding grounds for pests and pathogens, leading to disease outbreaks and unpleasant living conditions	**Figure 2: Accumulating garbage** **(source: BH online)**	**SDG 3: GOOD HEALTH AND WELL-BEING** Our app will send automated reminders and also function as complaint platform for resident to report improper disposal activities, this will help maintain hygienic residential environments.

The current waste management system in Malaysia are fragmented, where residents must navigate multiple platforms to book RoRo bins, pay fees, and find disposal information.	 **Figure 2: Different platforms to book for waste collection.**	**SDG 9: INDUSTRY, INNOVATION & INFRASTRUCTURE** Our application will integrate these disconnected services into a single, user-friendly application that leverages smart scheduling, unified payments, and real-time information. This digital infrastructure upgrade makes waste management services more accessible and efficient for all residents.
Electronic waste, or e-waste, is a growing problem worldwide, and Malaysia is no exception. It has become a serious environmental and public health issue, particularly in our densely populated cities.	 **Figure 3: Infographic about e-waste in Malaysia** **(source: SWCorp.gov.my)**	**SDG 12: Responsible Consumption and Production** Our application encourages recycling and e-waste disposal by providing real-time information on e-waste drop-off locations and recycling centers. This supports responsible consumption by ensuring e-waste is properly managed rather than ending up in landfills, where it can contaminate soil and water sources.

3. PROPOSED SOLUTIONS

Ecolink is a centralized, all-in-one waste management application built to transform how communities handle waste in their daily life. The application is designed for both the public and local councils, simplifying every aspect of waste management, from daily recycling to large-scale disposal through one unified platform.

With Ecolink, users can easily locate the nearest recycling centers, find proper drop-off points for e-waste, and schedule the collection of bulk waste such as old furniture, electronic appliances, or large garden trimmings. The application also enables bookings and payment for Roll-on Roll-off (RoRo) bins including its permit, making it convenient for households, contractors, or event organizers to manage waste responsibly.

Beyond waste disposal, Ecolink strengthens the relationship between citizens and their local councils. Users can report issues directly such as missed collections, overflowing bins, or illegal dumping sites; ensuring faster response times and cleaner neighborhoods.

Ecolink also introduces a community-driven feature that allows individuals to book or offer gig jobs for waste pickup, fostering a local green economy while encouraging shared responsibility for environmental cleanliness.

It also serves as a communication hub between councils and the community. Through the app, councils can share announcements about upcoming recycling campaigns, green initiatives, and community clean-up events, keeping residents informed and engaged. Whether it's promoting new waste policies, introducing sustainability programs, or notifying users about collection schedules, Ecolink ensures that important environmental updates reach everyone in the community quickly and effectively.

By bringing together technology, transparency, and community engagement, Ecolink aims to create a smarter, cleaner, and more connected environment; where everyone plays a part in building a sustainable future.

Key Features :

1. Recycling and E-Waste Locator
   ○ Helps users find the nearest recycling centers and proper drop-off points for electronic waste.
2. Bulk Waste Collection Scheduling
   ○ Allows users to schedule pickups for large waste items such as old furniture, electronic appliances or large garden trimmings.
3. RoRo Bin Booking System

- ○ Enables users to book Roll-on Roll-off (RoRo) bins and its permit for big cleanups, construction projects, or community events.
4. Issue Reporting to Local Councils
    - ○ Lets users directly report problems such as missed collections, overflowing bins, or illegal dumping sites for quicker responses.
5. Community Gig Job Platform
    - ○ Provides opportunities for individuals to book or offer waste pickup services, supporting a local green economy.
6. Council Announcement Hub
    - ○ Allows councils to post updates and announcements about recycling campaigns, green initiatives, community clean-ups, waste collection schedules, and environmental programs.

4. ADDRESSING THE PROBLEMS

1. Difficulty finding proper disposal services for bulky waste and old furniture
The app includes an interactive disposal locator and bulk waste booking feature.

a. Users can view nearby collection centers, municipal disposal sites, and recycling points through a map interface.
b. They can directly schedule bulk pickups for old furniture or renovation waste.
c. This clear, guided interface prevents confusion and illegal dumping.
d. *HCI Principle:* Visibility and Mapping users can see available options and follow logical steps for each action.
e. *Related SDG:* SDG 11 – Sustainable Cities and Communities.

2. Missed or irregular waste collection leading to hygiene issues. EcoLink will feature automated reminders and notifications linked to residents' addresses and council pickup schedules.

a. The app notifies users of upcoming or delayed waste collections.
b. A complaint submission function allows quick reporting of uncollected garbage, complete with photo and GPS tagging.
c. *HCI Principle:* Feedback and Consistency users stay informed and can respond easily.
d. *Related SDG:* SDG 3 – Good Health and Well-being

3. Fragmented platforms for RoRo bin booking and permit payments
All RoRo bin booking and permit fee payments are integrated within the app.

a. Users can select bin size, rental duration, and pay directly without using separate platforms.
b. This reduces delays and simplifies the process for both residents and municipal councils.

    c. *HCI Principle:* Consistency and Efficiency uniform layouts and navigation flow simplify repetitive tasks.
    d. *Related SDG:* SDG 9 – Industry, Innovation and Infrastructure.

4. Unclear process for e-waste disposal and recycling. The app provides a recycling and e-waste directory that displays collection points, accepted materials, and updated buy-back prices.

    a. Visual guides educate users about recyclable items and e-waste categories.
    b. Notifications promote recycling events or trade-in campaigns.
    c. *HCI Principle:* Affordance and Learnability clear icons and color-coded labels help users act confidently.
    d. *Related SDG:* SDG 12 – Responsible Consumption and Production.

5. Lack of accessible communication between public, private collectors, and councils. A built-in Community Hub allows residents to interact with municipal departments and private service providers.

    a. Users can report illegal dumping, request emergency pickups, or check public cleanliness campaigns.
    b. Local councils can post announcements and advisories.
    c. *HCI Principle:* User Engagement and Feedback promotes active citizen participation and government transparency.
    d. *Related SDG:* SDG 11 and SDG 12.

6. Limited job opportunities and informal waste laborers not digitally connected. The app introduces a Gig Service Feature where residents can post or accept short-term jobs related to waste and environmental maintenance.

    a. Jobs include cleaning compounds, mowing grass, trimming trees, collecting recyclable materials, or hauling bulky waste.
    b. Residents can hire gig workers for on-demand cleanup, and workers can earn income safely with verified profiles and ratings.
    c. This feature not only promotes cleaner surroundings but also opens up community-based micro-employment.
    d. *HCI Principle:* Affordance, Satisfaction, and User Motivation the interface encourages interaction through easy task creation, transparent feedback, and reward mechanisms.
    e. *Related SDG:* SDG 8 – Decent Work and Economic Growth and SDG 11 – Sustainable Cities and Communities.

Summary of How the Solution Addresses the Problem

Identified Problem	Proposed App Feature	HCI Principle Applied	Related SDG
Bulky waste disposal confusion	Interactive map & bulk pickup booking	Visibility, Mapping	SDG 11
Missed waste collection	Automated reminders & complaint system	Feedback, Consistency	SDG 3
Fragmented booking/payment platforms	Unified RoRo bin booking & payment	Consistency, Efficiency	SDG 9
Improper e-waste handling	E-waste locator & recycling education	Affordance, Learnability	SDG 12
Weak communication & awareness	Community Hub for reporting & notices	User Engagement, Feedback	SDG 11 & 12
Limited community job opportunities	Gig Service for local cleanup jobs	Affordance, Motivation, Satisfaction	SDG 8 & 11

5. TARGET USERS

Overview

The Waste Management Application is designed to serve multiple user groups that contribute to a cleaner and more sustainable community. The **Urban Resident**, or "Responsible Householder," represents everyday citizens who need an easier way to manage household and bulky waste responsibly. The **Gig Worker**, known as "The Community Helper," includes individuals seeking part-time or flexible jobs related to waste collection, recycling, and environmental upkeep. Meanwhile, **Local Councils** are responsible for overseeing public waste operations, including managing **collection schedules**, handling **public complaints**, and approving **RoRo bin bookings** for bulk waste disposal. They also use the app's **Community Hub** to share cleanliness announcements, promote recycling campaigns, and respond to residents' feedback. **Private Contractors**, on the other hand, play a more operational role. They **supply and manage RoRo bins**, handle **bulk waste collection services**, and coordinate logistics for waste transportation and recycling. Through the app, contractors can receive digital booking requests, track bin usage, and process payments efficiently.

1. Urban Resident – "The Responsible Householder"

Profile:

- Adults, living in urban or residential areas.
- Struggle to dispose of bulky or renovation waste properly.

Needs / Problems:

- Hard to locate disposal sites or schedule waste pickups.
- Often miss collection days or experience uncollected garbage.

App Features Used:

- Interactive disposal locator and bulk waste booking.
- Automated reminders and complaint submission (with photo & GPS).

HCI Principles:

- Visibility - see nearby disposal options clearly.
- Feedback - receive confirmation and reminders.

Related SDGs:

- SDG 3 - Good Health & Well-being.
- SDG 11 - Sustainable Cities & Communities.

2. Gig Worker / Informal Waste Collector – "The Community Helper"

Profile:

- Individuals seeking side income or flexible jobs.
- May own small vehicles (motorbike, pickup truck).

Needs / Problems:

- Limited access to consistent waste-related job opportunities.
- Lack of trust or verified digital platform for local gigs.

App Features Used:

- Gig Service Feature for short-term cleanup, hauling, and recycling jobs.
- Verified profiles, job listings, and digital payments.

HCI Principles:

- Affordance & Learnability – easy-to-use job posting and acceptance flow.
- User Motivation – ratings and rewards encourage engagement.

Related SDGs:

- SDG 8 - Decent Work & Economic Growth.
- SDG 11 - Sustainable Cities & Communities.

3. Local Council / Private Contractor – "The Service Coordinator"

Profile

- **Local Councils:** Government officers managing waste collection, public complaints, and RoRo bin bookings.
- **Private Contractors:** Companies that **supply and manage RoRo bins**, handle bulky waste pickup, and recycling logistics.
- Both rely on efficient coordination and real-time information to plan operations.
- Use the app to communicate with residents, track jobs, and process transactions.

Needs/ Problems:

- Fragmented platforms for bin booking, permit payments, and waste scheduling.
- Delayed communication between councils, contractors, and the public.
- Difficulty tracking collection progress and responding to complaints in real-time.
- Need for an integrated system to streamline operations and improve transparency.

Local Council Responsibilities:

- Manage waste collection schedules and public complaints
- Approve and monitor RoRo bin bookings
- Post announcements and engage with residents through the Community Hub

Private Contractor Responsibilities:

- Supply, deliver, and manage RoRo bins
- Provide bulky waste collection and recycling logistics
- Handle service bookings and payment through the app

App Functions Used:

- Integrated dashboard and Community Hub

HCI Principles:

- Consistency and Efficiency

Related SDGs:

- SDG 9 - Industry, Innovation, and Infrastructure
- SDG 11 - Sustainable Cities and Communities
- SDG 12 - Responsible Consumption and Production

6. REFERENCES

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