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GRADUATION PROJECT I
Food Guard

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Disclaimer

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Abstract

The world today faces a growing problem of food waste, which negatively impacts food security, the environment, and the economy. This project presents a practical digital initiative aimed at reducing household food waste through the development of an intelligent application called **Food Guard**. The application enables users to track food products and their expiry dates, receive smart notifications when items are about to expire, and analyze consumption behavior over time—helping them make more conscious decisions about food usage and storage.

The system is built using modern technologies, including Flutter for mobile application development, Django with a PostgreSQL database for a secure and robust backend, and Firebase for enabling real-time notifications. Additionally, artificial intelligence is integrated to provide smart storage tips and suggest recipes based on available ingredients. The application also offers a comprehensive system for managing food donations, whether surplus items or ready-made meals.

Food Guard is expected to make a tangible impact on raising food awareness and reducing waste, based on the comprehensive technical solutions it provides and the user-friendly experience it offers. The platform also holds promising potential for future expansion to support communities and connect them through smart cooperation networks.

Chapter 1

Introduction

1.1 General Background

Food waste is one of the world's most urgent global issues, with significant social, economic, and environmental consequences. According to reports by the Food and Agriculture Organization (FAO), one-third of the food produced globally is wasted each year, while millions of people suffer from hunger and food insecurity. This contradiction is especially evident in many communities, where food surplus exists alongside a pressing need. Although charitable initiatives and governmental efforts exist, there is a clear gap in efficiently and systematically delivering surplus food to those in need. With the advancement of technology and the widespread use of smartphones, it has become possible to adopt modern digital solutions to address this problem in more sustainable and effective ways.

1.2 Project Objectives

The Food Guard project aims to provide a smart and comprehensive digital solution to reduce food waste and promote a culture of donation. It targets both regular users and administrators through the following key features:

For Regular Users

- **Secure Authentication System:** Includes registration, login, logout, and password recovery using JWT tokens.
- **Personal Inventory Management:**
 - Add food items and track their expiration dates.
 - Receive automatic alerts when products are nearing expiration, and also when they are expired.
 - Categorize items by status (expired, near expiry, safe) using color indicators.
 - Display charts showing personal product consumption and waste statistics.
- **Smart Basket:**

- Analyze user consumption behavior.
- Suggest appropriate purchase quantities and tips to reduce waste.
- **Donation System:**
 - Donate food, leftovers, or money, and participate in donation campaigns.
 - Track personal contributions to donation efforts.
- **Awareness and Content Interaction:**
 - Access educational content such as articles, videos, stories, and posts created by administrators.
 - Interact with content via likes and saves.
- **Communication System:**
 - Chat with administrators for questions or donation coordination.
- **AI and Smart Recommendations:**
 - Instant recipe generator based on ingredients.
 - Suggestions to reuse leftovers instead of discarding them.
 - Smart storage tips tailored for each product to extend shelf life.

For Administrators

- **Comprehensive Dashboard:**
 - Manage user data, monitor donations, and supervise content.
 - View consumption analytics by city or product category.
- **Campaign Management:**
 - Launch food or financial donation campaigns.
 - Monitor campaign progress and manage campaign status.
- **Content Publishing:**
 - Share useful articles, videos, and awareness materials.
 - Monitor user engagement with the published content.
- **Smart Analytics:**
 - Analyze user consumption behavior anonymously to support research and statistics.
 - Identify items that are frequently wasted or quickly consumed.
 - Track user participation in donations and evaluate their impact.

1.3 Project Significance

Food Guard represents an innovative digital response to one of the world's most pressing issues: food waste. It promotes responsible consumption, organizes donation efforts, and delivers reliable, targeted awareness content through the admin panel.

The significance of the project can be summarized as follows:

- **Addressing Food Waste Locally and Globally:** With over 1.3 billion tons of food wasted annually, leading to more than \$940 billion in economic losses and environmental harm (e.g., carbon emissions, unnecessary water and energy use), the app helps reduce this impact starting from individual behavior.
- **Centralized and Reliable Awareness:** Content is exclusively published by administrators to ensure message accuracy and avoid misinformation—unlike open platforms where unreliable posts may spread.
- **Encouraging Positive User Engagement:** Although regular users cannot publish content, they can like and save it, which promotes awareness safely and avoids random, unmoderated posting.
- **Supporting Humanitarian Organizations and Expanding Reach:** With the smart dashboard, admins can manage campaigns and analyze user behavior, enabling future integration with charities, food banks, and educational institutions.
- **Alignment with Sustainable Development Goals (SDGs):** The project supports SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production) by creating a digital ecosystem that encourages users to reduce waste and support others.

In short, Food Guard is a smart community platform that combines awareness, organization, and real-world action—empowering users to take part in sustainable food waste reduction through responsible technology.

1.4 Organization of the Report

This report is structured into six chapters as follows:

- **Chapter One** introduces the project, including background, objectives, significance, and report structure.
- **Chapter Two** provides a theoretical background and reviews previous studies .
- **Chapter Three** presents the methodology, system design, architecture, and the tools used in the development. It also describes the implementation of the main features in both the mobile and web platforms.
- **Chapter Four** This chapter summarizes the key outcomes of the project and discusses the role of the application in achieving its main goals
- **Chapter Five** Evaluates the project's actual achievements compared to its goals, and discusses its strengths and limitations.

- **Chapter Six** Summarizes the findings, outlines possible improvements, and suggests future directions for expansion and development.

Chapter 2

Theoretical Background and Related Work

2.1 Theoretical Background

Food waste is considered one of the most pressing global challenges today due to its significant environmental, economic, and social consequences. According to reports by the Food and Agriculture Organization (FAO), one-third of all food produced globally is wasted every year. This results in a massive loss of resources such as water, energy, and agricultural land, and contributes to greenhouse gas emissions and the acceleration of climate change.

With the advancement of smartphone technologies and artificial intelligence, it has become possible to design digital solutions that enable individuals and communities to manage their food consumption more responsibly. Research has shown that smart tracking of expiration dates, real-time alerts, and the analysis of consumer behavior can significantly reduce food waste, particularly at the household level. Moreover, awareness campaigns and educational content play a crucial role in reshaping individual behavior and promoting a culture of conscious consumption.

2.2 Related Work

In recent years, a variety of mobile applications have emerged with the goal of reducing food waste. For example, Too Good To Go allows users to purchase surplus food from stores at discounted prices, while Olio facilitates food sharing between individuals within local communities. Although these applications have proven successful in some regions, they often lack advanced features for household inventory management and user behavior analysis. In this context, the study titled “The Impact of Smartphone Apps Designed to Reduce Food Waste” Mathisen and Johansen (2022) demonstrated that apps incorporating expiration reminders and consumption behavior analysis contribute effectively to minimizing household food waste—especially when designed with user-friendly interfaces and intelligent functionalities. Additionally, the systematic review “Mobile Applications to Reduce Food Waste in Supply Chains” Hong et al. (2024) analyzed various apps targeting food waste along supply chains. The

study emphasized that applications integrating smart tracking, timely alerts, and user engagement have a significant impact not only on managing surplus food but also on promoting more sustainable consumer behavior.

2.3 Relevance to the Food Guard Application

The **Food Guard** application was developed by leveraging the findings of these studies. It presents an integrated system that includes smart inventory tracking, a structured food donation system, and educational content curated by qualified administrators.

What sets **Food Guard** apart is its combination of technical, analytical, and social tools into a single platform. This makes it a unique and scalable contribution to the field of food waste management, with the potential for future integration with local charities and food banks.

Chapter 3

Methodology

3.1 TOOLS, TECHNOLOGIES, ARCHITECTURE, AND PROGRAMMING LANGUAGE

3.1.1 Tools

To develop **Food Guard** efficiently and deliver a functional and scalable food management solution, we used a well-integrated set of tools:

- **Visual Studio Code:** Used as the main development environment for both frontend (Flutter) and backend (Django) code editing and debugging.
- **Android Studio Emulator:** Employed to test the mobile app during development on a simulated Android device.
- **PostgreSQL:** The main database used to store structured data such as users, products, donations, logs, and system settings.
- **Postman:** Used for testing RESTful API endpoints between the frontend and backend, ensuring proper request handling, authentication, and response formats.
- **GitHub:** Used for version control and team collaboration, allowing organized development, issue tracking, and backup of source code.
- **Firebase Cloud Messaging:** Integrated to send real-time notifications to users, such as alerts for product expiry.

3.1.2 Architecture Diagram

The architecture of the **Food Guard** application is designed in a structured and layered manner that ensures clarity, maintainability, and scalability. The interaction begins at the frontend, where the user engages with the application through a user-friendly interface built using Flutter. This interface displays products, alerts, campaigns, and allows the user to perform actions such as adding items or donating food.

When an action is triggered, it is passed to the Service Layer in Flutter, which is responsible for sending requests to the backend through RESTful API calls.

3.1.3 Programming Languages & Frameworks

Frontend Framework

Flutter: Used to develop the mobile user interface for Android. It is an open-source UI toolkit developed by Google that enables the creation of high-performance, cross-platform applications using a single codebase. Flutter was chosen for its ability to build responsive and visually appealing interfaces with smooth animations and performance.

Dart Programming Language: Flutter uses Dart as its core language. Dart is an object-oriented, asynchronous-friendly programming language developed by Google. It is well-suited for mobile application development due to its clean syntax, performance efficiency, and support for reactive programming.

Backend Development

Django Framework: The backend was developed using Django, a powerful and secure Python-based web framework. Django is known for its clean architecture, rapid development capabilities, and built-in security features. It provides a robust foundation for scalable web services and complex database operations.

Django REST Framework (DRF): Used to build RESTful APIs that connect the Flutter frontend to the backend. DRF provides tools for serialization, authentication, permissions, and request handling, making it easier to build a secure and maintainable API layer.

Python Programming Language: Django is built on Python, a high-level, readable language that is widely used in web development. Python's extensive libraries and simplicity accelerated backend development and enabled integration of features such as user management, donation tracking, and image handling.

Database Administration

PostgreSQL: Selected as the primary relational database system for its reliability, performance, and support for complex queries. PostgreSQL ensures scalability and data integrity in handling relational data.

ORM (Object-Relational Mapping): Django's built-in ORM was used to interact with PostgreSQL. Developers could define models in Python and map them to database tables, simplifying CRUD operations without writing raw SQL.

Database Migrations: Django's migration system kept the database schema in sync with the application's models. It ensured smooth updates and version control of the database structure throughout development.

3.2 FEATURES IMPLEMENTATION

3.2.1 MOBILE APPLICATION

The primary goal of our **Food Guard** application is to help individuals reduce food waste and encourage them to donate surplus food in a simple, organized, and efficient way. Since the mobile phone is the most accessible and convenient tool for users, **Food Guard** was developed as a mobile application, allowing users to easily track their food items, receive expiry alerts, and participate in donation activities anytime and anywhere.

The application also includes educational content to raise awareness about food conservation and responsible consumption habits, supporting the broader mission of building a more sustainable and caring community.

In our application, there are two types of users:

- **Regular user:** Can track food items, receive expiry reminders, donate products or leftovers, and interact with posts and awareness content.
- **Administrator:** Oversees the entire system, including managing users, reviewing donations, creating and controlling campaigns, and publishing educational posts and notifications.

In the following sections, we will explain the roles and features available to each type of user in detail.

3.2.1.1 Use “Food Guard” as a USER

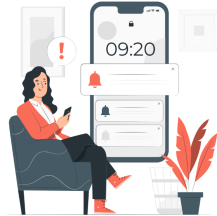
1. Introduction screens

The intro screen in the Food Guard application introduces users to the app’s main goals through three interactive and informative screens. These include: reducing food waste, tracking expiration dates, and encouraging community participation by donating surplus food. This introduction aims to simplify the app’s concept and help users quickly understand their role in minimizing food waste and contributing to a more aware and cooperative community—right from their very first interaction with the app.



Reduce Food Waste

Track your food before it expires and avoid waste!



Track Expiry Dates

Enter your food items and get reminders before expiry!



Give Food, Spread Hope

Turn your extra food into hope join community campaigns and help fight food waste

Skip Next

(a) First intro screen.

Skip Next

(b) Second intro screen.

Let's Get Started

(c) Third intro screen.

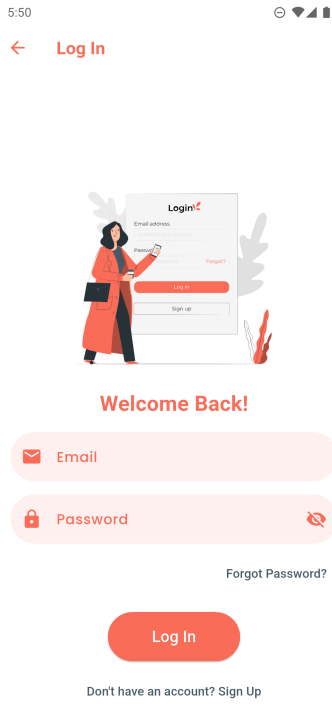
Figure 3.1: Introduction screens .

2. Authentication Screens

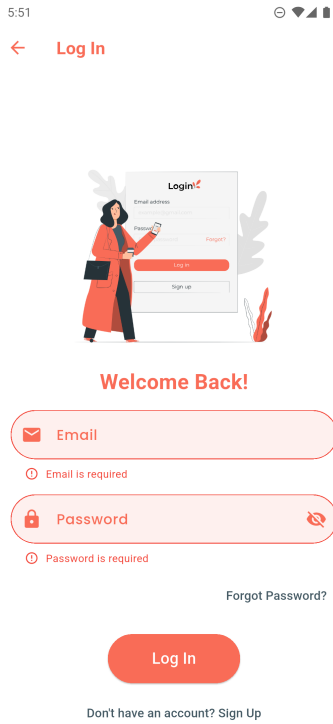
Our authentication screens provide three essential functions: user registration for new accounts, secure login for existing users, and a password recovery option for users who have forgotten their login credentials.

• Login Screens

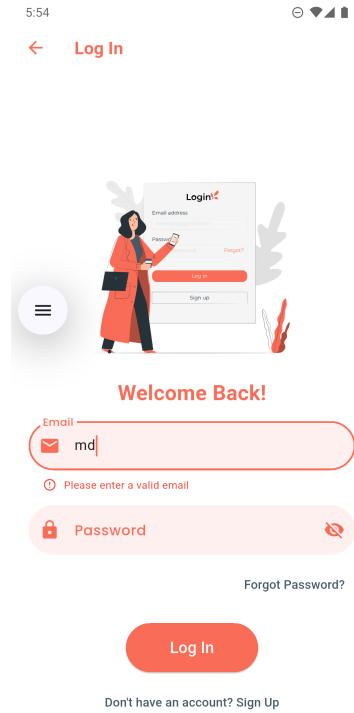
The Log-In Screen allows registered users to access their accounts by entering their email and password. The interface is simple and user-friendly, guiding users through the login process. If the entered credentials are incorrect—such as a wrong email or password—the system displays an error message informing the user of the issue and prevents access until valid information is provided. This helps maintain security and ensures only authorized users can log in.



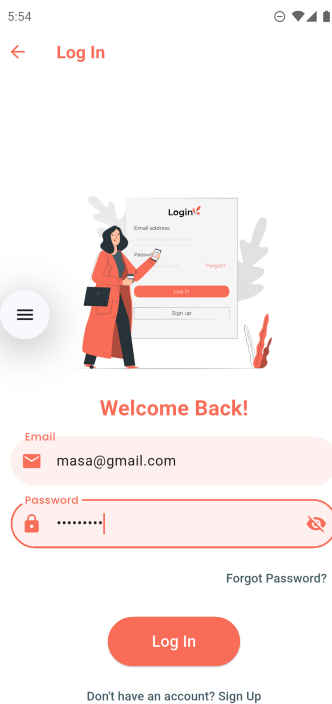
(a) Login screen.



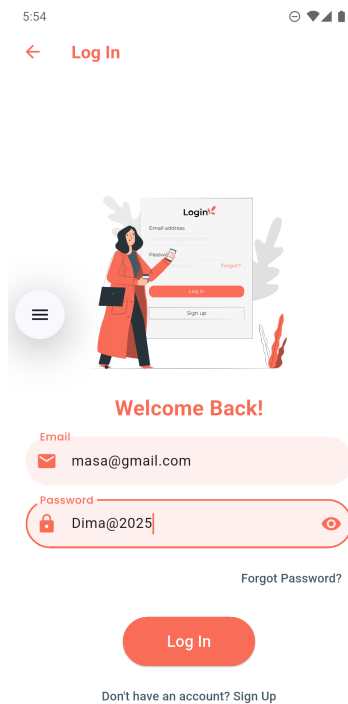
(b) Empty field validation.



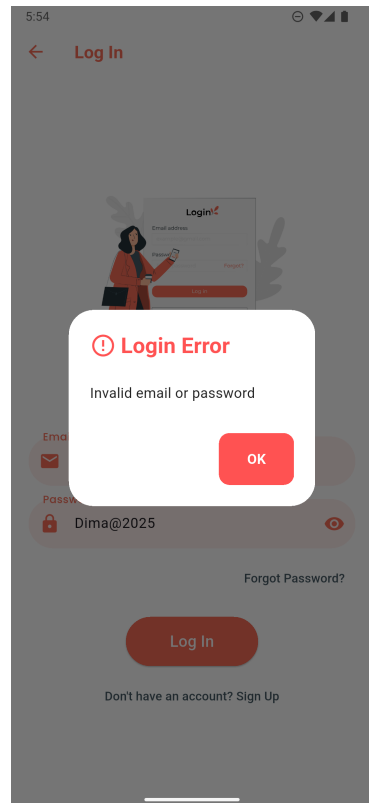
(c) Email format validation.



(d) Hidden password.



(e) Password visibility.



(f) Error message.

Figure 3.2: Login screens .

- **Sign-up Screens**

During account creation, users are required to provide essential information including their full name, email address, phone number, password, country, and city. The system performs real-time validation to ensure that all data is correctly entered and that both the email and phone number are unique and not previously used.

One of the core strengths of this system is its ability to assess the strength of the entered password, ensuring it meets the application’s security requirements. Additionally, the form prevents the submission of empty fields, ensuring complete and accurate data collection. To add a personalized touch, the system automatically assigns a unique color to each user profile and uses the first letter of the user’s name as their default avatar image.

This ensures that each account created is not only secure and verified but also uniquely identifiable, offering users a professional and customized start to their journey within the application.

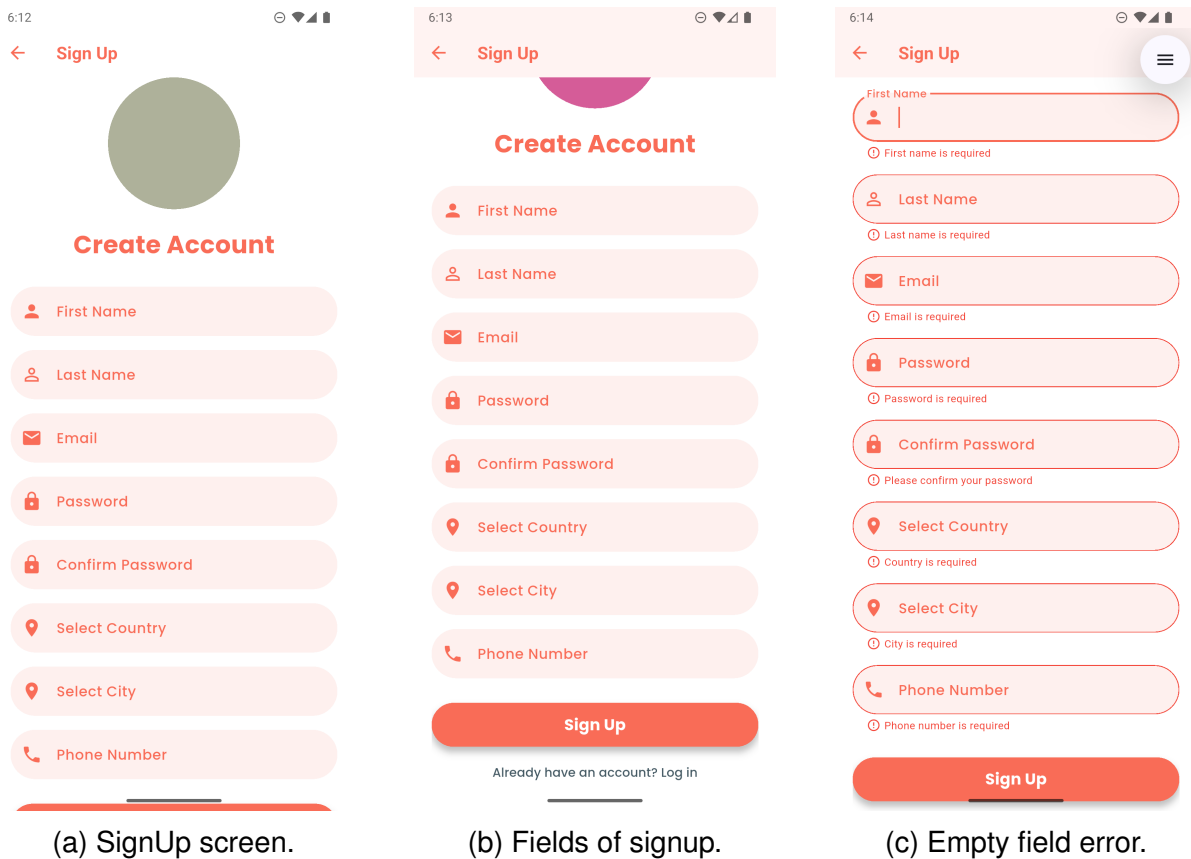
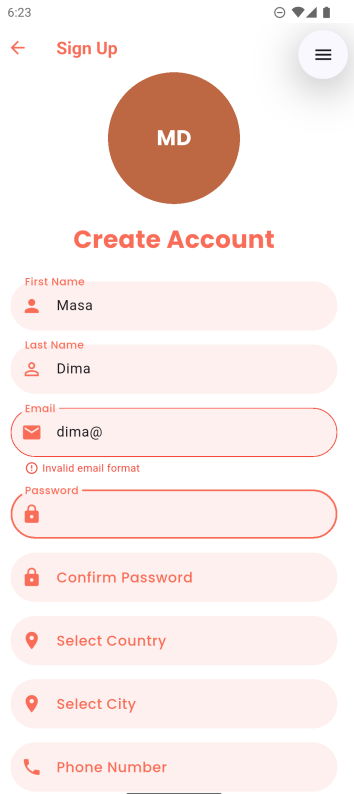
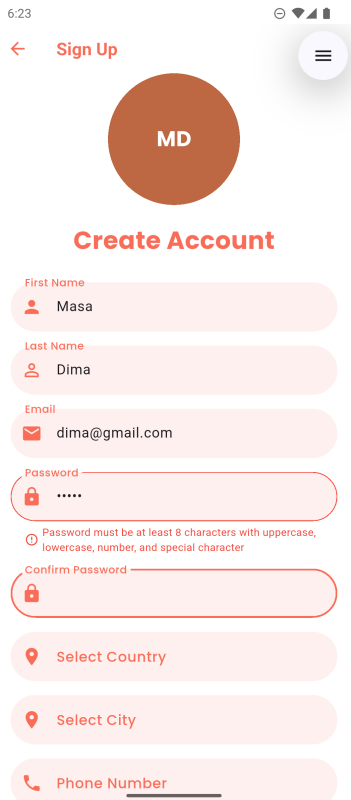


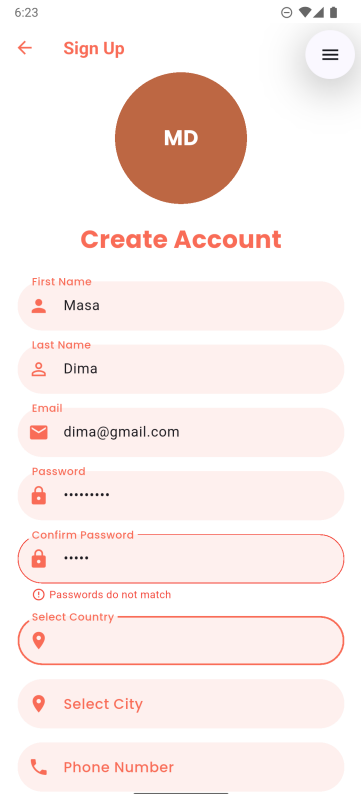
Figure 3.3: Sign-up screens (1/3).



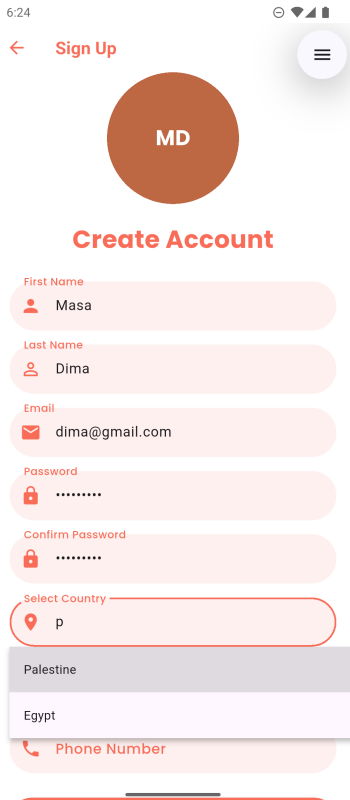
(a) Email format validation.



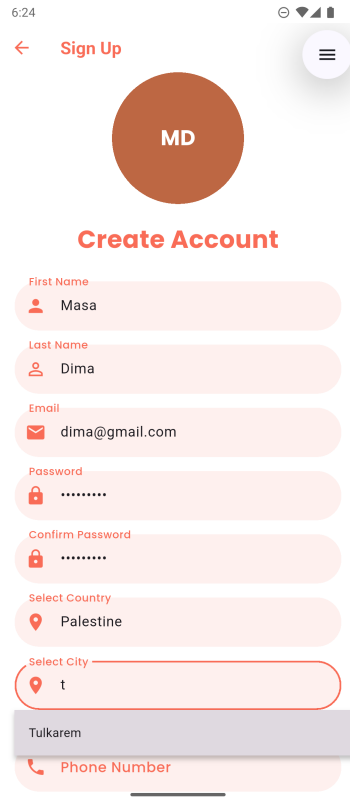
(b) Password strength check.



(c) Password match check.

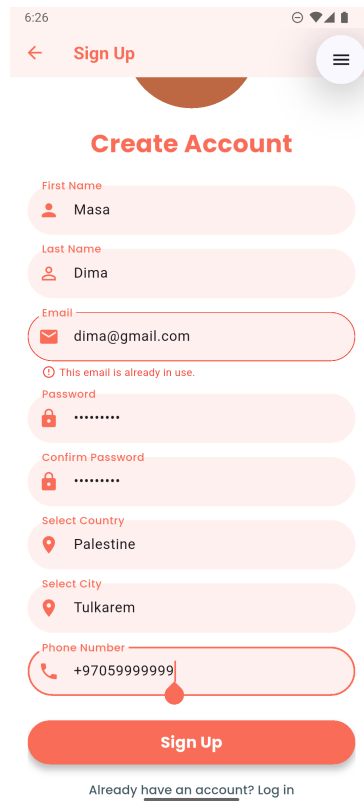
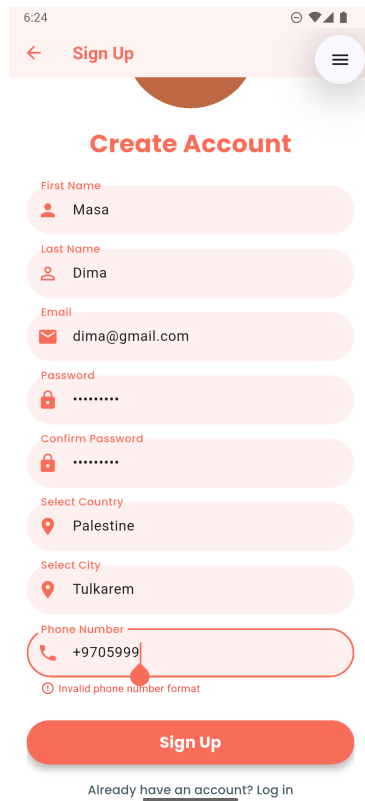


(d) Select country.



(e) Select city.

Figure 3.4: Sign-up screens (2/3).



(a) Phone number format

(b) Email duplication check.

Figure 3.5: Sign-up screens (3/3).

After the system verifies that the email is not already in use, it sends a verification code to the user's email address. This code must be entered in the verification screen to complete account activation.

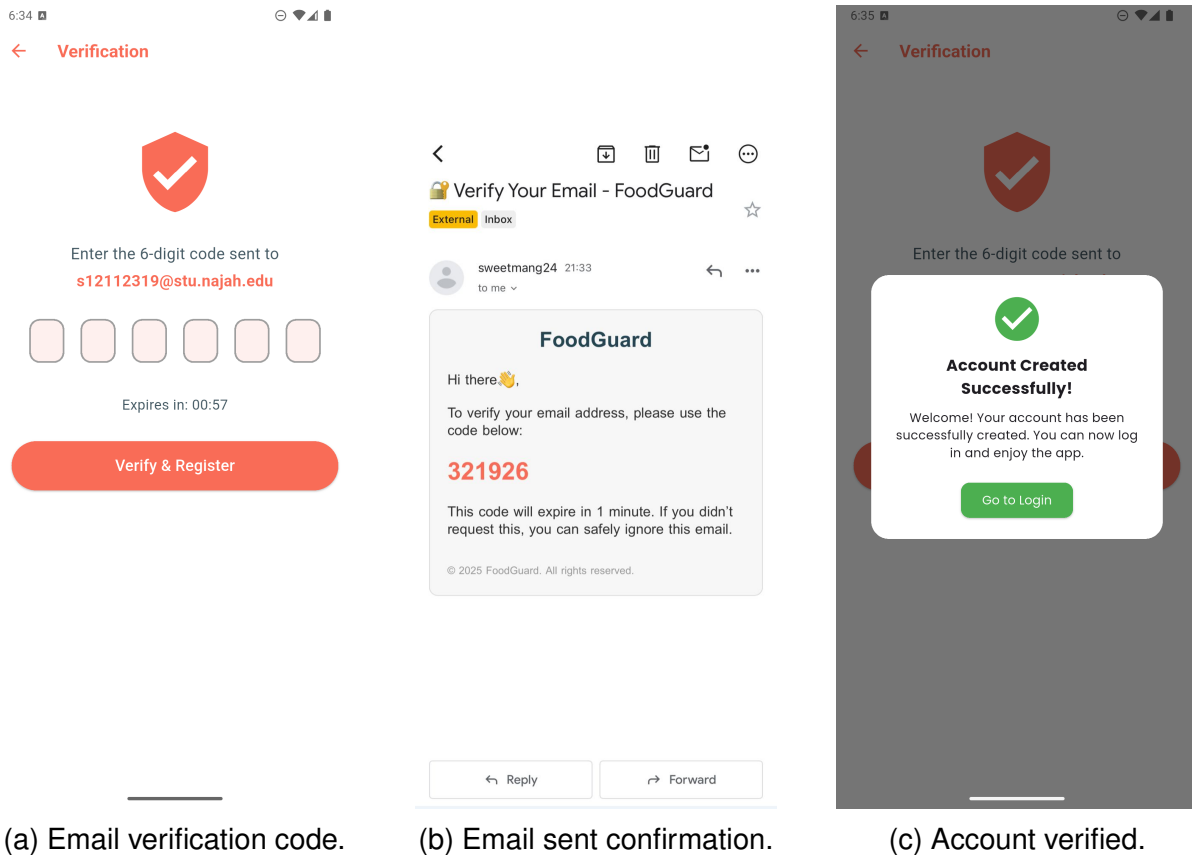
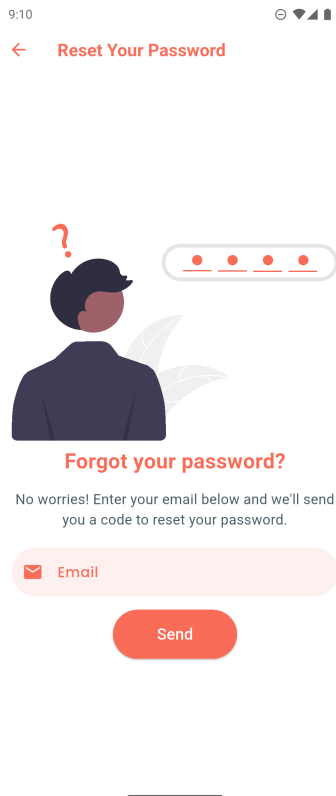


Figure 3.6: Email verification process.

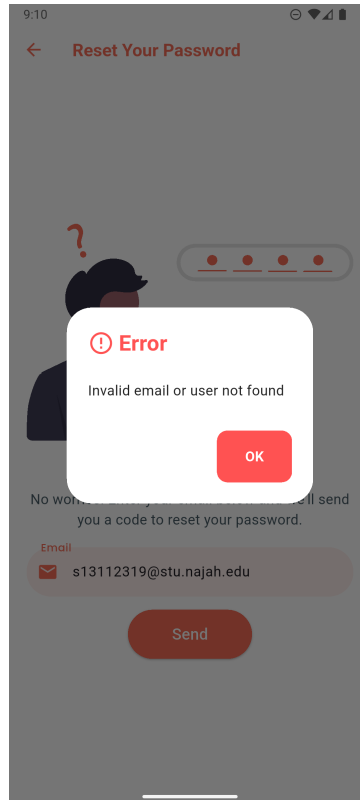
- **Forgot Password Screens**

- **Step 1: Requesting Password Reset and Email Validation**

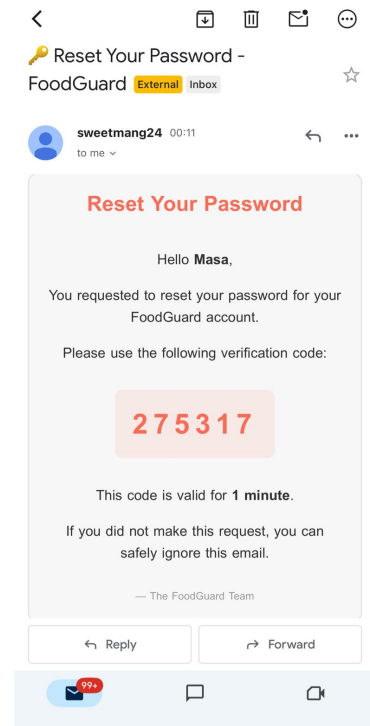
- When users forget their password, they can initiate the reset process by entering their registered email address. The system instantly checks if the email exists in the database. If the email is not found, an error message is shown. Otherwise, a verification code is sent to the provided email address.



(a) Forgot Password screen



(b) Email existence check

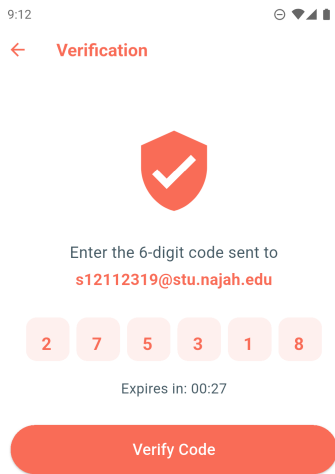


(c) Reset code sent to email

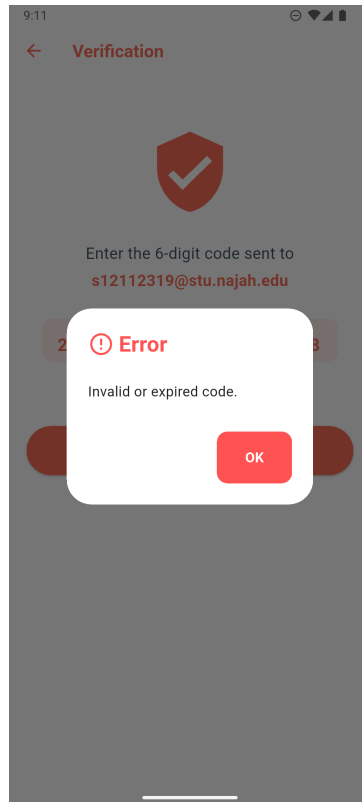
Figure 3.7: Password reset request and email validation steps.

Step 2: Code Verification and Error Handling

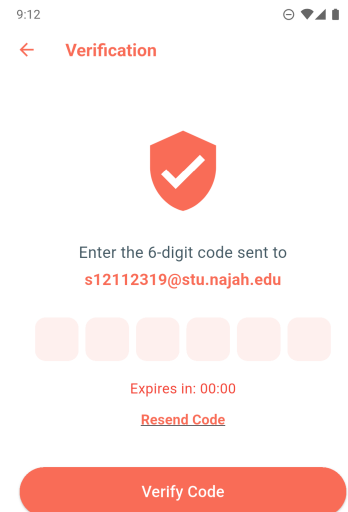
After receiving the verification code, the user is required to enter it in the provided field. The system validates the code in real-time. If the code is incorrect, expired, or invalid, the user receives appropriate error feedback. There is also an option to resend the code if needed.



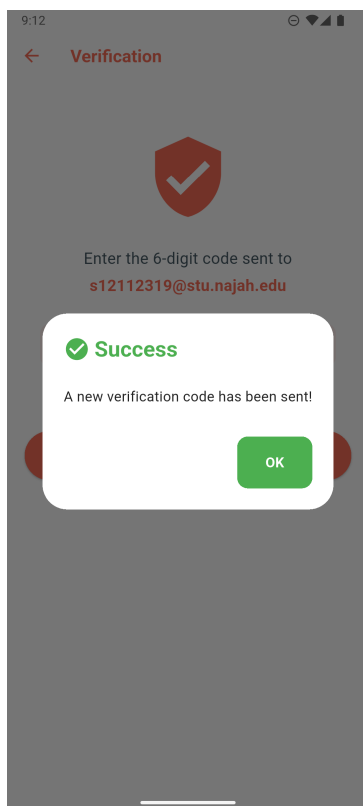
(a) Incorrect code entry.



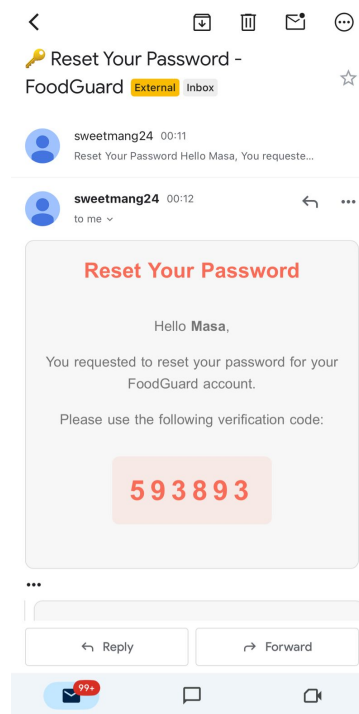
(b) Verification error.



(c) Expired verification code.



(d) Resend verification code.



(e) Resent code email.

Figure 3.8: Verification code entry and handling invalid or expired cases.

Step 3: Resetting Password and Confirmation

Once the correct verification code is entered, the user is redirected to a new screen where they can set a new password. After entering and confirming the new password, the system successfully updates it and notifies the user of the reset completion.

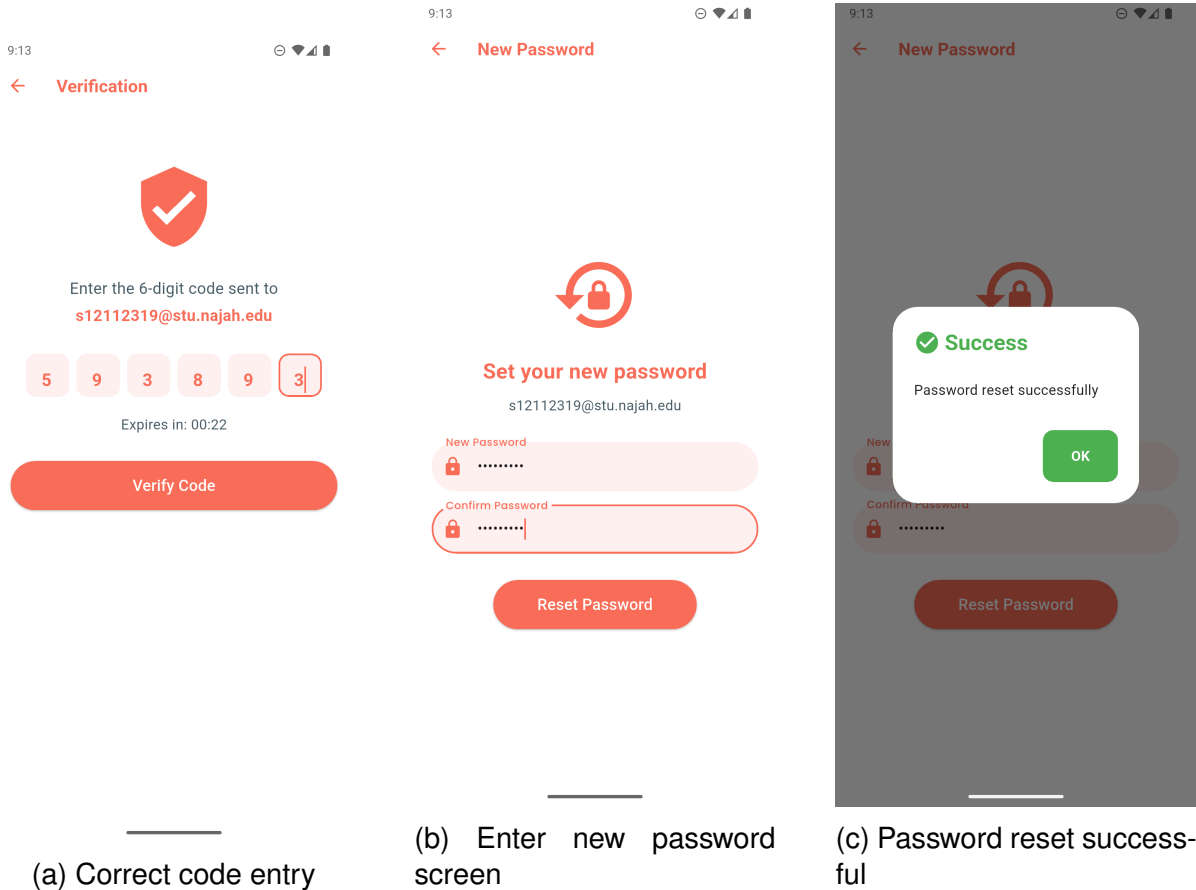


Figure 3.9: Final steps: password reset and confirmation.

3. User Home Page

The user home page is the first screen that appears after logging into the app. It is designed to be simple, engaging, and informative, helping users quickly access important content and features.

It contains several key sections that enhance the user experience and promote daily interaction with the app:

3.1 Daily Motivation and Animated Fact

At the top of the home page, users are welcomed with a motivational message that changes daily. This message encourages users to adopt positive habits and reduce food waste.

Beneath the daily motivation, an animated section displays food-related facts that change every few seconds. This interactive feature educates users in a light and engaging way.

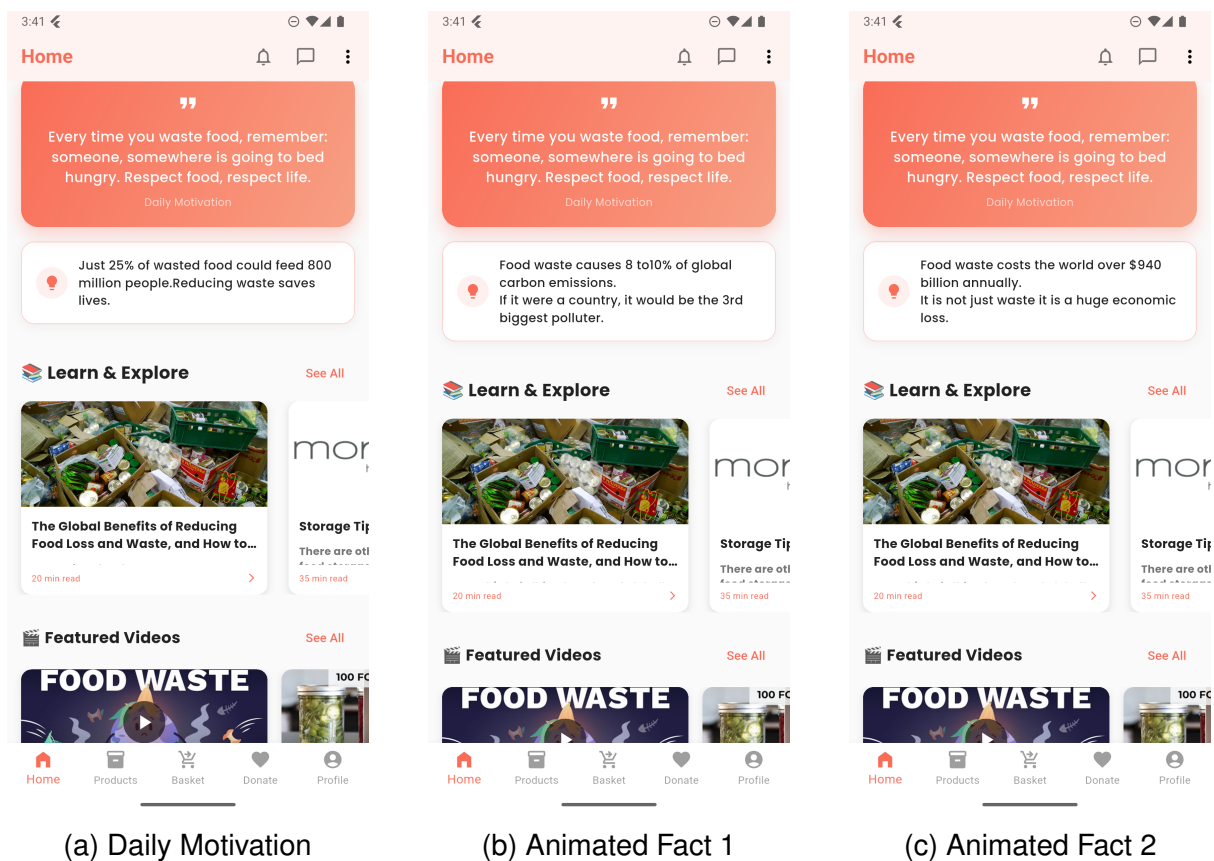


Figure 3.10: Top section of the home page showing daily motivation and animated facts.

3.2 Educational Articles

The home page includes a section for educational articles posted by the admin. These articles provide users with practical advice, awareness messages, and tips related to food storage, donation, and waste reduction.

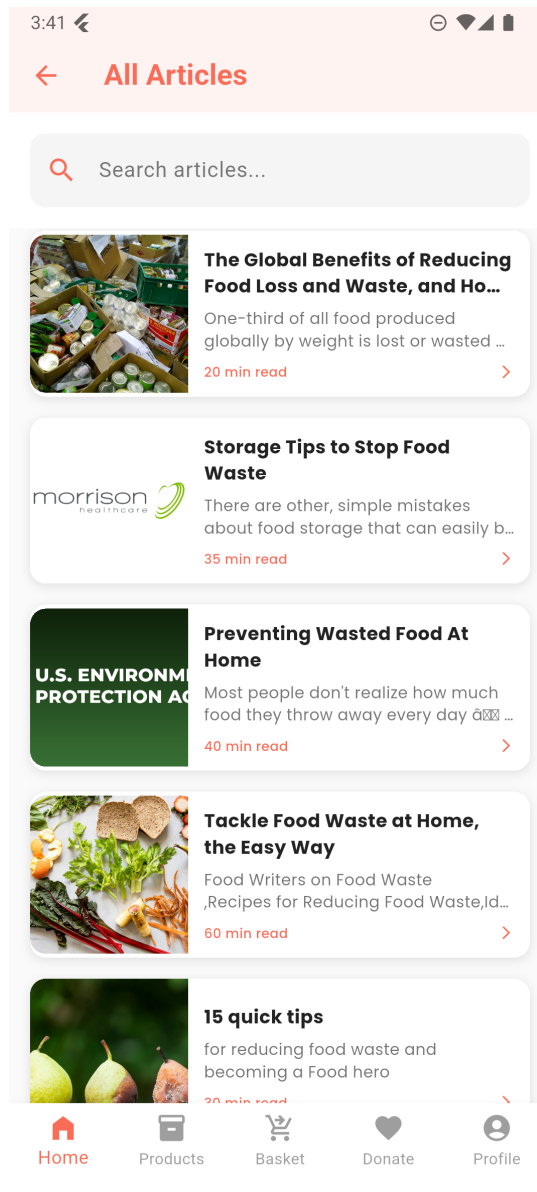
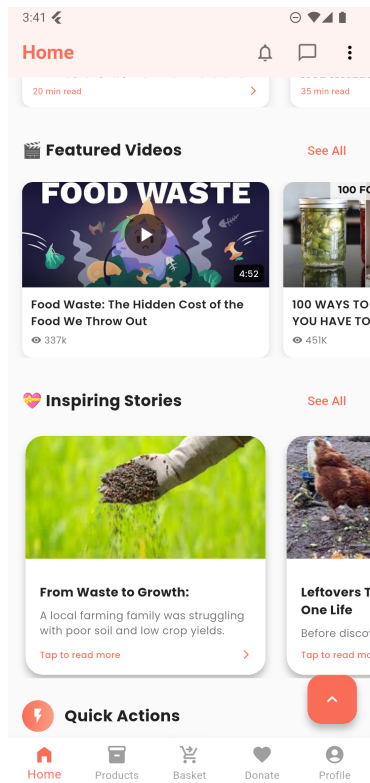


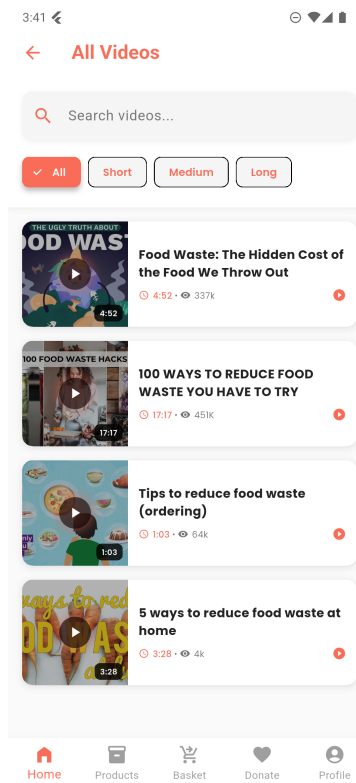
Figure 3.11: An educational article displayed on the home page.

3.4 Awareness Videos with Filter Options

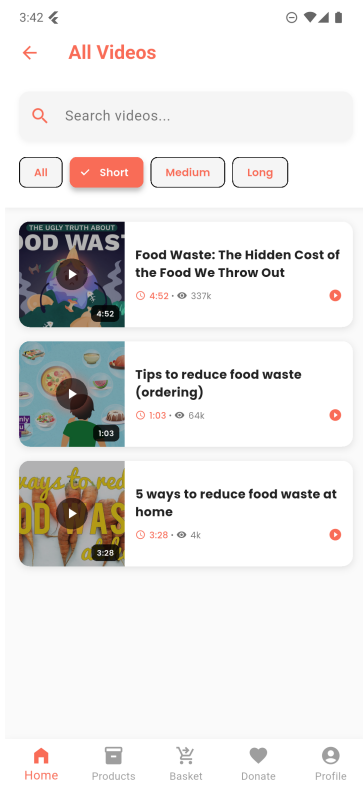
A dedicated section displays awareness videos published by the admin. Users can filter these videos based on their length: short, medium, or long. This allows users to choose the content format that fits their time and interest.



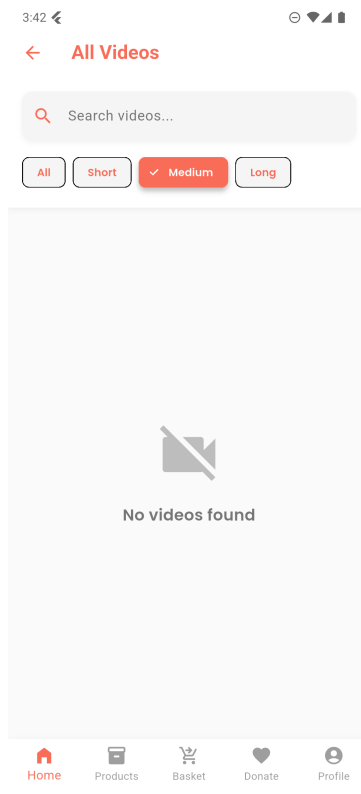
(a) Featured Videos section in the home page



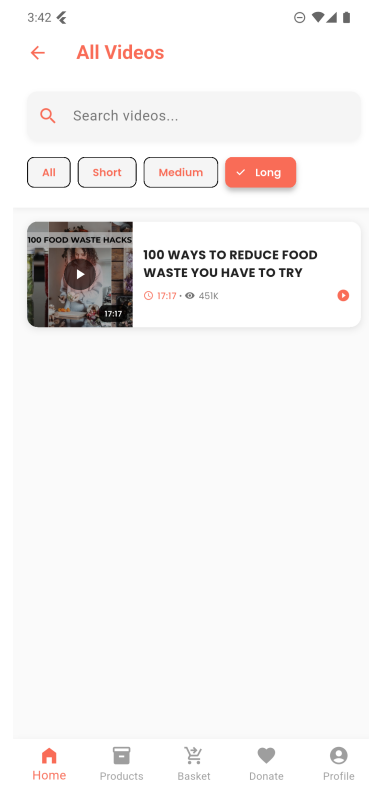
(b) All Videos tab displaying all awareness videos



(c) Videos filtered by short duration



(d) Videos filtered by medium duration



(e) Videos filtered by long duration

Figure 3.12: Awareness videos shown in various views with duration filters.

3.5 Inspiring Stories

The Inspiring Stories section highlights real-life experiences of individuals or communities who contributed positively to reducing food waste or helping others through food donations. These stories aim to motivate users by showcasing meaningful actions and encouraging social responsibility.

Each story card includes a title, a brief description, and an image to summarize the story. Users can tap on any card to open a detailed view that contains the full story, the contributor's name, and a larger image. This interactive layout helps create emotional engagement and promotes a culture of sharing and sustainability.

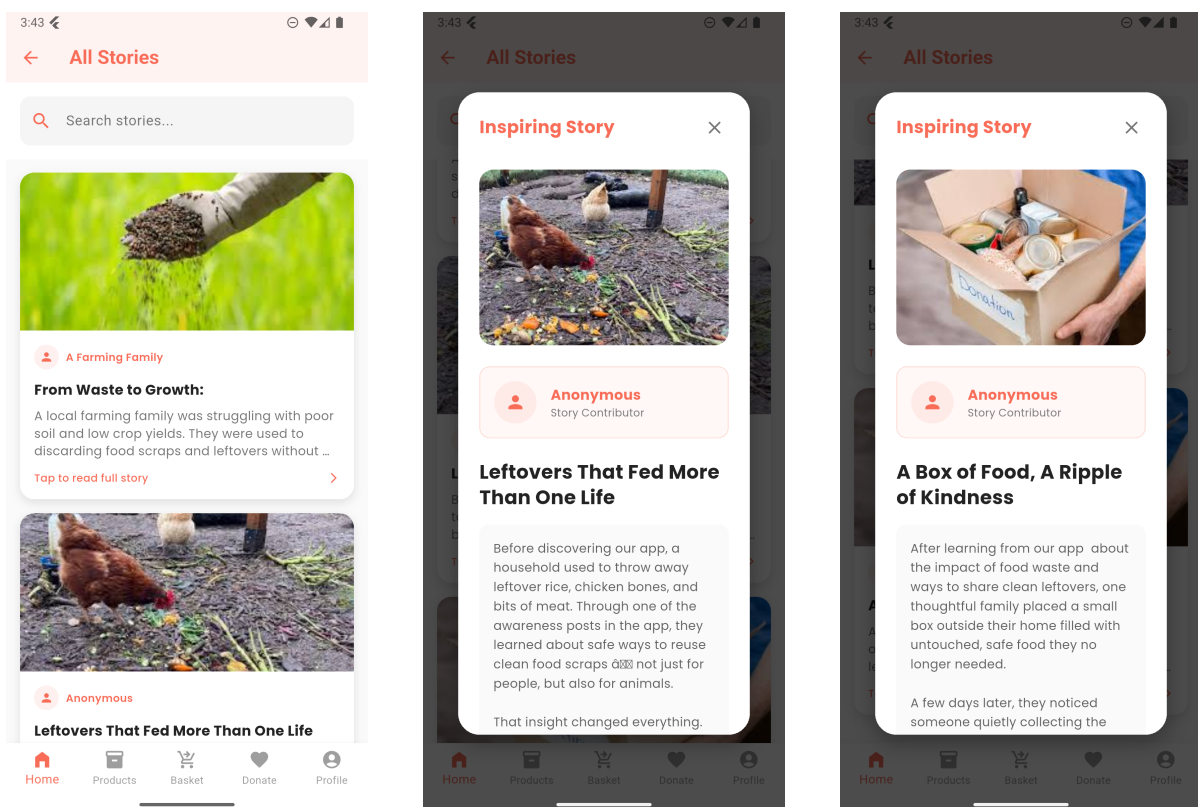


Figure 3.13: Inspiring stories with detailed view.

3.6 AI-Based Smart Suggestions

To support users in minimizing food waste, the application integrates artificial intelligence through two key features. The first, **Recipe AI**, intelligently generates recipes based on the ingredients entered by the user. The second, **Reuse Leftovers**, offers creative suggestions to turn leftover food into new, nutritious meals. These AI-powered tools empower users to make the most of their groceries and reduce unnecessary waste.

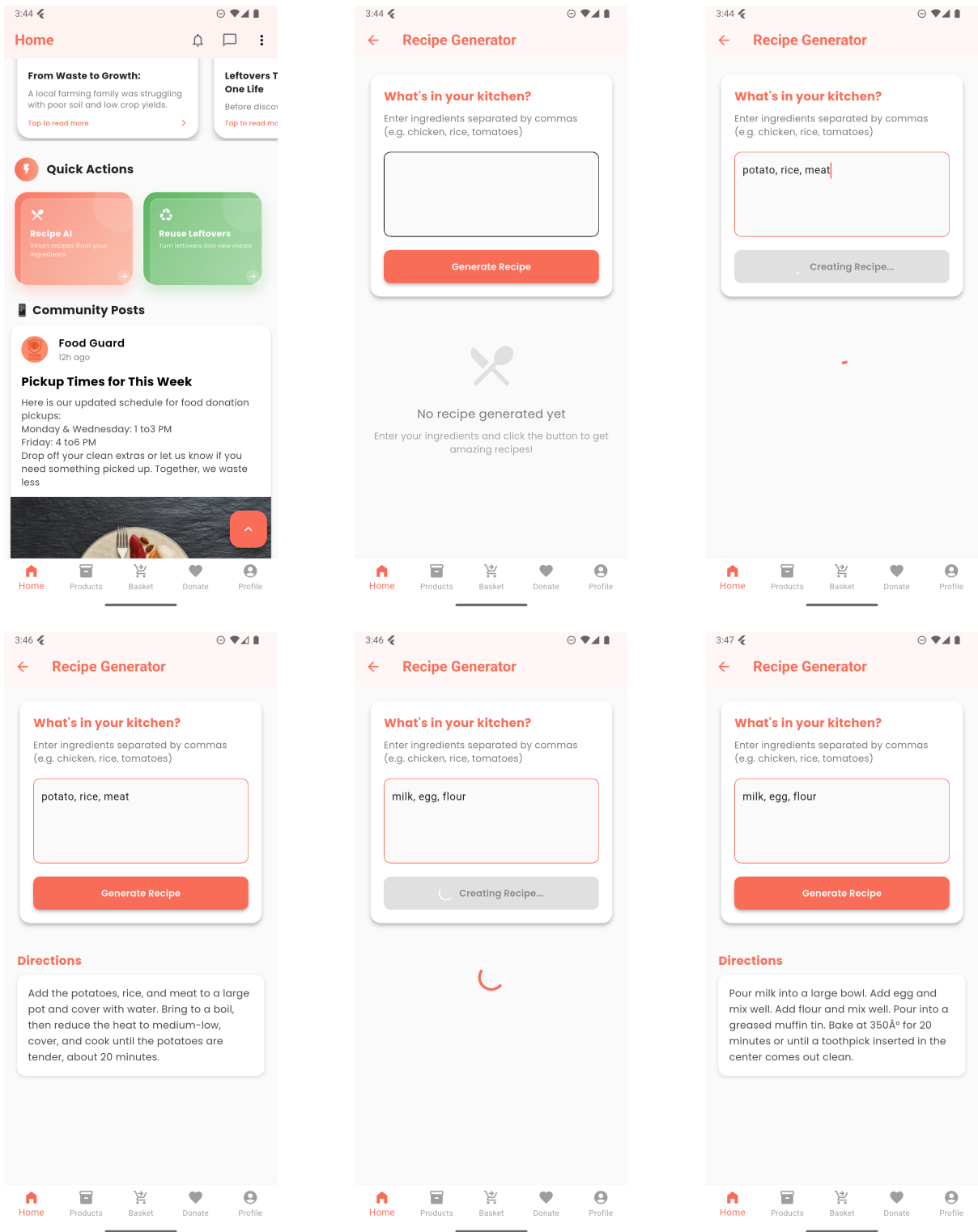


Figure 3.14: AI feature that suggests meals based on available ingredients.

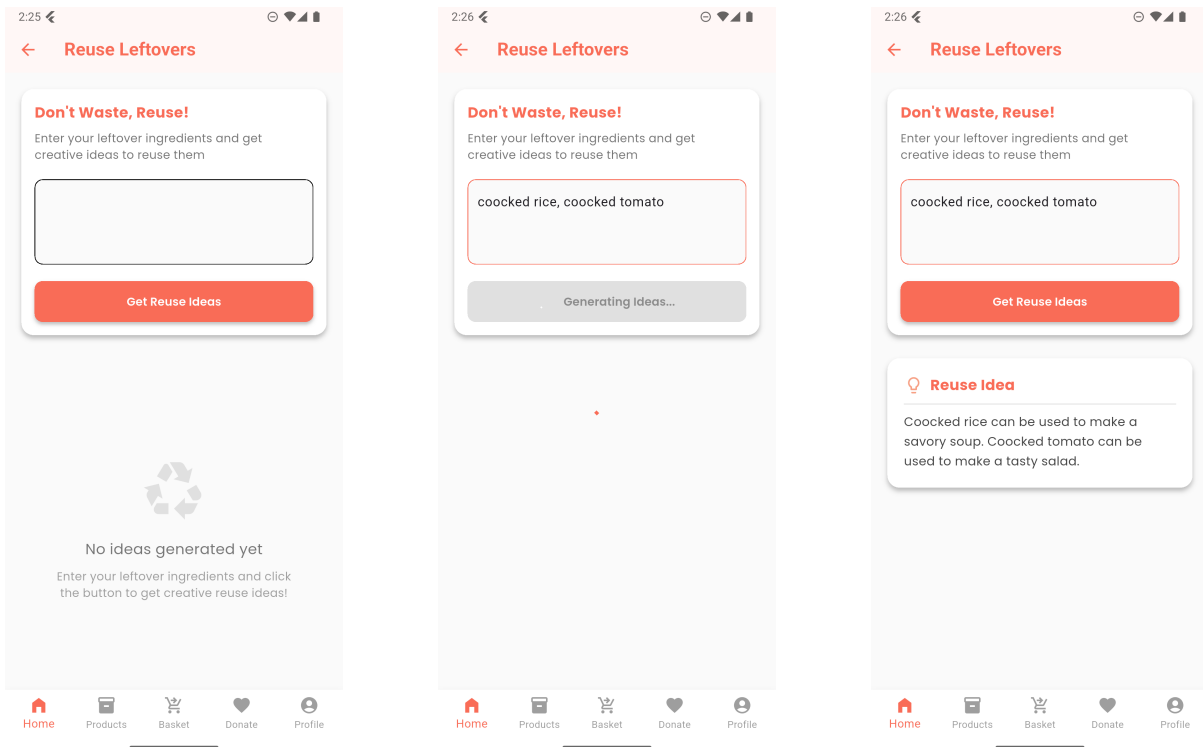


Figure 3.15: AI feature that suggests creative ways to reuse leftover food.

3.7 Admin Posts Displayed to Users

This section displays the posts published by the admin, which appear on the user's home page to deliver either awareness-related content or important community announcements, such as food collection events or meeting locations. Users can interact with these posts by liking them or saving them for future reference.

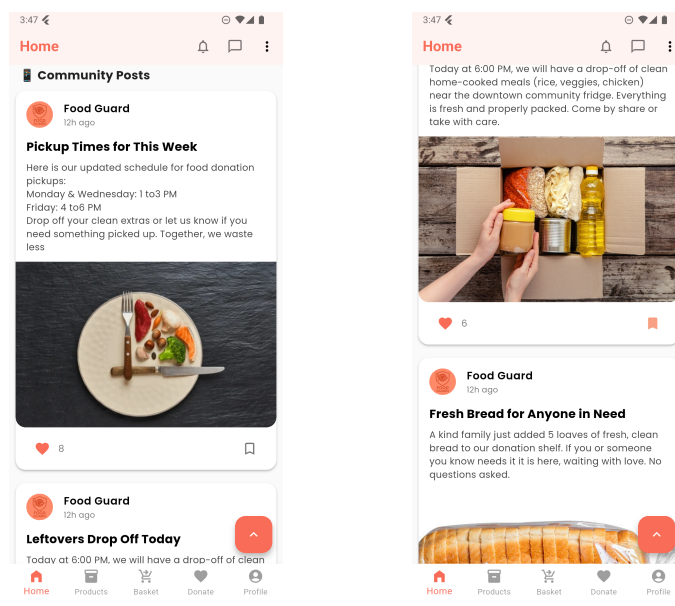
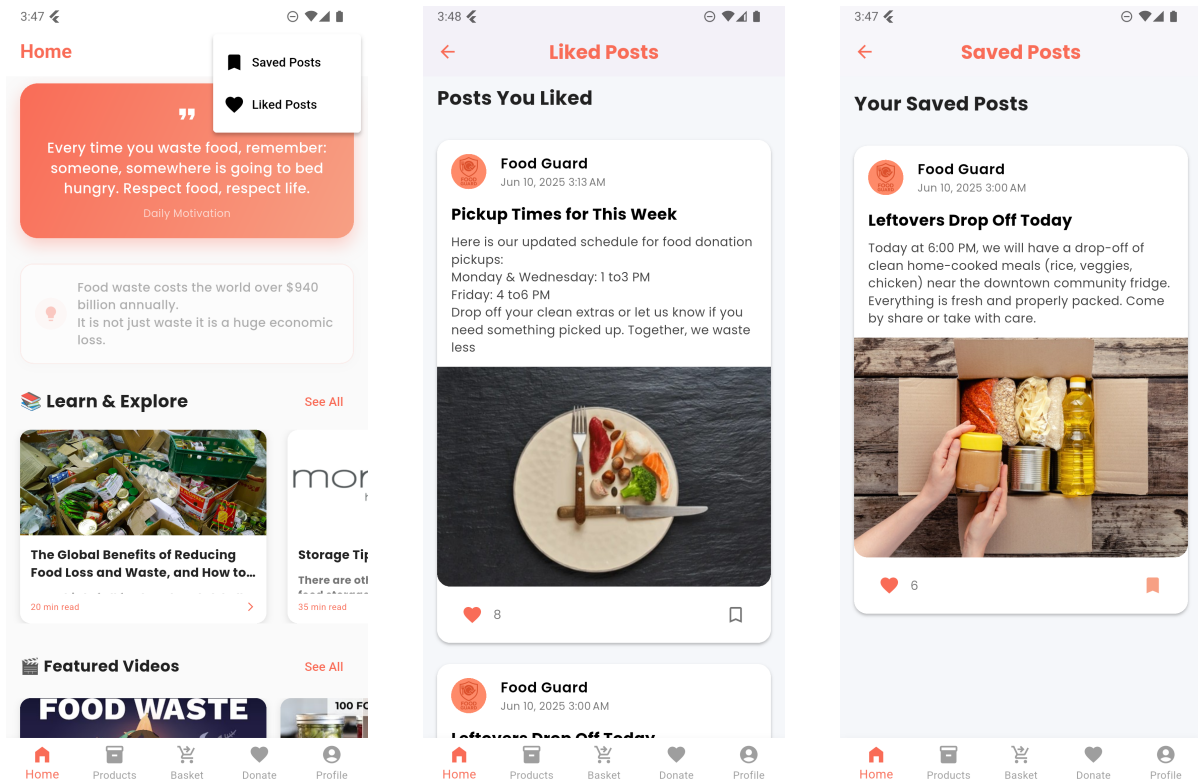


Figure 3.16: Display of posts published by the admin to the user.

Users can access the posts they have interacted with through two dedicated sections: one for liked posts and another for saved posts. Each section provides an organized view of the corresponding posts for easy reference.



(a) Open like or save.

(b) Liked posts section.

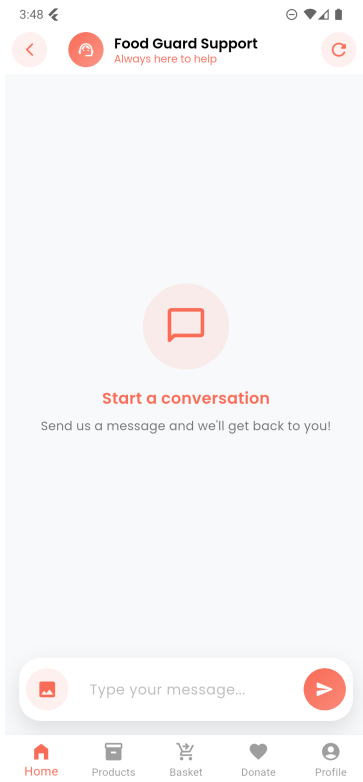
(c) Saved posts section.

Figure 3.17: User views for posts they have liked or saved for later.

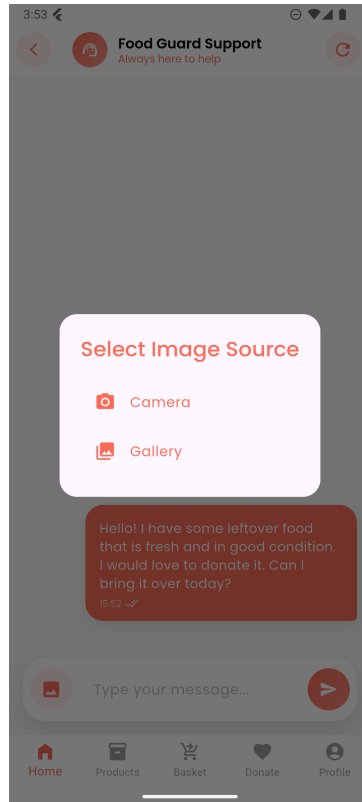
3.8 Chat with Admin

The application includes a built-in chat feature that allows users to communicate directly with the admin. This feature enables users to ask questions, seek help, or request support regarding food-saving practices or app usage.

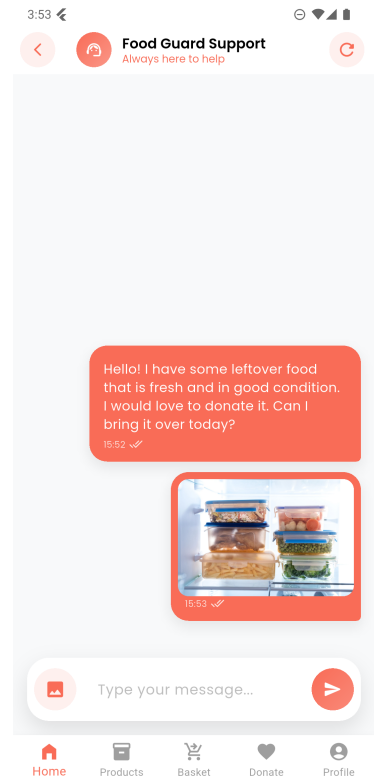
Initially, the chat appears empty. Users can send text messages as well as images. Once a message or image is sent, it appears in the conversation thread. When the admin replies, a notification badge appears on the chat icon on the home page, and the updated conversation shows the admin's response clearly.



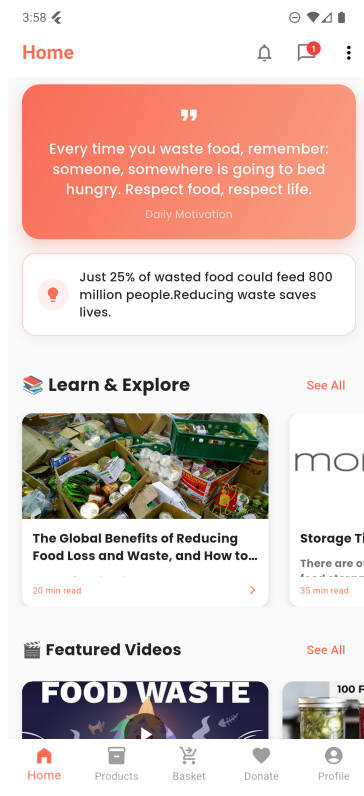
(a) Empty chat screen.



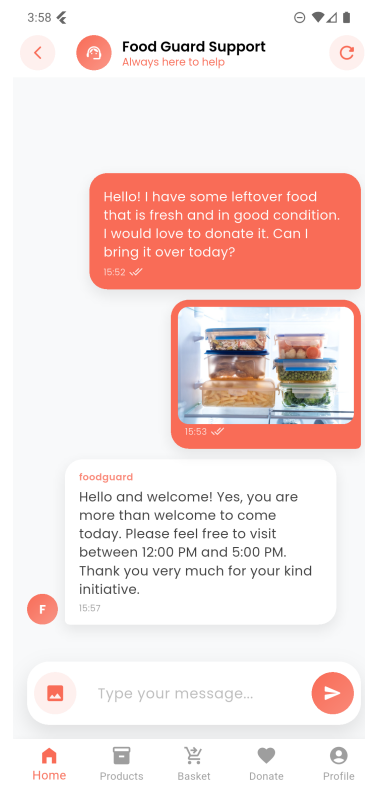
(b) User sends a message.



(c) User sends an image.



(d) Unread message badge shown on the home page.



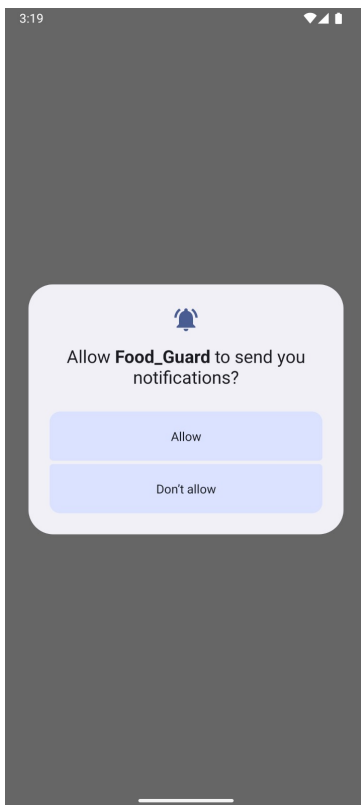
(e) Admin's reply in chat..

Figure 3.18: User-admin chat interface.

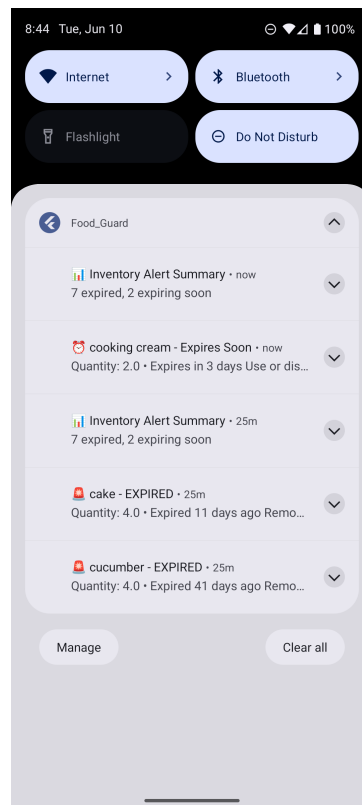
3.9 Smart Notification System

The application includes a smart notification system that alerts users about the status of their inventory items in a timely and actionable way. Notifications are categorized into three types:

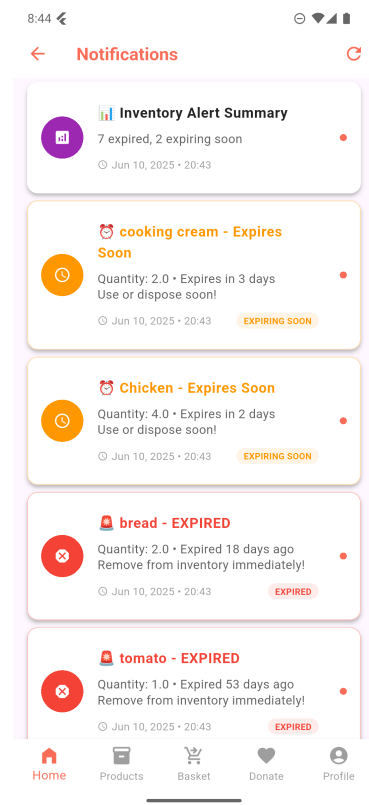
- **Early Alerts:** Triggered when a product is marked as *Expires Soon*, encouraging users to consume or donate it before it goes to waste.
- **Urgent Alerts:** Sent on the day a product expires, prompting immediate user attention.
- **Late Reminders:** Issued for already expired products, reminding users to properly dispose of them.



(a) Permission dialog for notifications.



(b) System notification panel with expiry alerts.



(c) In-app categorized expiry notifications.

Figure 3.19: Examples of notification flows in *Food Guard*.

4. Inventory

The inventory management system is a core component of the Food Guard application. It allows users to track their stored food products at home, monitor their quantity and expiration status, and ultimately reduce food waste while promoting better consumption awareness.

The inventory interface presents a detailed list of all products added by the user. For each item, the following information is displayed:

- Product name
- Remaining quantity
- Unit (e.g., item, kg, liter, bottle)
- Expiry date
- Storage location (fridge, freezer, pantry, etc.)
- Product status (Good, expiring soon, or expired)
- Whether the product is opened
- Product image (if available)

Users can add new products through a structured form that includes sections for basic information, expiry behavior, and additional optional details. The design focuses on clarity and ease of use, with drop-down menus for product type, storage location, expiry behavior, and measurement unit.

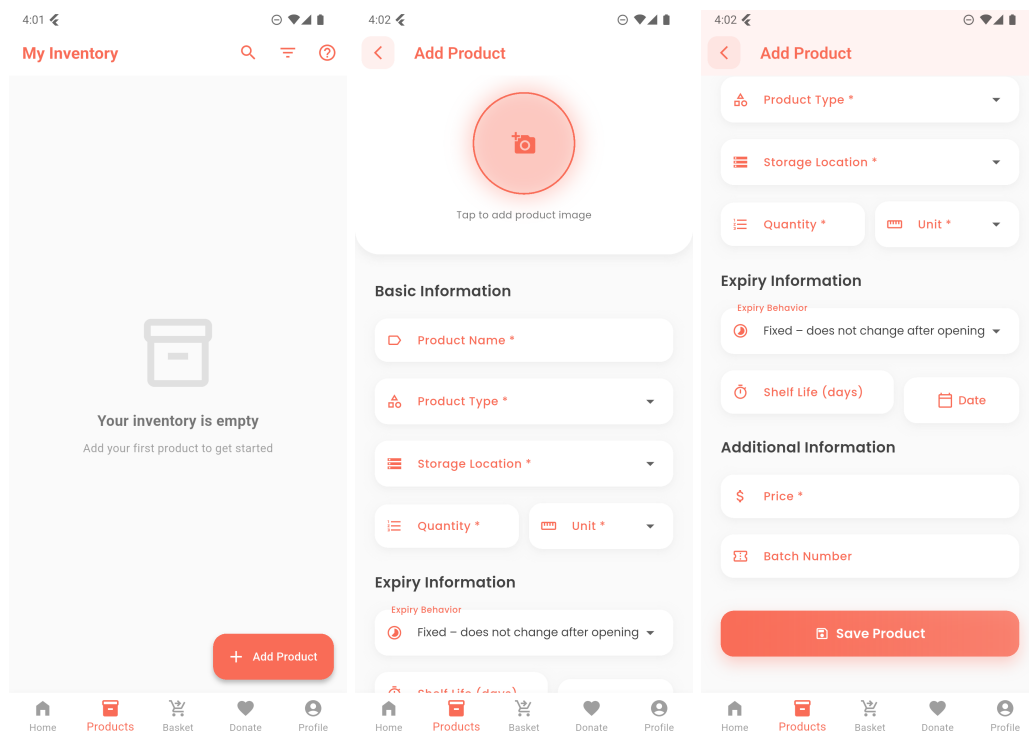


Figure 3.20: Basic product addition interface

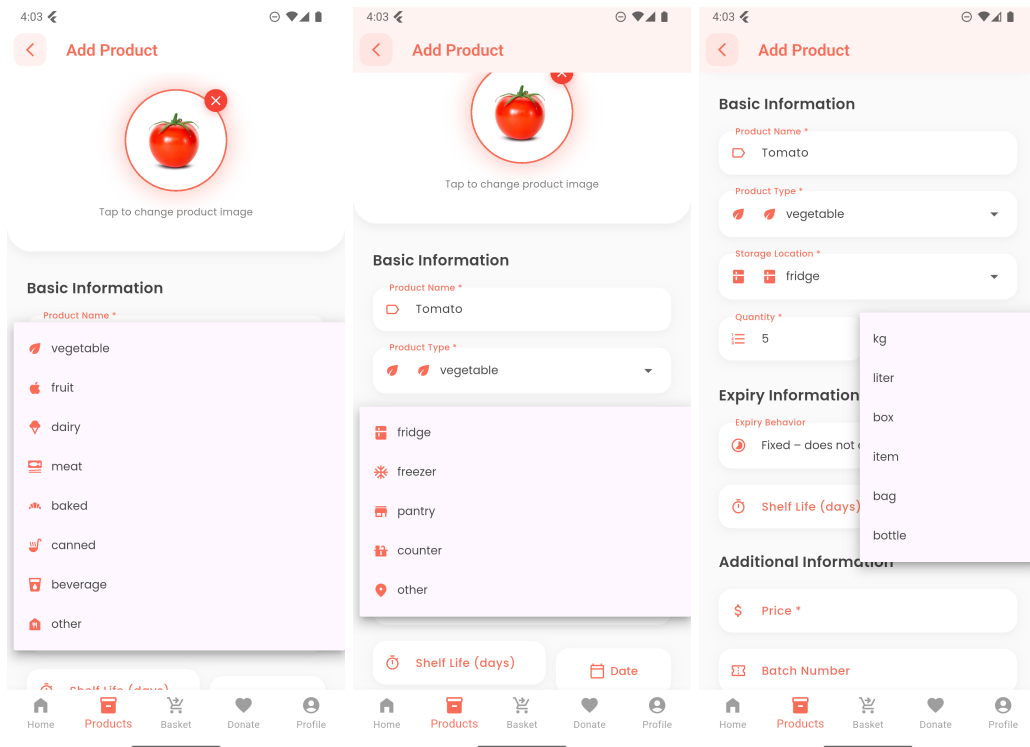


Figure 3.21: Dropdown menus for type, storage, and unit

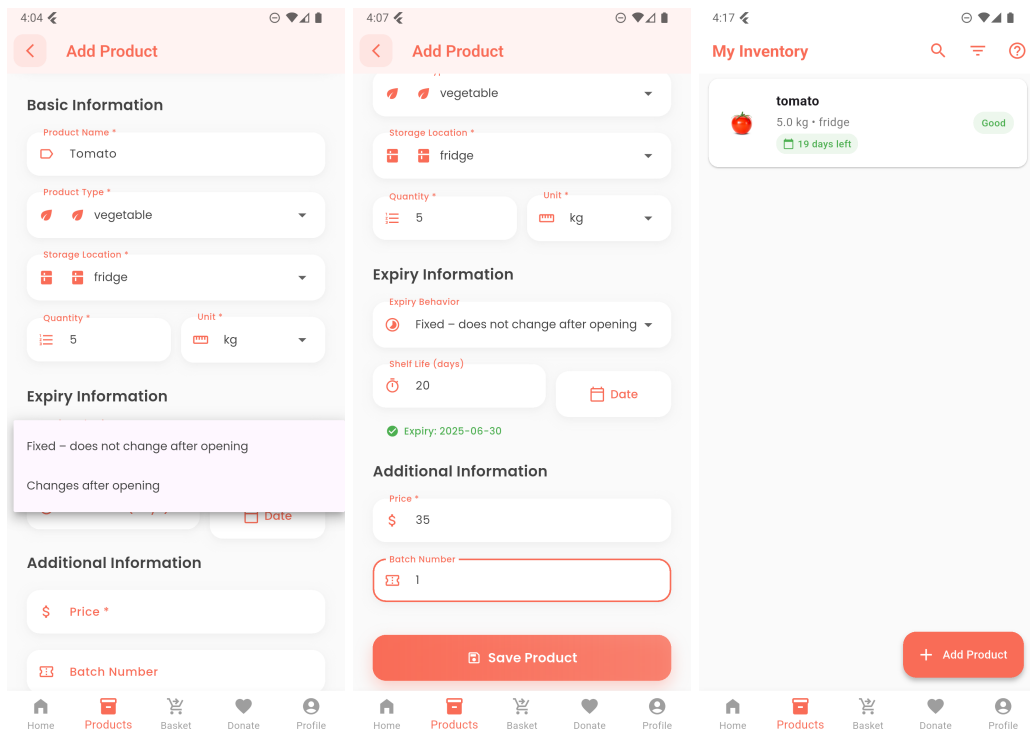
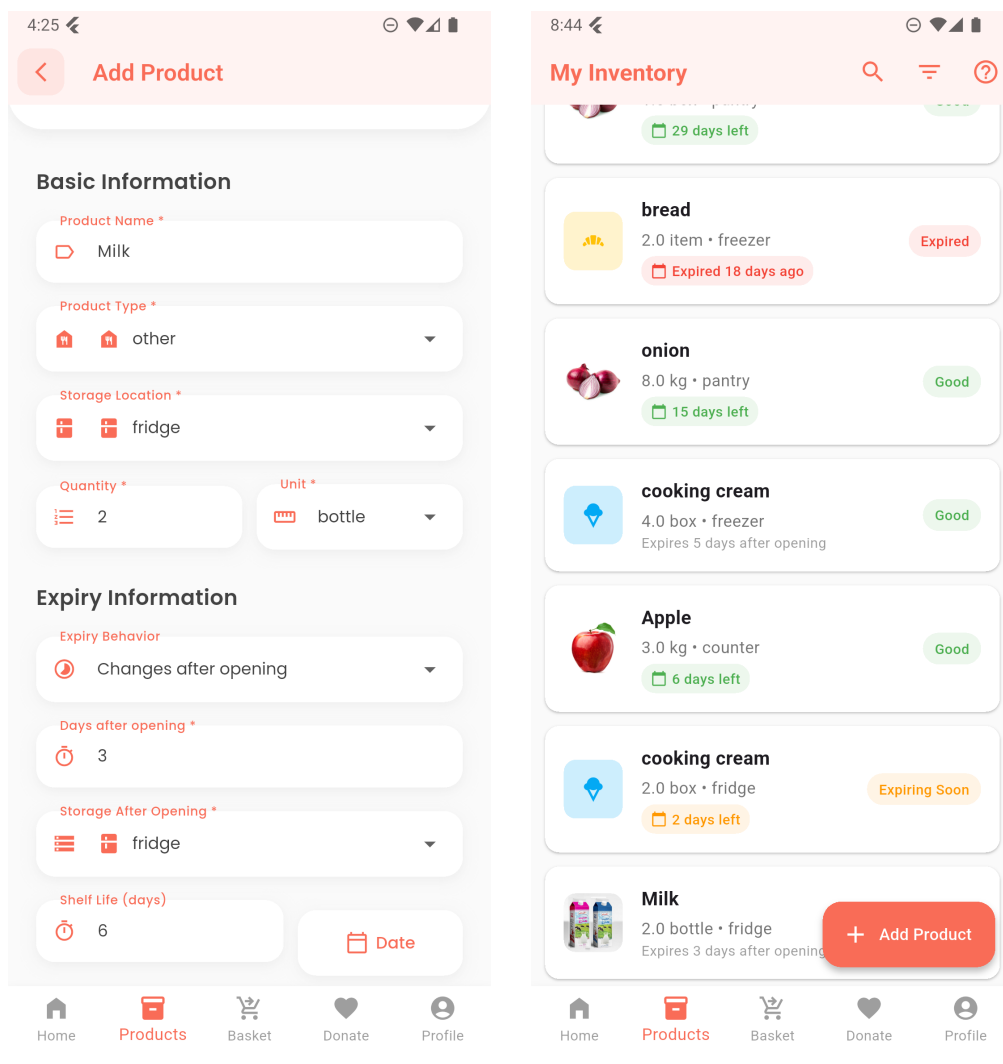


Figure 3.22: Expiry behavior options Fixed and product preview in inventory

4.1 Open Product Feature

Some food products, such as milk or juice, change their expiry date after opening. For these cases, Food Guard provides an “Open Product” feature that enables the user to:

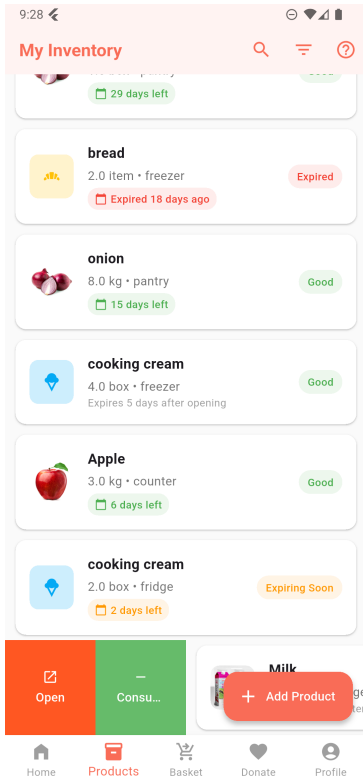
- Reduce the quantity from the original product.
- Automatically generate a new product entry with:
 - Opening date
 - Number of days until expiry after opening
 - New storage location (if different)
- Maintain a link between the opened product and the original one.



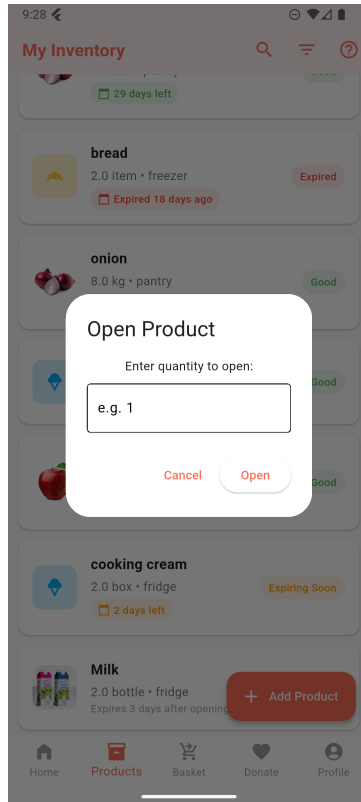
(a) Adding a product with post-opening expiry settings.

(b) Product appears with “Expires after opening” status.

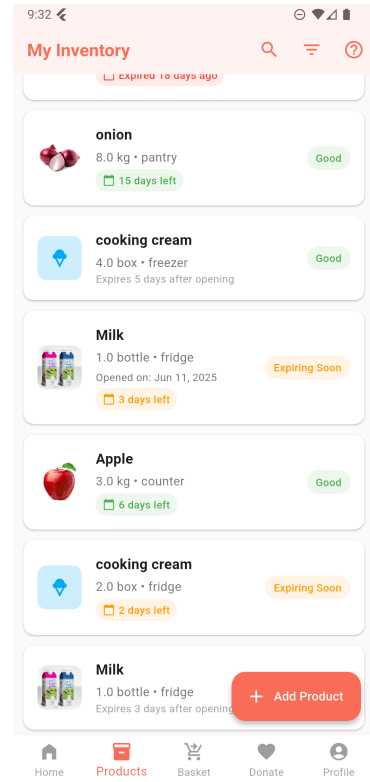
Figure 3.23: Product added with expiry changes upon opening.



(a) Slide options include "Open".

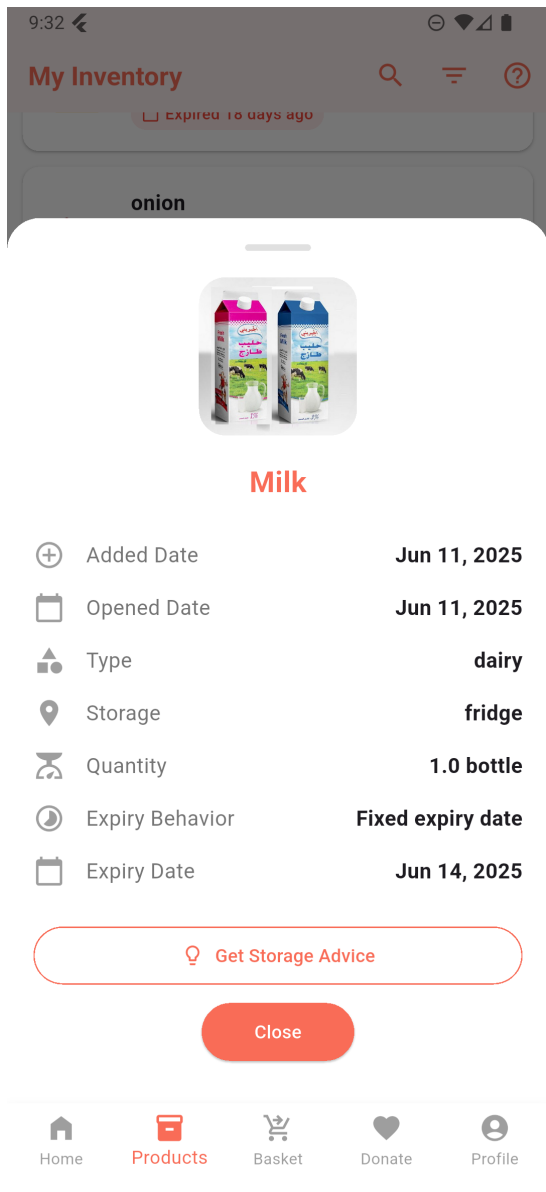


(b) Dialog to enter the quantity to open.

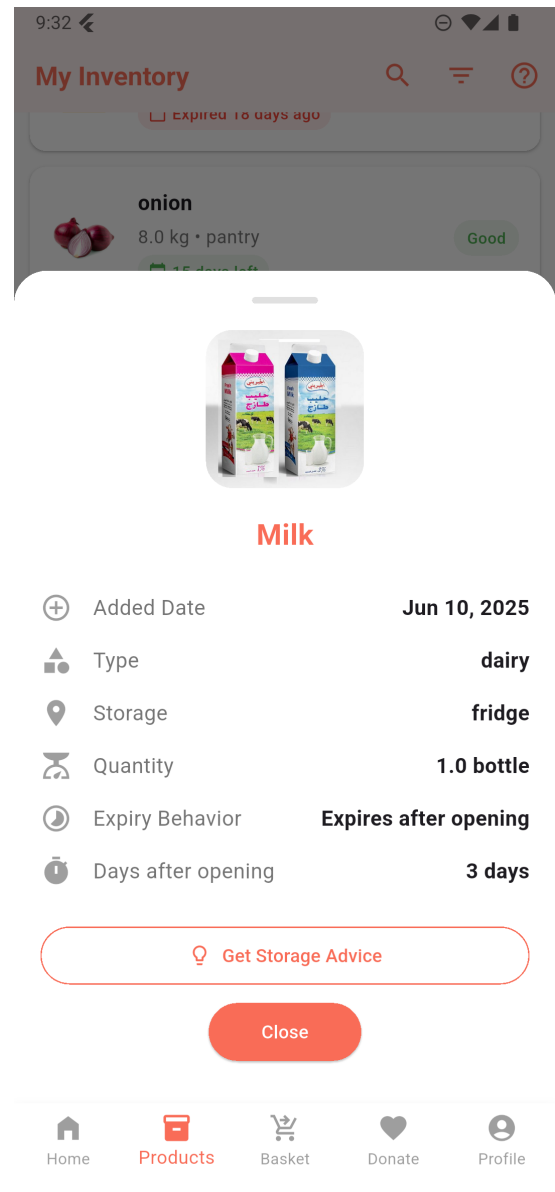


(c) New product created with updated expiry based on opening.

Figure 3.24: Process of opening the product and generating a new entry.



(a) Details of the opened product showing opening and expiry date.



(b) Initial product remains listed with reduced quantity.

Figure 3.25: Tracking both opened and original products after the split.

4.2 Partial or Full Consumption

The consumption feature allows users to manage product quantities accurately—either by consuming part of the quantity or the entire amount.

By tapping the **Consume** button next to the product on the inventory screen, a dialog appears where the user can enter the desired quantity to consume.

Partial Consumption: The quantity is reduced directly in the active inventory. Additionally, a log entry is created in the `ProductLog` table with log type "consume", which includes the product ID, consumed quantity, and user ID.

Full Consumption: When the full quantity is consumed, the product is automatically removed from the active inventory. Its data is archived in the `ArchivedProduct` table. The archive reason is recorded as "full consume".

The following additional data is saved:

- (a) Final quantity consumed.
- (b) Archiving date (auto-set).
- (c) Days the product remained in inventory (from added date to archiving).

A full log entry is also created in the `ProductLog` table for traceability.

This process ensures complete documentation of user actions and enables future analytical insights regarding consumption behavior, waste patterns, and storage habits.

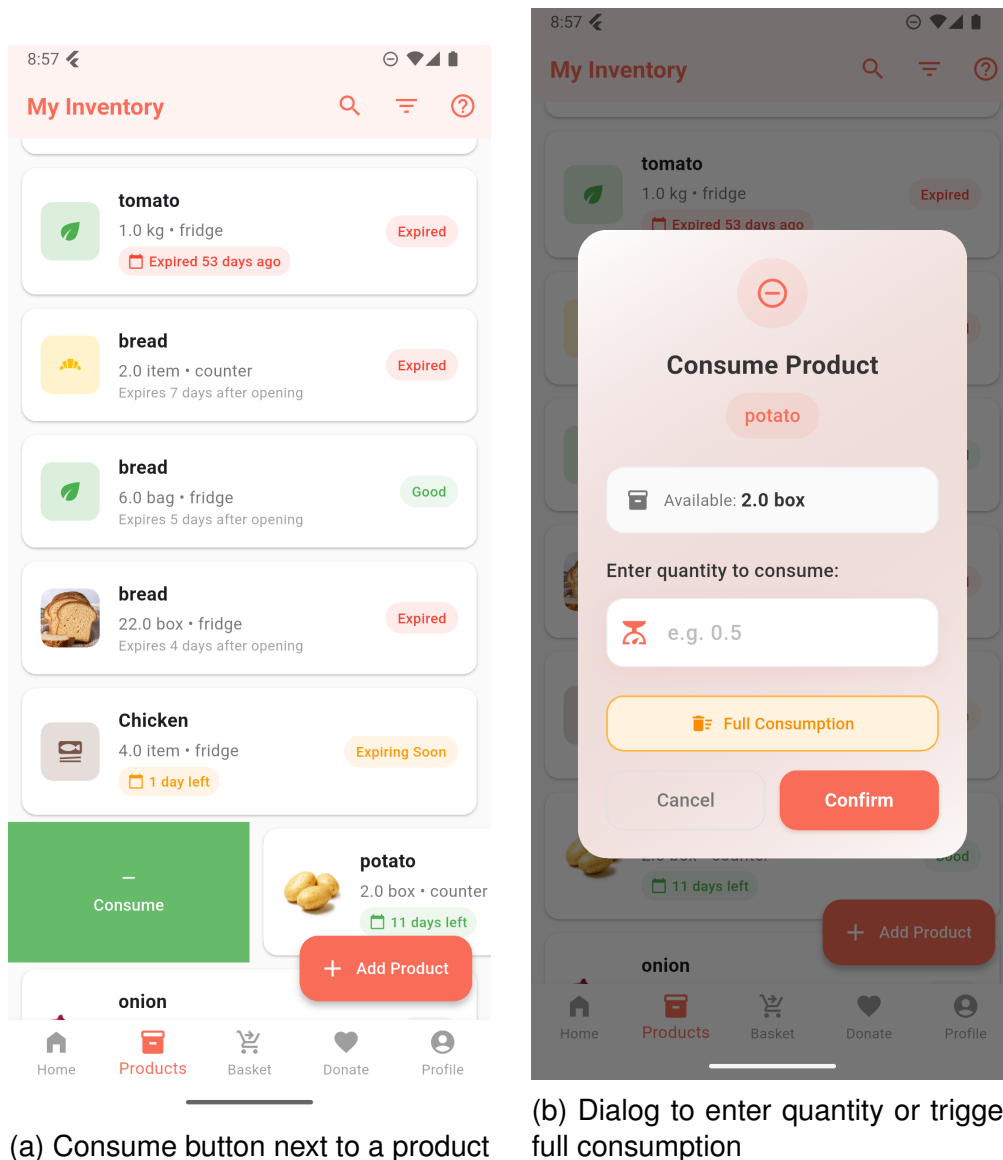
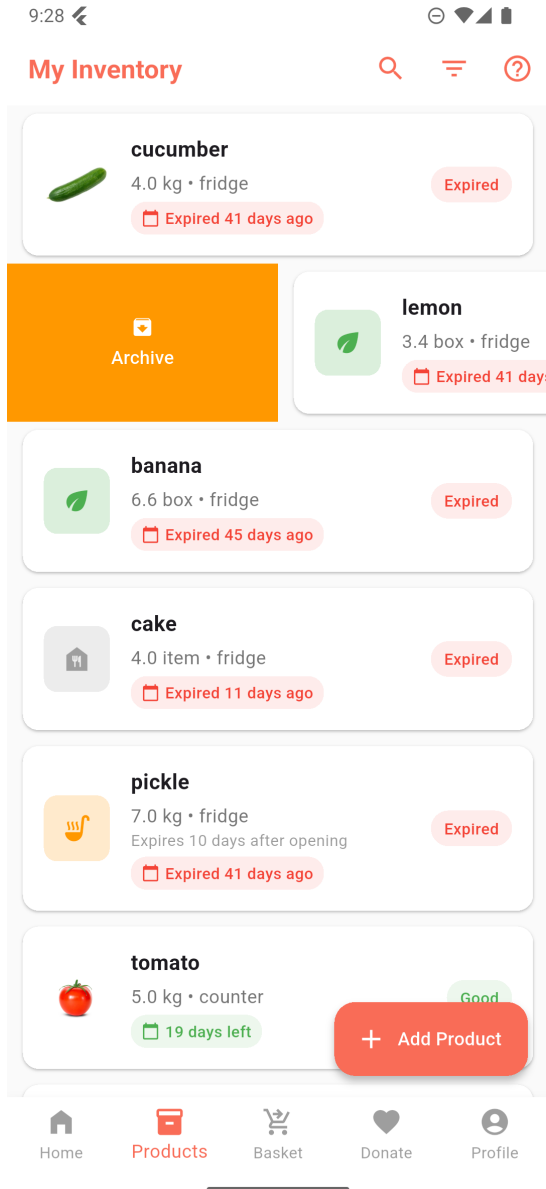


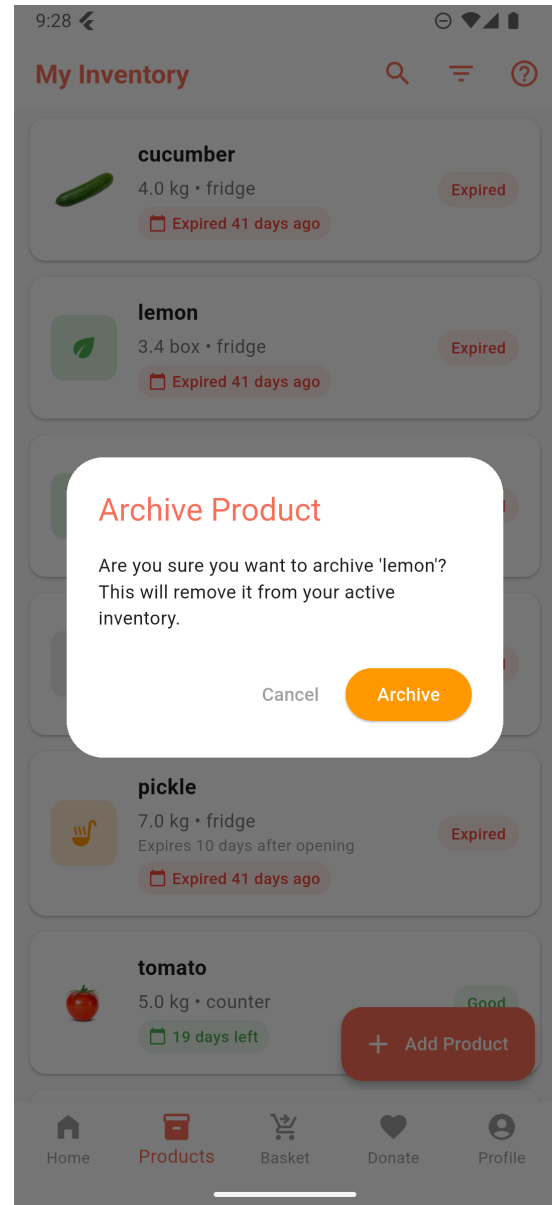
Figure 3.26: Consumption process: step-by-step interface

4.3 Manual Archiving

In the case of an expired product, the system does not archive it automatically. Instead, the **Consume** button is replaced with an **Archive** button. This design decision encourages users to consciously review expired items and take responsible actions. The user is prompted with a confirmation dialog to ensure intentional archiving. This approach promotes awareness of food waste and accountability by requiring the user to acknowledge each expired item before it is moved to the archive.



(a) Archive button appears for expired items



(b) User confirmation before archiving

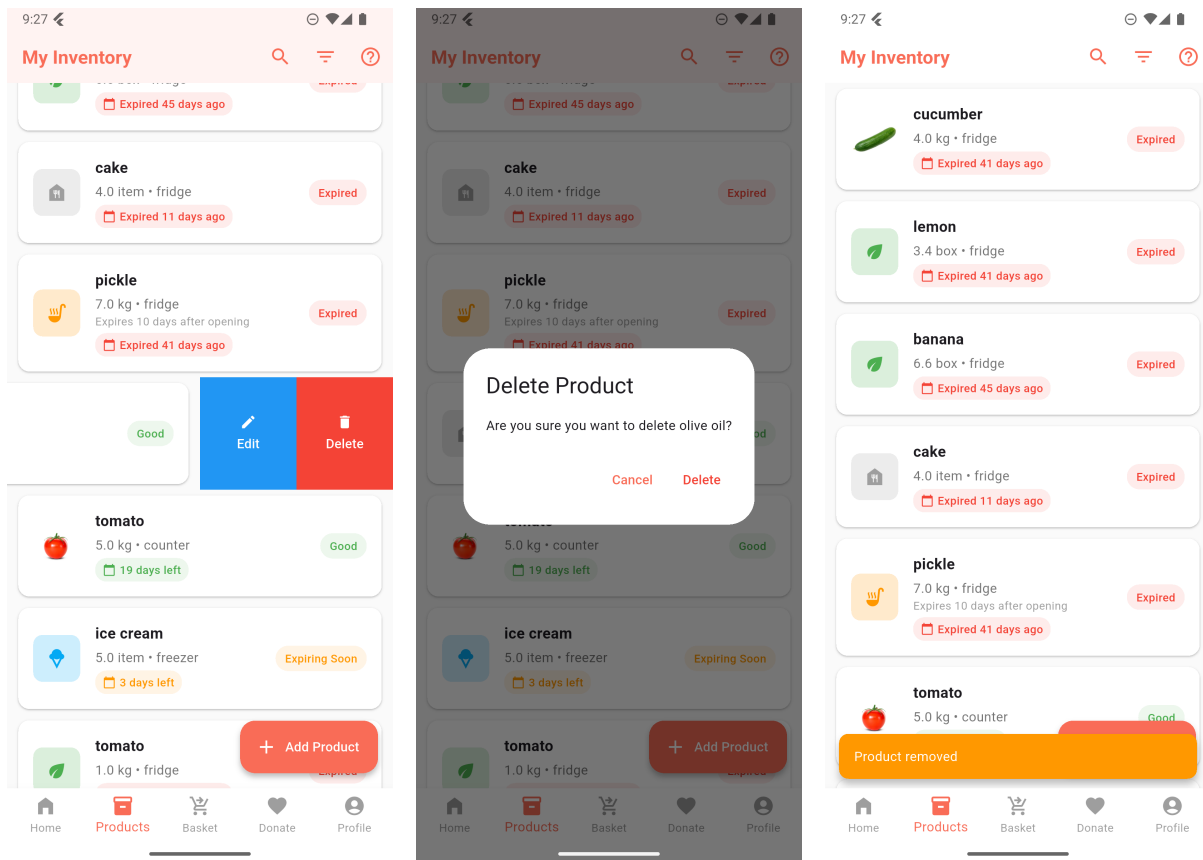
Figure 3.27: Manual archiving process for expired products

4.4 Product Deletion

Sometimes a user may mistakenly add a product or decide that tracking a certain item is unnecessary. In such cases, the app provides a delete function.

- Deleting a product does **not** move it to the archive.
- Instead, the action is recorded in the ProductLog table with the log type "delete".
- Logged data includes the product ID, deletion timestamp, and the user ID.

This logging mechanism ensures transparency, accountability, and the ability to analyze user interaction patterns with the inventory system.



(a) Swipe Right to reveal delete action

(b) Confirmation dialog for deletion

(c) Product deleted successfully with toast message

Figure 3.28: Steps for deleting a product and logging the action

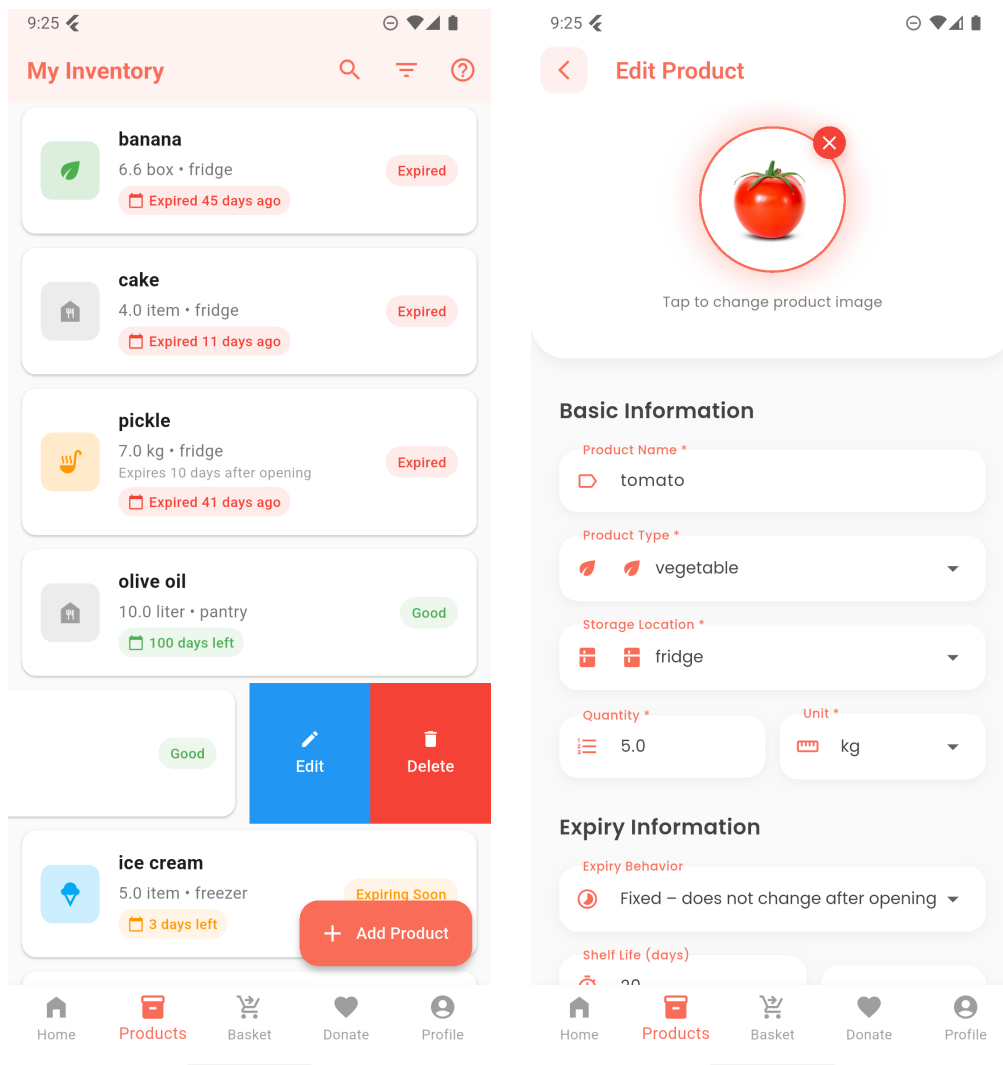
4.4 Editing Product Details

Editing a product allows users to correct previously added information such as name, type, quantity, storage location, and expiry behavior.

By tapping the **Edit** button on a product, users are directed to the Edit Product screen where they can:

- Update the product's name and type.
- Change the storage location (e.g., fridge, freezer, counter).
- Modify the quantity and unit.
- Adjust the expiry behavior and shelf life days.
- Replace or update the product image.

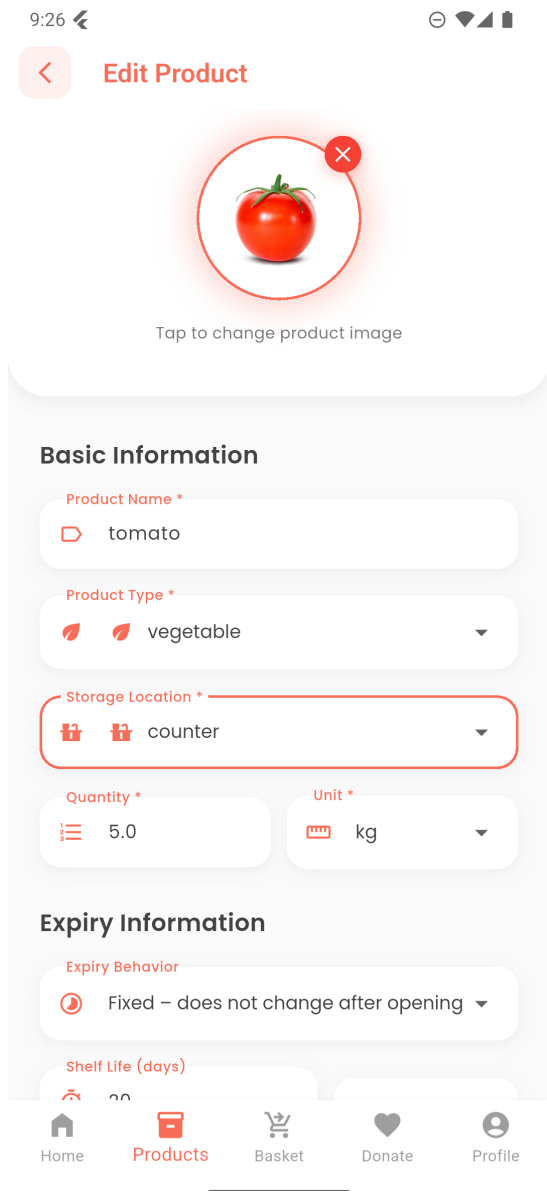
This feature ensures that inventory data remains accurate and up to date, which is essential for reliable tracking and generating useful analytics.



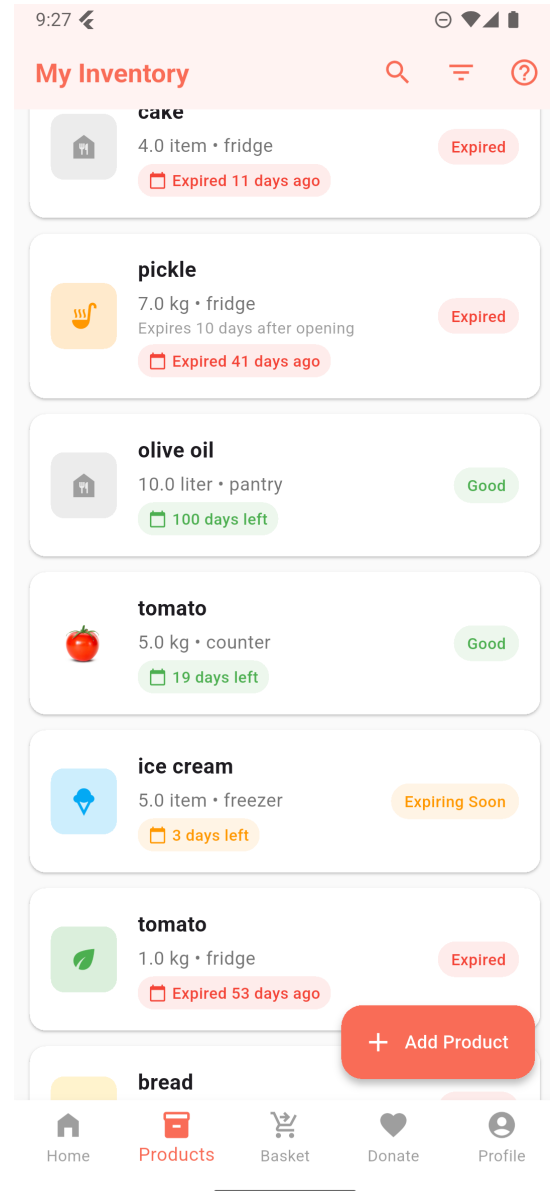
(a) Edit button in product card

(b) Edit Product screen (1)

Figure 3.29: Accessing the product editing interface



(a) Changing storage location



(b) Updated inventory view after edit

Figure 3.30: Saving and reflecting product changes in the inventory

4.6 Smart Storage Tips (AI-Powered)

To help users store their products in the best possible way and reduce spoilage, the app provides AI-powered storage suggestions. This feature utilizes a pre-trained model to generate practical, product-specific advice.

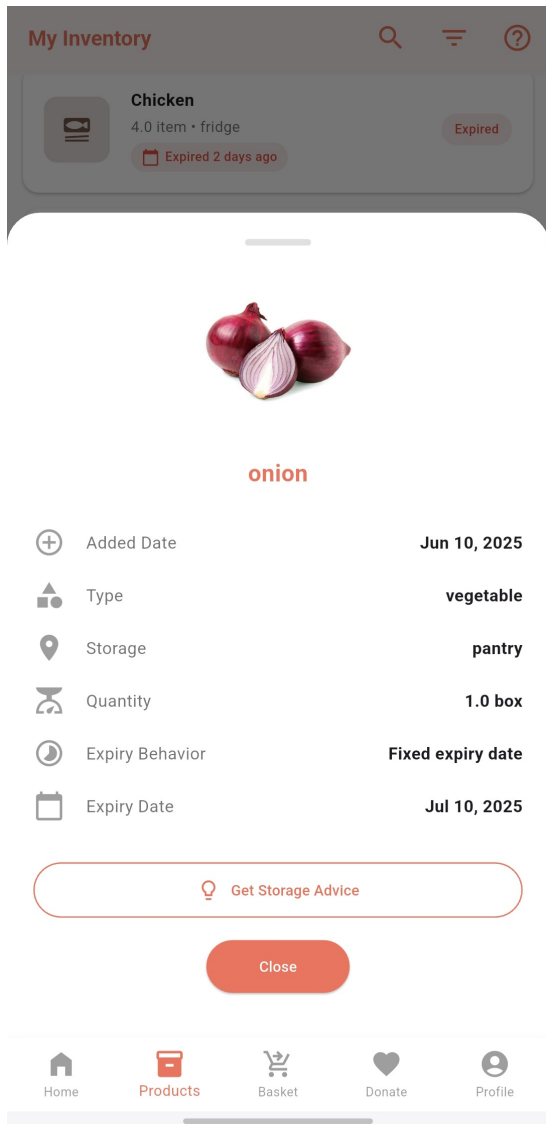
- Users can view product details by clicking on the item card.
- A **Get Storage Advice** button appears for every product.
- Once clicked, a pop-up shows a tailored tip based on the product name.

These smart suggestions are designed to:

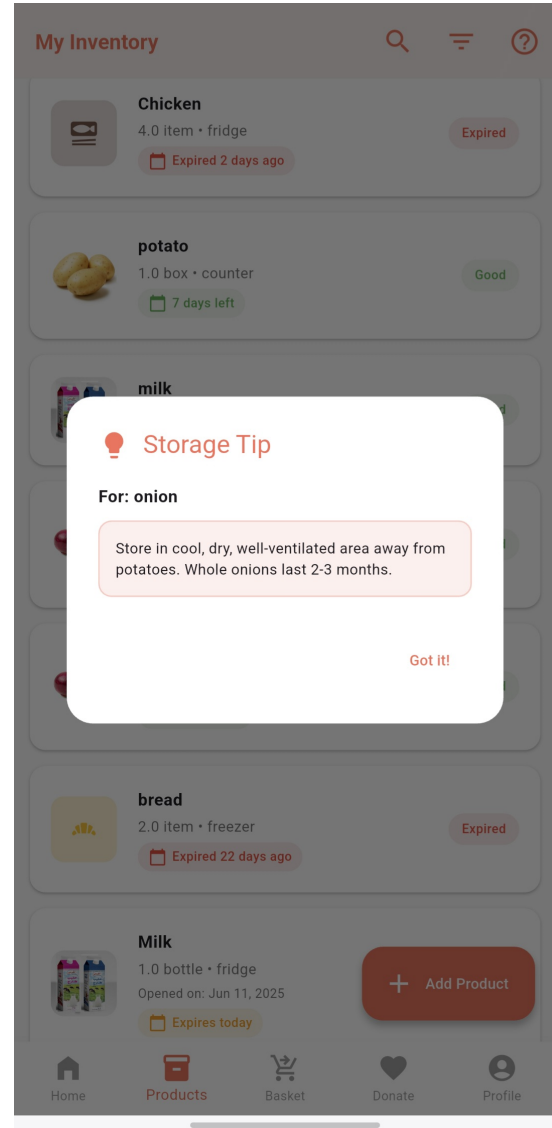
- Encourage users to store products under ideal conditions (e.g., tempera-

ture, humidity, separation from certain foods).

- Extend shelf life and reduce waste.
- Increase awareness about proper food storage through brief, clear guidance.



(a) Product detail with storage tip button



(b) AI-generated storage advice for onions

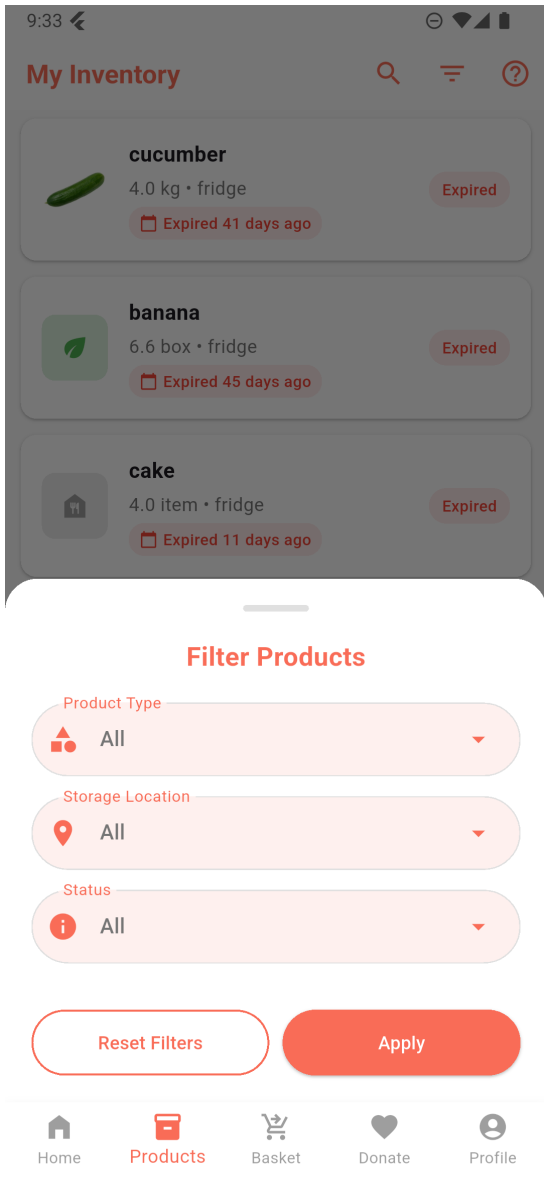
Figure 3.31: AI-based personalized storage recommendations to minimize waste

4.6 Filtering Inventory Items

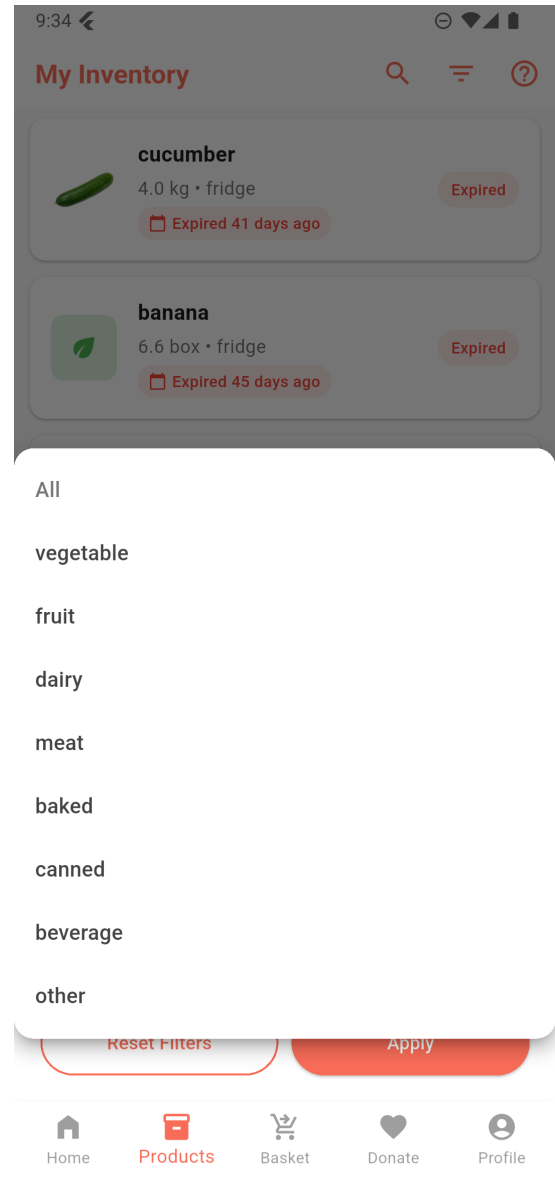
To help users navigate large inventories efficiently, the app provides a flexible filtering system. Users can filter products by three main criteria:

- **Product Type:** (e.g., vegetable, dairy, meat, etc.)
- **Storage Location:** (e.g., fridge, pantry, freezer, etc.)
- **Status:** (e.g., Good, Expiring Soon, Expired)

By combining these filters, users can narrow down the view to exactly what they're looking for—such as all vegetables in the fridge that are still good.

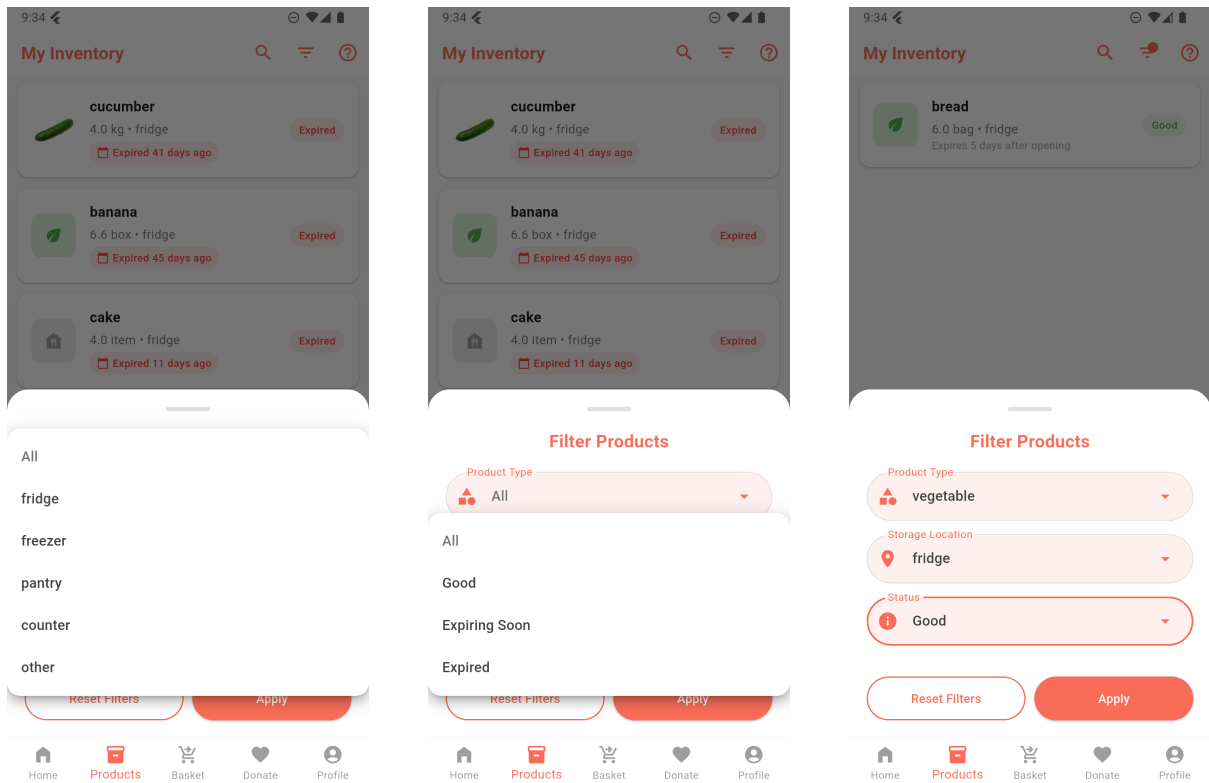


(a) Filter modal interface



(b) Product Type dropdown

Figure 3.32: Initial filter view and selecting product type



(a) Storage filter

(b) Status dropdown

(c) Filtered result

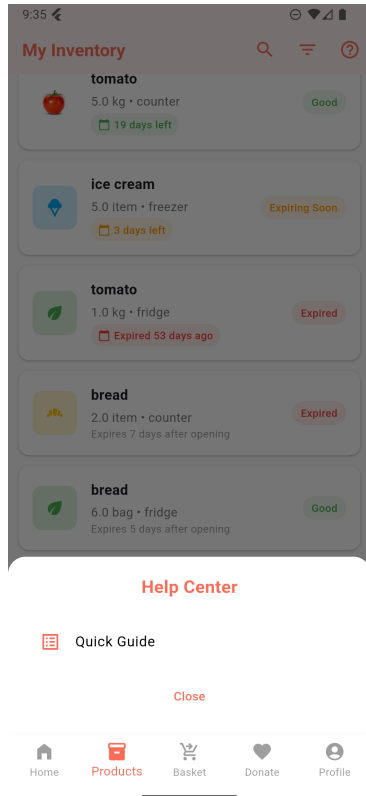
Figure 3.33: Filtering by location, status, and viewing results

4.7 Quick Guide and Help Center

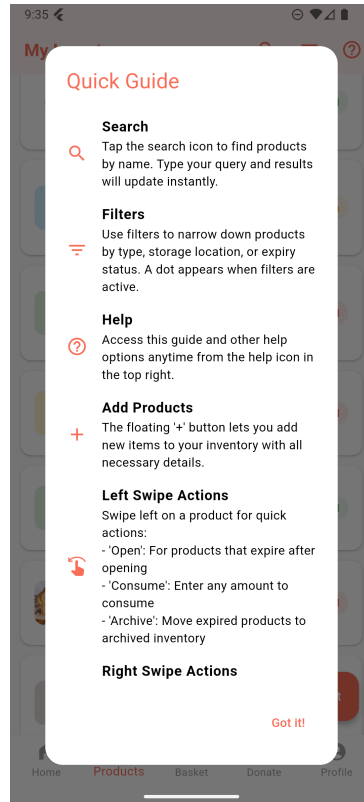
The app provides an in-app quick guide to assist users with understanding functionalities such as swipe actions, expiry labeling, status icons, and how to manage inventory effectively.

This guide is accessible through the **Help Center** icon located in the top right of the inventory screen. It explains:

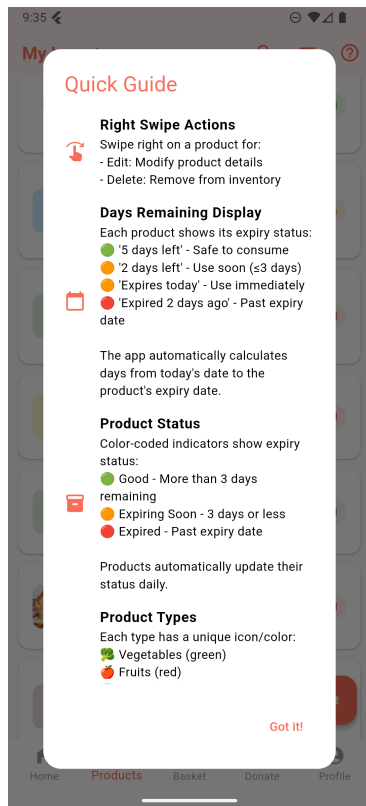
- Left and right swipe actions (e.g., edit, delete, consume, archive).
- Meaning of expiry labels: good, expiring soon, expired.
- How product statuses are automatically updated based on expiry dates.
- Icon-based product types and color-coding logic.
- Search, filters, and adding new products.
- Expiry behavior logic and storage insights.



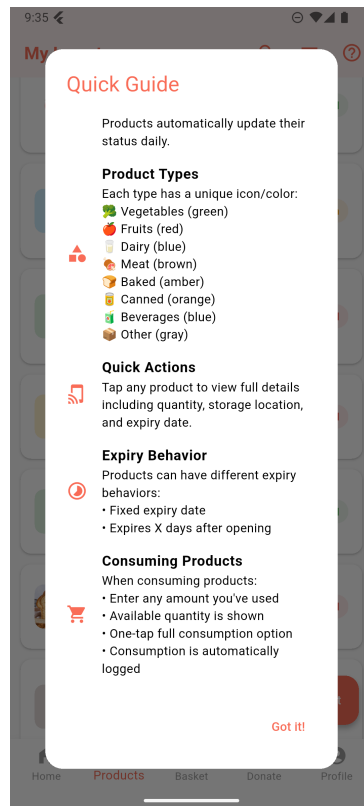
(a) Help Center view with Quick Guide access



(b) Quick Guide: search, filters, add, swipe



(c) Quick Guide: expiry colors, product status



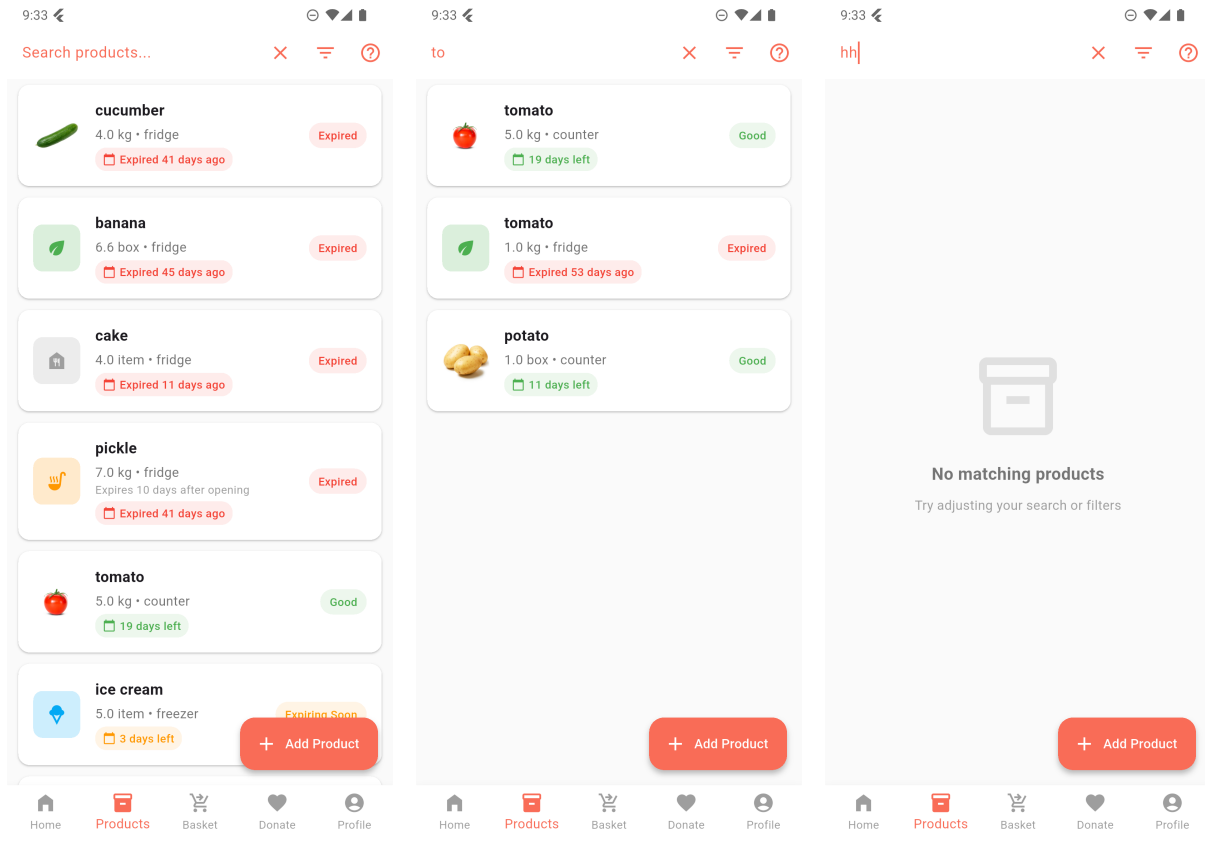
(d) Quick Guide: expiry behavior and consumption

Figure 3.34: In-app Quick Guide for product tracking and user support

4.7 Search Functionality

The search feature helps users quickly find specific products in their inventory.

- A search bar is available at the top of the inventory page.
- Typing a keyword dynamically filters the product list.
- Matching results are shown instantly based on product name.
- If no match is found, the interface displays a message indicating so.



(a) Initial search bar with full inventory

(b) Filtered results for keyword "to"

(c) No matching result message

Figure 3.35: Live search functionality within the inventory screen

4.8 Product Name Suggestions

When adding a new product, the app assists users by providing dynamic name suggestions.

- As the user begins typing in the **Product Name** field, a dropdown appears.
- The suggestions are based on previously added product names stored in the database.

- This improves consistency, reduces typing effort, and minimizes spelling errors.
- It also enables better analytics by unifying product naming conventions.

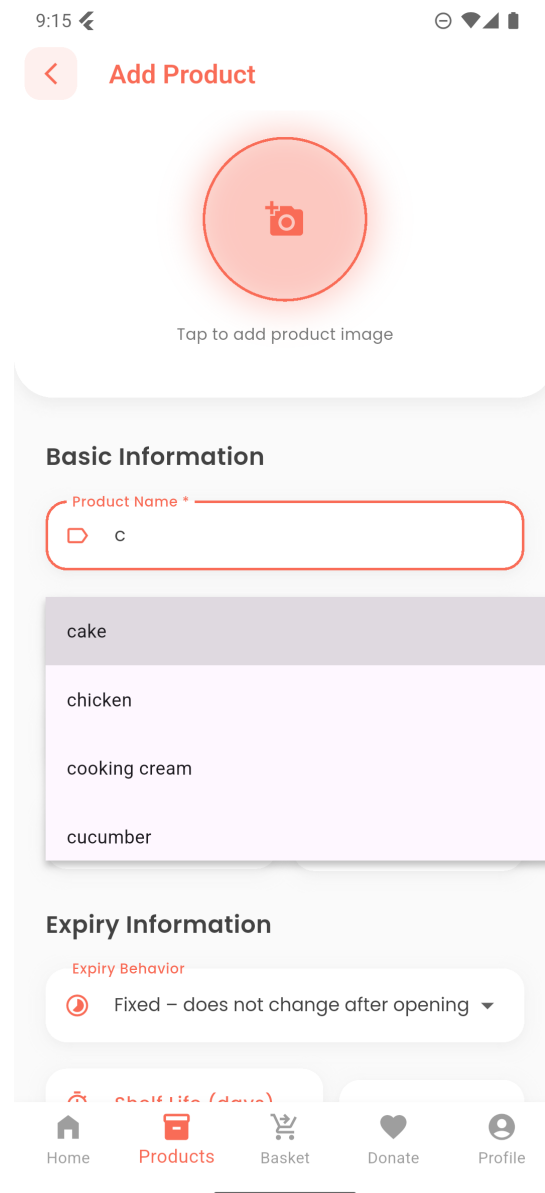


Figure 3.36: Auto-suggestion of product names while typing

5. Smart Basket

The **Smart Basket** screen in the **Food Guard** application provides users with two main views to support decision-making:

- **Insights**
- **Out of Stock**

Each of these options serves a distinct purpose and is discussed in detail in the following subsections.

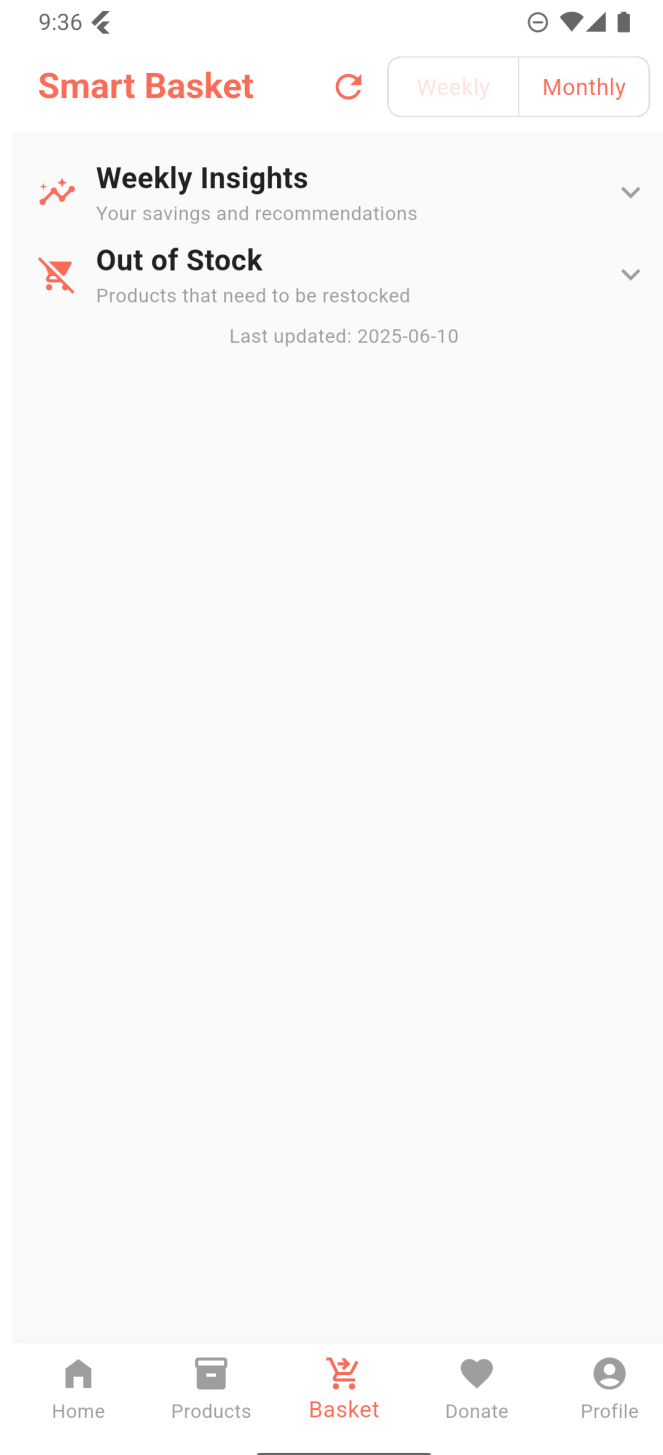


Figure 3.37: Smart Basket main view with access to Insights and Out of Stock sections

Insight

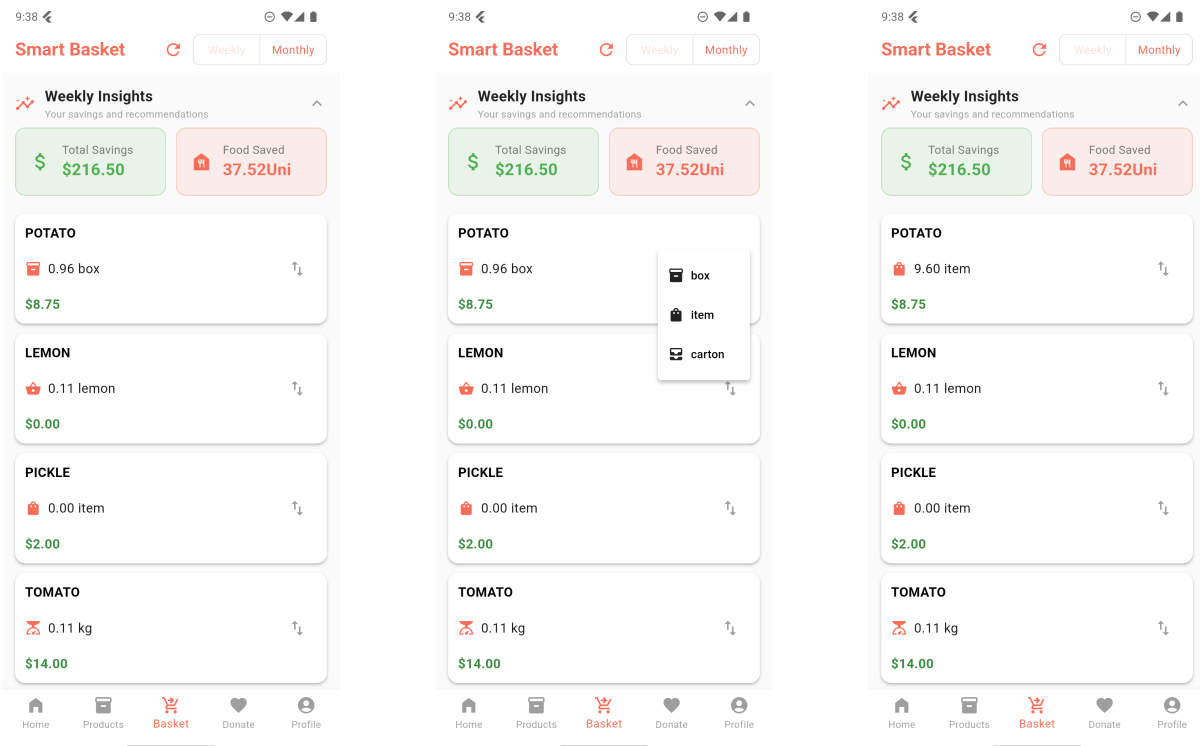
The **Insight** is one of the key analytical features of the **Food Guard** application. It aims to provide personalized suggestions to users regarding the appropriate

quantities of products they may need to purchase over a specific period (weekly or monthly). This feature is based on analyzing the user's previous consumption and purchase behavior to estimate quantities that closely match actual needs. This helps significantly reduce over-purchasing and food waste.

The Smart Basket interface displays a list of recommended products, along with the suggested quantity and a default unit (e.g., kilogram, item, pack). The user can also change the unit using a dropdown menu next to each product, offering flexibility in interpretation and comparison.

Moreover, the interface allows users to switch between weekly and monthly analysis modes, providing better insight into short-term and long-term consumption patterns. The displayed values are updated according to the selected period and include:

- **Total Savings:** An estimate of how much money the user will save by sticking to the recommended quantities instead of overbuying.
- **Food Saved:** The amount of food that could be preserved from waste by following the recommended quantities.

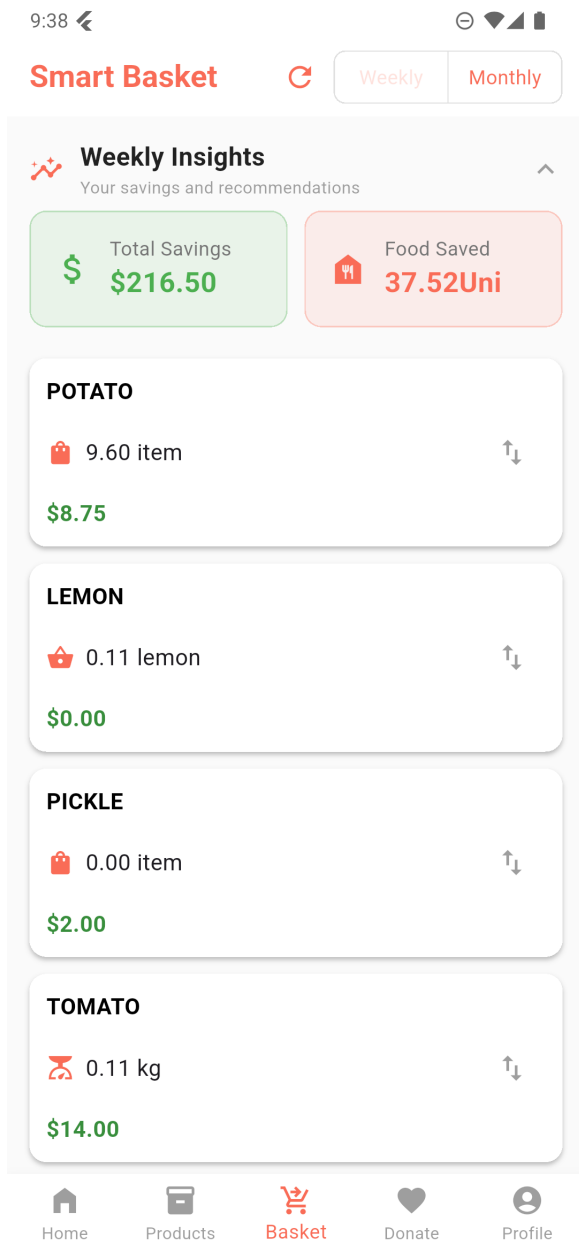


(a) Items & Quantities

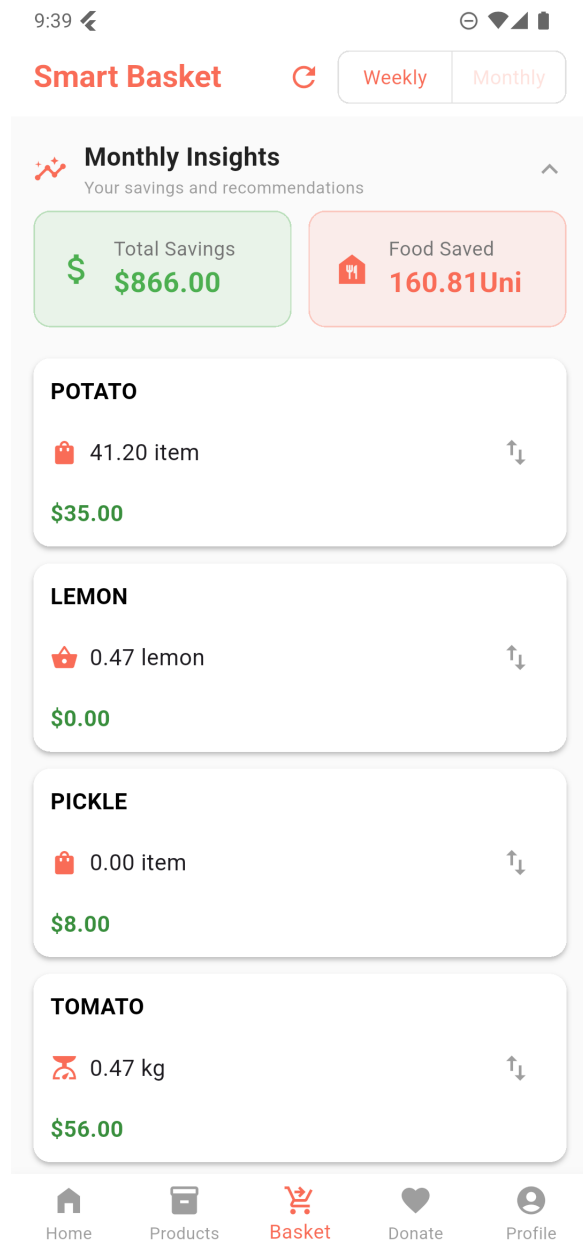
(b) Unit changed

(c) Updated unit display

Figure 3.38: Smart Basket recommendations with quantity and unit flexibility



(a) Weekly insights



(b) Monthly insights

Figure 3.39: Weekly and monthly Smart Basket insights

Out of Stock

The **Out of Stock** feature in the **Food Guard** application serves as a practical guide to help users identify which products are no longer available in their inventory. This may be due to either full consumption or expiration. The system automatically displays these unavailable products, making it easier for users to plan their next shopping trip and ensure that they restock essential items.

For each product, the interface clearly states the **reason for unavailability**, which can be one of the following:

- **Out of Stock:** The product has been fully used.
- **Expired:** The product has expired even though some quantity remained unused.

Once the user re-adds the product to the inventory, it is automatically removed from the Out of Stock list, as it is now available again. If the user had multiple entries for the same product (e.g., one consumed, one expired), the system shows only the **most recent status** to avoid duplication and confusion.

This feature ensures that users are reminded of missing products and can use it as a reference when shopping, ultimately helping to reduce both unplanned purchases and food waste.

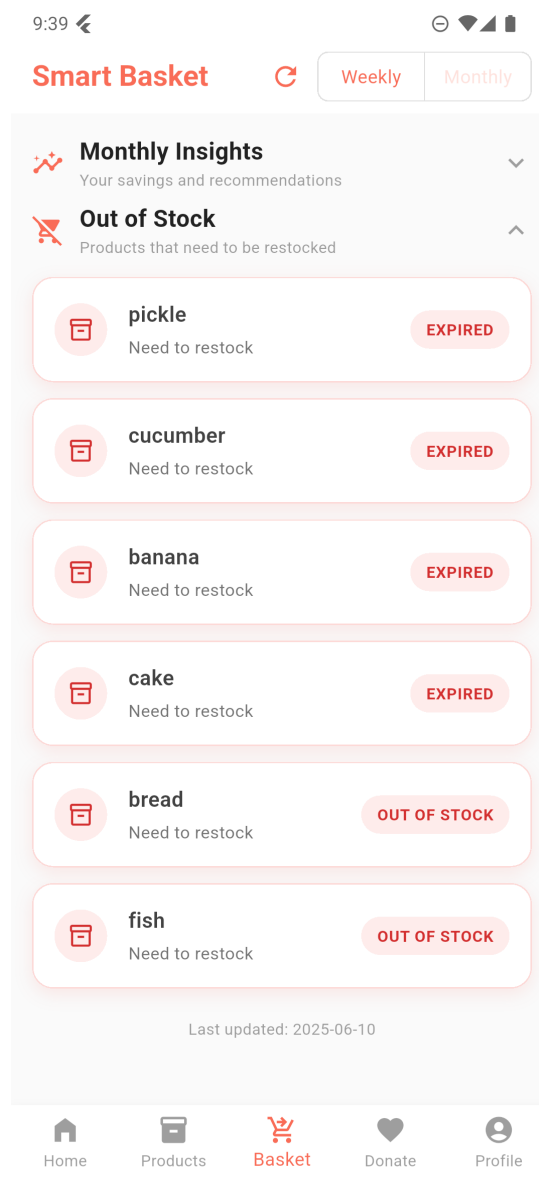


Figure 3.40: Out of Stock screen showing unavailable products with reason

6. Donation

The **Donation System** in the **Food Guard** application is designed to enable users to make a positive social and environmental impact by redistributing surplus or unused food, converting waste, or contributing financially. This system provides users with flexible donation options that cater to different preferences and capacities. By incorporating donation functionalities, the app helps bridge the gap between surplus and need, contributing to both food waste reduction and community support.

Upon accessing the donation section, users can choose from the following types:

- **Donate Money:** Contribute financially to support meals.
- **Donate Products:** Share surplus food items that are still usable with others in need.
- **Donate Leftovers:** Donate food waste for composting or as animal feed, supporting circular waste management.
- **Join Campaigns:** Participate in community-driven donation campaigns and initiatives.

This modular approach to donations ensures that every user, regardless of their available resources, can take part in reducing waste and supporting others.

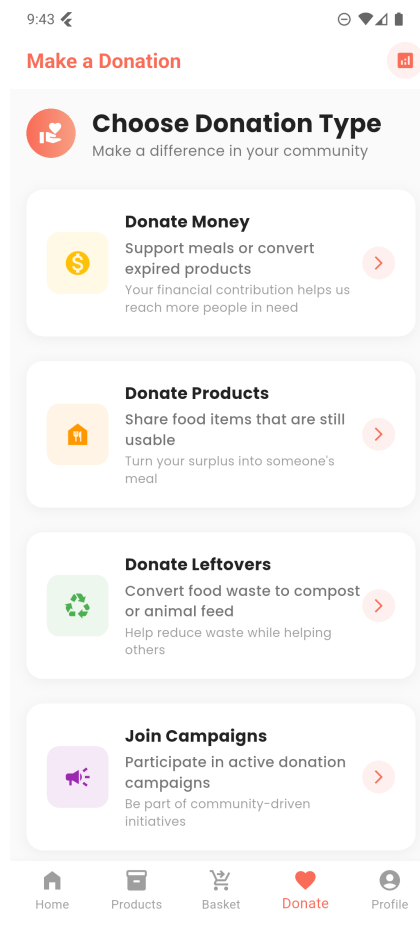


Figure 3.41: Donation system interface offering multiple contribution options

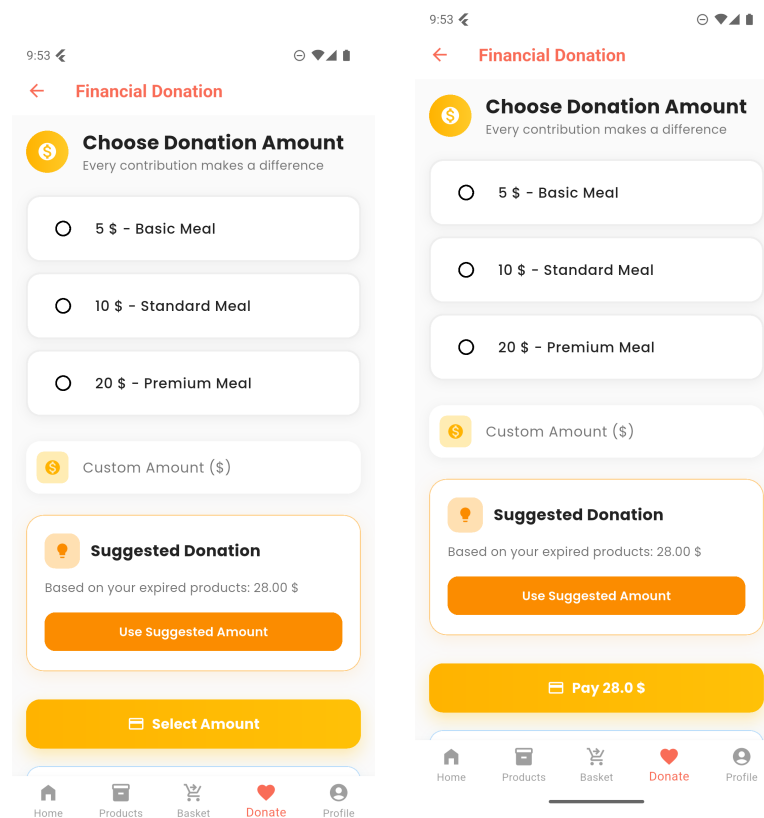
1. Financial Donation Interface

When the user selects the **Financial Donation** option from the donation system in the **Food Guard** application, they are presented with a dedicated interface to choose their preferred donation amount. This interface is designed to simplify the donation process by offering flexible options that suit different user capabilities and intentions.

The user can choose from the following options:

- Fixed amounts: such as **\$5** for a Basic Meal, **\$10** for a Standard Meal, or **\$20** for a Premium Meal.
- Custom amount: the user may enter any donation value manually.
- Suggested amount: the system calculates a recommended donation value based on the total value of expired products in the user's inventory.

The suggested donation option is highlighted to encourage users to compensate for expired items by giving back to the community. This creates a meaningful connection between food waste reduction and charitable giving.



(a) Fixed and custom donation amount

(b) Suggested amount based on expired product value

Figure 3.42: Financial donation interface within the donation system

Payment Process for Financial Donation

After selecting the donation amount, the user is directed to the **Payment Details** screen to finalize the contribution. This interface enables secure entry of credit card information and confirms the transaction amount before processing the payment.

The payment process includes the following steps:

- **Entering payment details:** The user inputs their card number, expiry date, CVV, and name.
- **Reviewing the total amount:** The interface displays the final donation amount to be charged.
- **Payment confirmation:** Upon successful transaction, a confirmation message appears showing the amount, card information, transaction ID, and timestamp.

This structured flow ensures clarity, security, and user confidence during the donation process, while also providing clear feedback after completion.

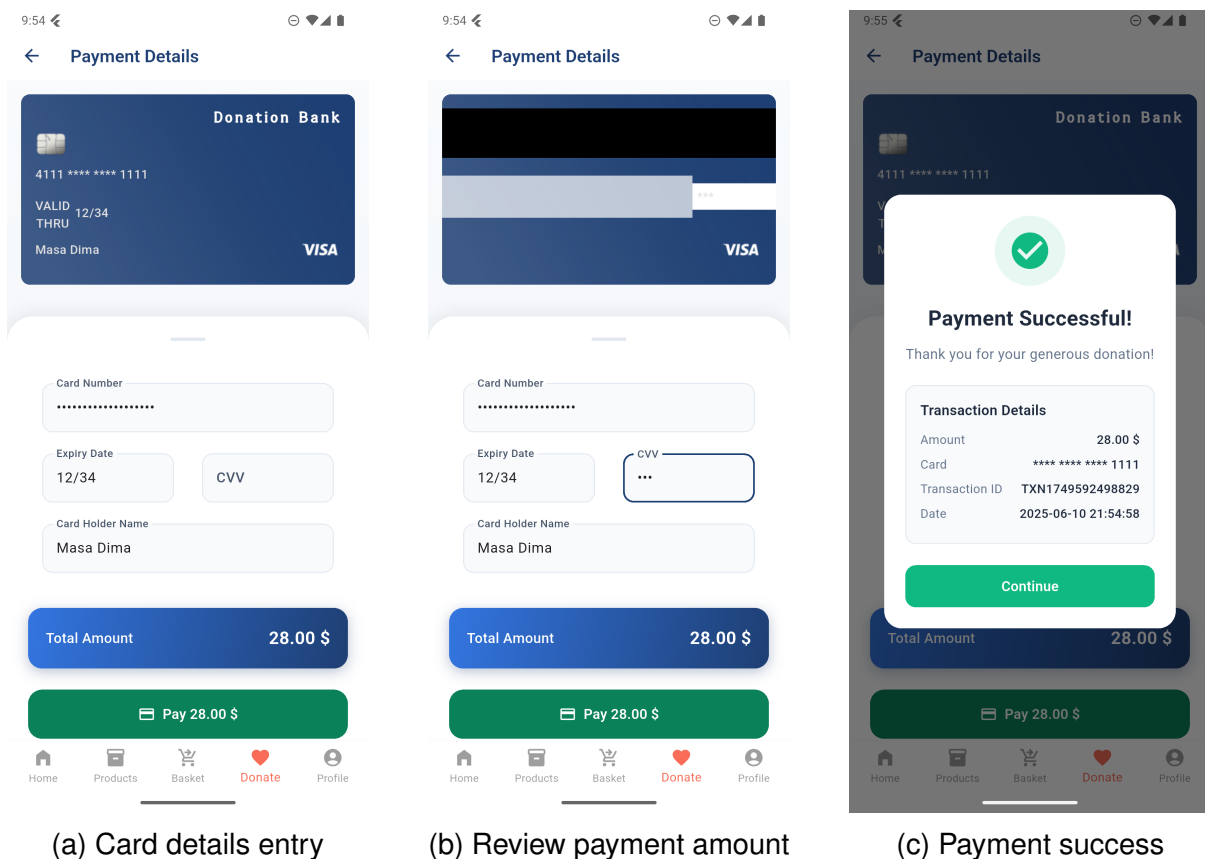


Figure 3.43: Steps of the payment process for financial donations

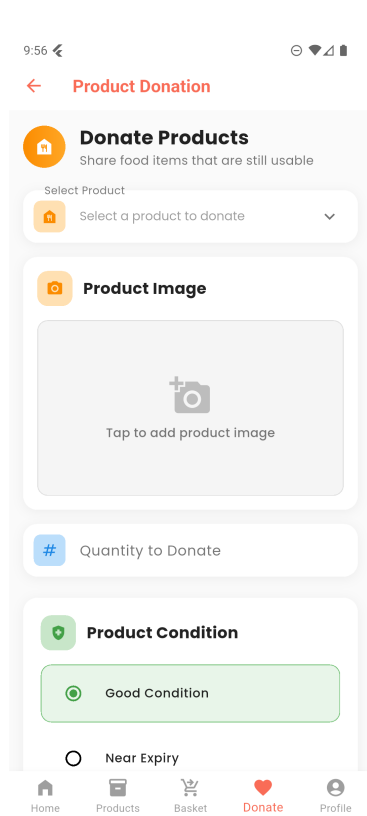
2.Product Donation Interface

The **Donate Products** feature in the **Food Guard** app allows users to contribute food items from their inventory that are still usable. This option promotes community engagement and food sharing while reducing surplus waste.

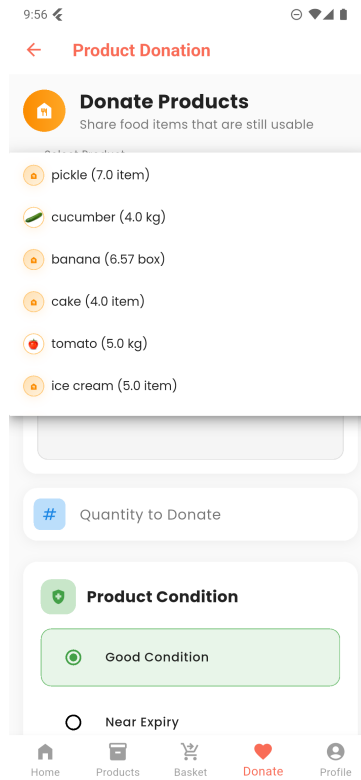
The donation process is structured as follows:

- **Product Selection:** The user selects an available item from their current inventory list.
- **Quantity Specification:** The user defines the quantity to donate based on the available stock.
- **Product Condition:** The user indicates the condition of the donated item:
 - Good Condition
 - Near Expiry
 - Expired – For Compost
 - For Animal Feed
- **Optional Image Upload:** The user may upload a photo of the product to provide clarity and transparency.
- **Submission:** Once the details are entered, the donation request is submitted through the platform.

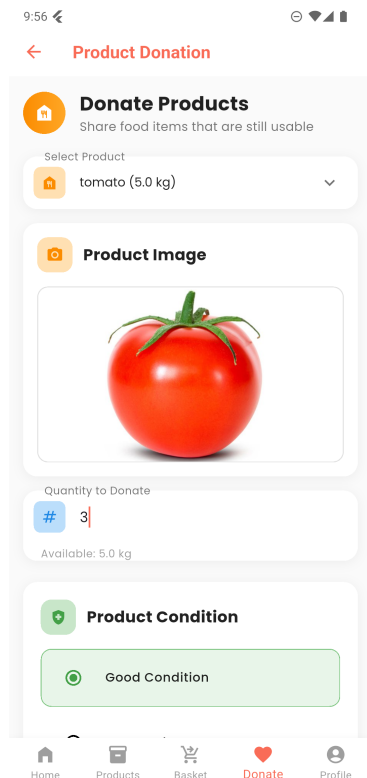
This flexible interface ensures that donations are categorized correctly and distributed or processed appropriately based on item condition.



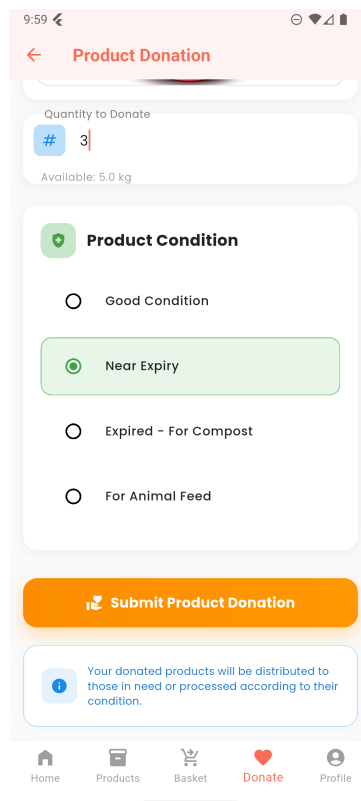
(a) Product donation form



(b) Select product from inventory



(c) Add product image



(d) Set quantity and choose condition

Figure 3.44: Step-by-step interface for donating usable food products

3. Leftover Donation Feature Donation Interface

The Leftover Donation section in **Food Guard** allows users to repurpose excess food that is no longer needed by donating it for composting or animal feed. This feature is especially important for minimizing food waste and promoting sustainable practices.

Users can start by uploading a photo of the leftovers and specifying basic details such as the food type (e.g., vegetables, fruits) and the food name. Optional notes can also be added for clarification. After that, users must choose the intended use—either compost or animal feed—based on the food's condition.

Once submitted, the system will process the donation accordingly and redirect the leftovers to the appropriate destination, reducing waste and contributing to the community's circular food economy.

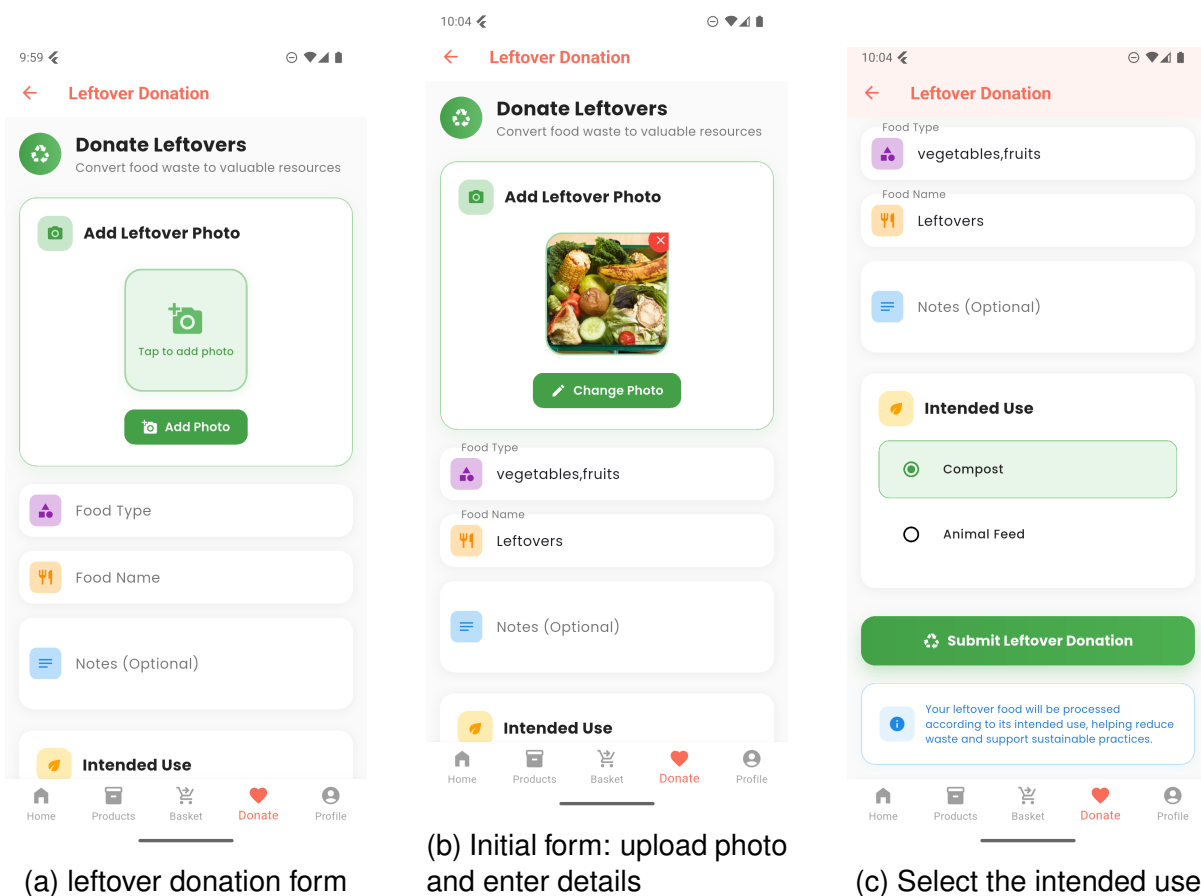


Figure 3.45: Steps for donating leftover food for reuse or compost

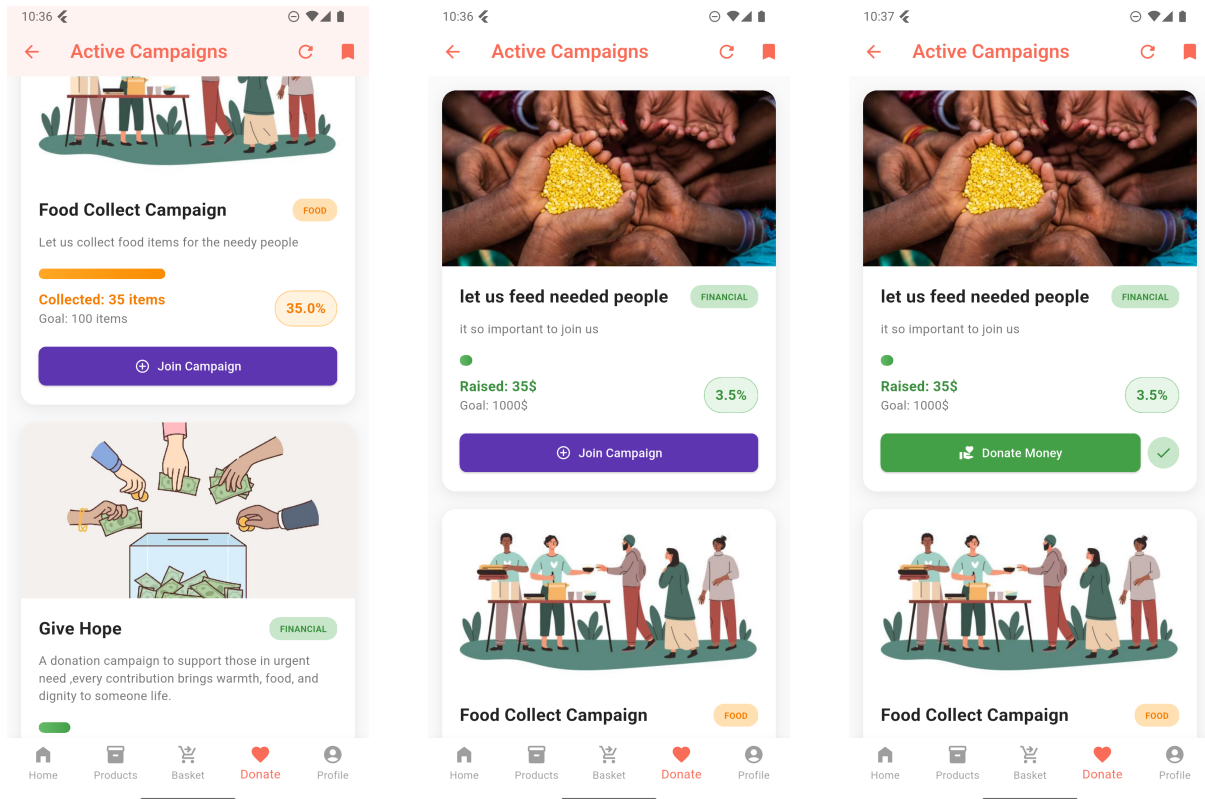
4. Donation Campaigns

The Active Campaigns feature in Food Guard allows users to contribute to ongoing donation initiatives. These campaigns may be financial (e.g., raising money for people in need) or food-related (e.g., collecting items for community distribution).

Each campaign displays a progress bar showing the amount raised or items

collected compared to the goal. Users can easily join by clicking the designated button. Once a contribution is made, the campaign updates to reflect the user's participation, enhancing transparency and encouraging community involvement.

This feature promotes collective action and helps coordinate resources for impactful causes.



(a) View food campaign and join

(b) View financial campaign and join

(c) Campaign joined successfully

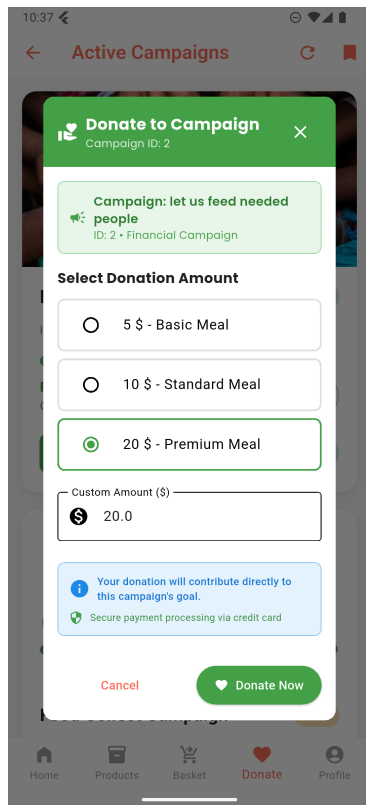
Figure 3.46: Exploring and joining active campaigns

Campaign Participation and Donation Flow

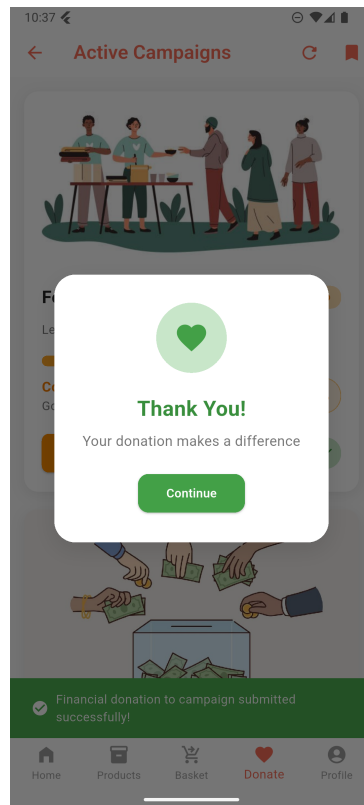
The campaign feature in the **Food Guard** app empowers users to contribute to social causes through two main types of campaigns: financial and food collection.

Users can view active campaigns, check the donation progress, and choose to participate. For financial campaigns, users may select from preset donation tiers (e.g., Basic, Standard, or Premium Meal) or enter a custom amount. The app supports secure payment processing, and a confirmation message appears once the donation is completed.

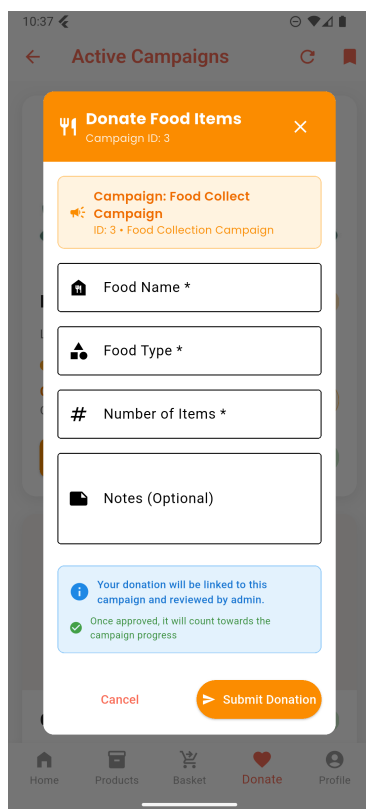
In food collection campaigns, users can donate food items by specifying the food name, type, quantity, and optional notes. Once submitted, the donation is reviewed by the admin and counted toward the campaign's total once approved.



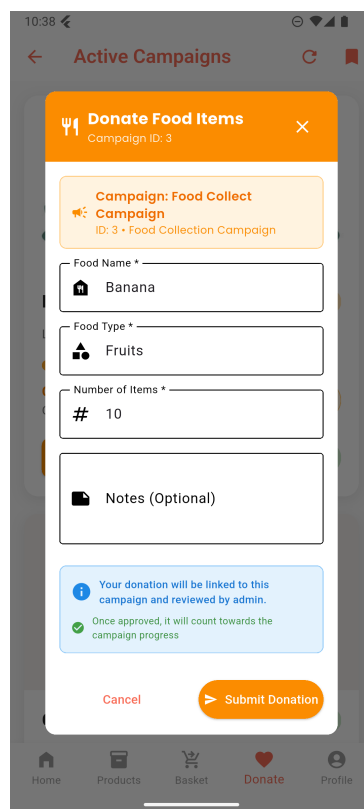
(a) Select donation tier or custom amount



(b) Donation success confirmation



(c) Food donation form for campaigns



(d) Submit food donation to campaign

Figure 3.47: Participating in financial and food campaigns within the app

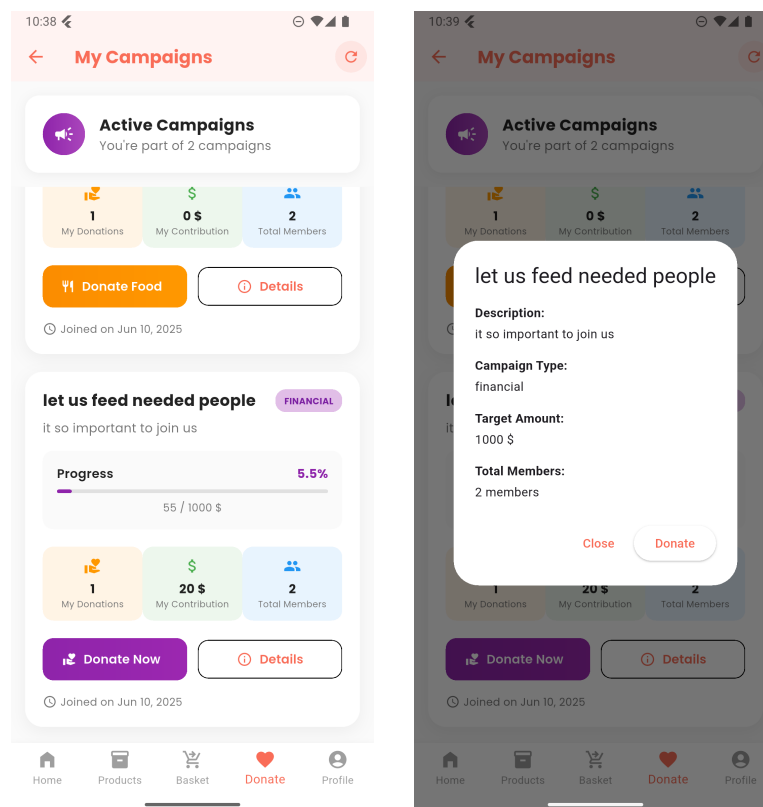
Joined Campaigns Overview

The My Campaigns section provides users with a personalized summary of the donation campaigns they have joined. This includes both financial and food-based campaigns. For each campaign, users can track their own contributions, view the total progress toward the goal, and re-engage through further donations.

Each campaign card displays:

- **My Donations:** Number of contributions made (food or money).
- **My Contribution:** Total value of monetary donations (for financial campaigns).
- **Total Members:** How many users have joined the campaign.
- **Progress Bar:** A visual indicator of how much of the campaign's goal has been achieved.
- **Join Date:** When the user started contributing to this campaign.

In addition, users can click the `Details` button to view extended campaign information, such as its description, target amount, and campaign type. The section encourages continued engagement by showing real-time progress and offering quick access to contribute again.



(a) Campaign overview with contributions and progress

(b) Detailed view of a joined campaign

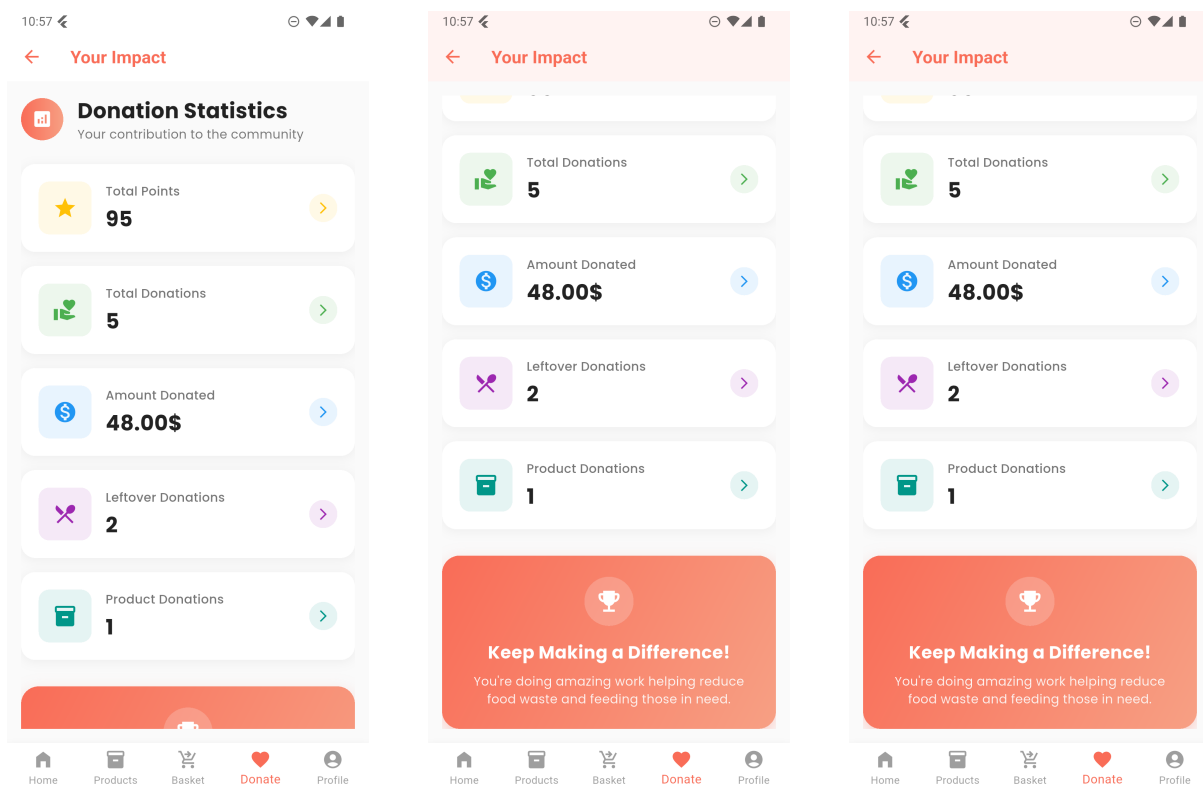
Figure 3.48: Joined campaigns summary and detail view

Donation Statistics

The **Donation Statistics** screen in the **Food Guard** app provides users with a clear summary of their contribution to the community. It displays:

- The total points earned through donations.
- The total number of donations made.
- The total amount of money donated (in USD).
- The number of leftover food donations.
- The number of usable product donations.

This screen helps raise user awareness of their social impact and includes a motivational message at the bottom to encourage continued contributions toward reducing food waste and helping people in need.

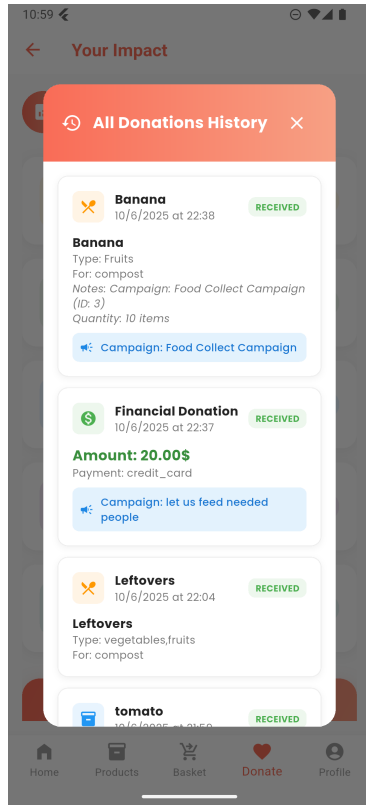


(a) Points and total donations overview

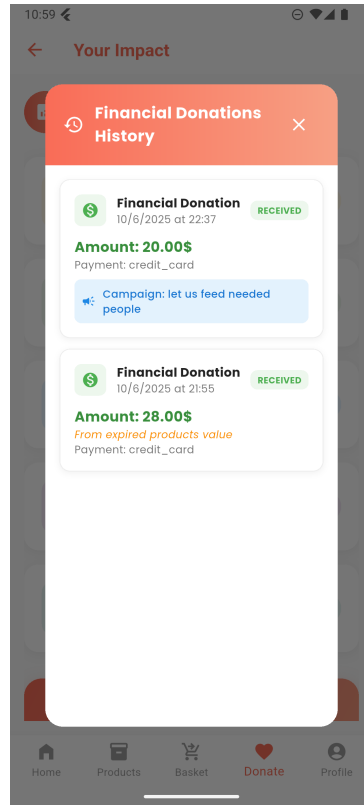
(b) Money and food donation breakdown

(c) Motivational message for impact

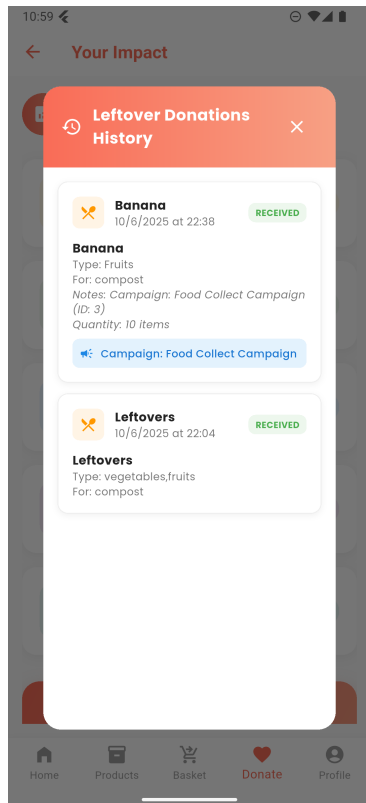
Figure 3.49: Donation statistics and user impact screen in the app



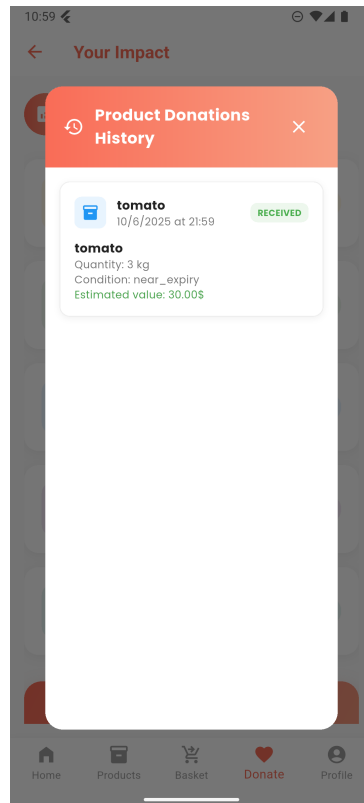
(a) All donation history



(b) All Financial donation



(c) Leftover donation history



(d) Product donation history

Figure 3.50: Donation history overview in the app

7. Profile

Profile Section

The **Profile** section serves as the main access point for users to manage their personal information within the **Food Guard** app. Through this page, users can view their account details, navigate to key features like archived products and consumption summary, and access account settings.

Edit Profile Feature

The **Edit Profile** functionality allows users to easily update their personal details, such as name, city, country, and phone number. Additionally, users can customize their profile color using the color picker for a personalized touch. Once changes are made, a confirmation message appears to indicate that the profile has been successfully updated.

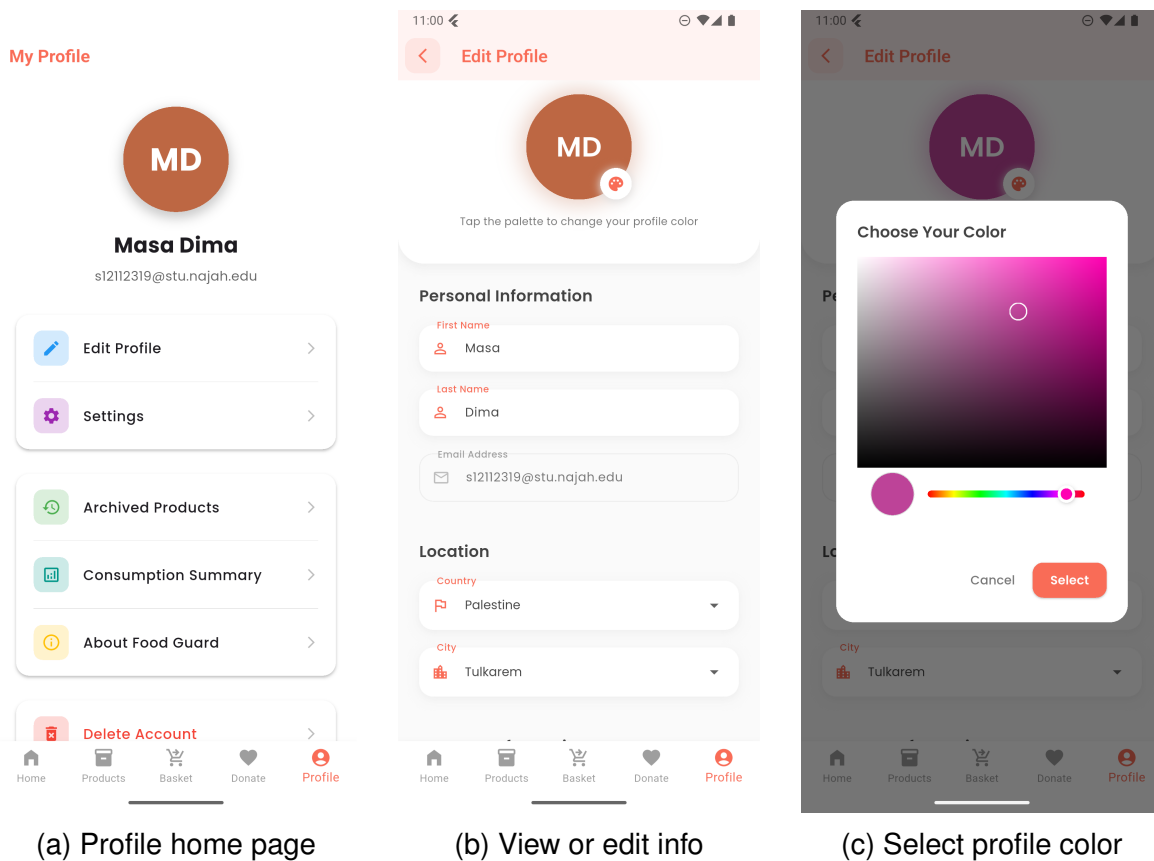


Figure 3.51: User profile main features

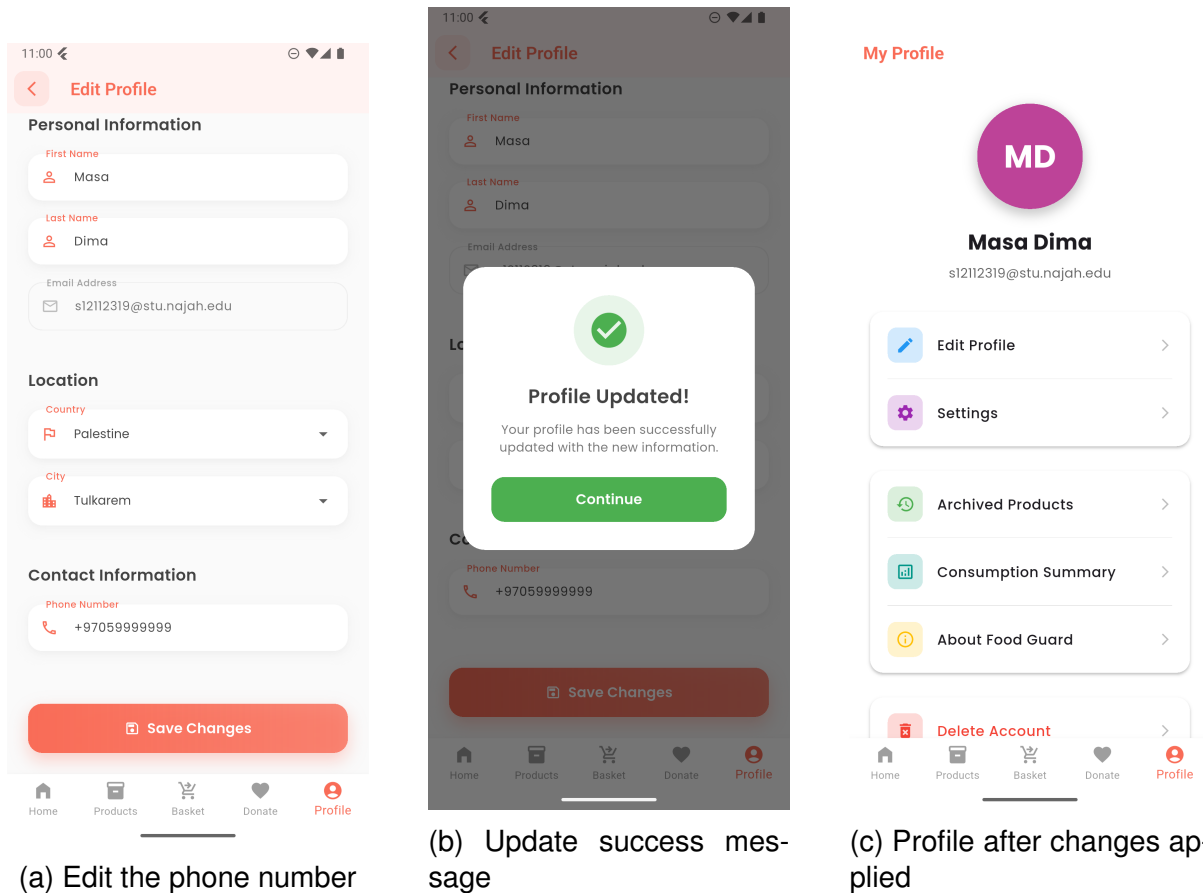


Figure 3.52: Final steps in editing user profile

Light and Dark Mode

The **Profile** screen provides users with access to key account functionalities and customization options. Through the integrated **Settings** section, users can enable or disable **Dark Mode** and manage **Notifications** with simple toggle switches.

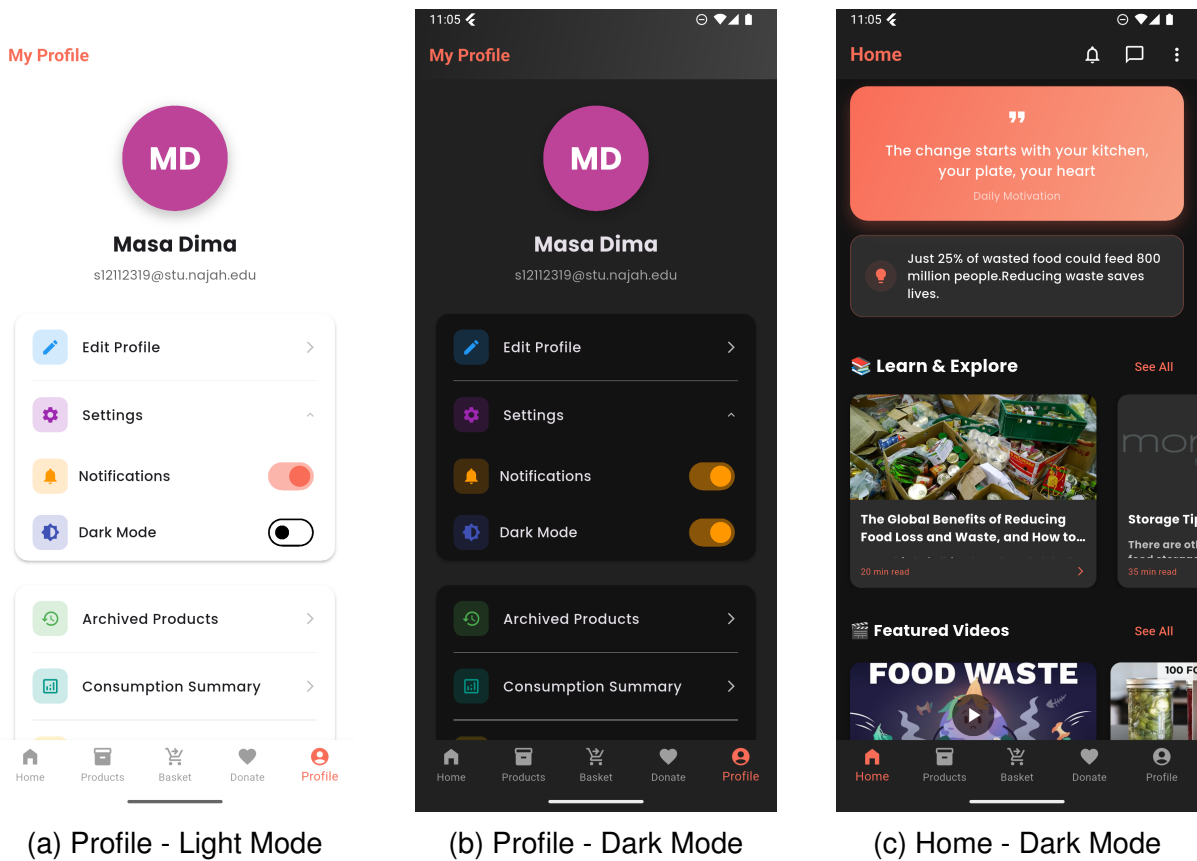


Figure 3.53: Profile screen and theme support in light and dark modes

Archived Products

The **Archived Products** screen displays a history of products that were either fully consumed or expired. Each archived item includes key details such as the product name, quantity and unit, archiving date, and the number of days it remained in inventory before being archived. A colored badge clearly indicates the archiving reason—either **Fully Consumed** (green) or **Expired (Archived)** (orange). This helps users track their consumption habits and minimize future waste.

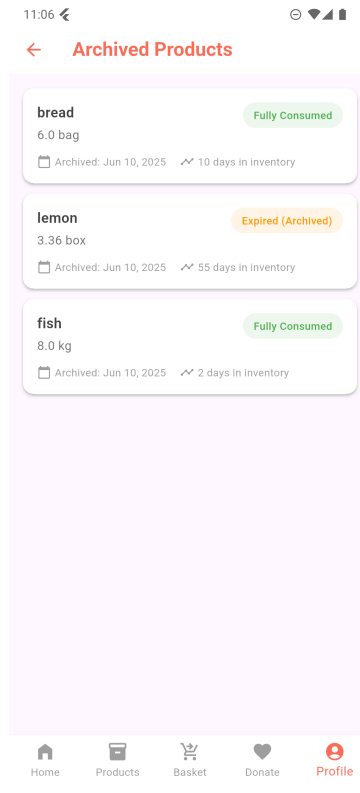


Figure 3.54: Archived Products screen showing consumed and expired items

Analytics Dashboard – Visualization Options

The **Analytics Dashboard** in the **Food Guard** app offers users three visualization options to analyze their product data efficiently:

- **All Products Overview** – Compare consumption and waste across all products using bar charts.
- **Single Product Analysis** – Track the history and trends of a specific product over time.
- **Consumption Summary** – View detailed statistics and efficiency metrics across the inventory.

When selecting the **All Products Overview** option, users can toggle between viewing **Consumed** and **Wasted** quantities. This helps identify which items are frequently wasted or consumed efficiently. Additionally, a search bar is available to filter and analyze specific products by name, providing a clear and focused analysis.

← **Analytics Dashboard**

Select Visualization Type

Choose how you want to analyze your product data



All Products Overview

Compare consumption across all products

[View Comparison →](#)



Single Product Analysis

Detailed trends for a specific product

[Select Product →](#)



Consumption Summary

Detailed consumption analytics and efficiency metrics

[View Summary →](#)

Data updates automatically when refreshed



Home



Products



Basket



Donate



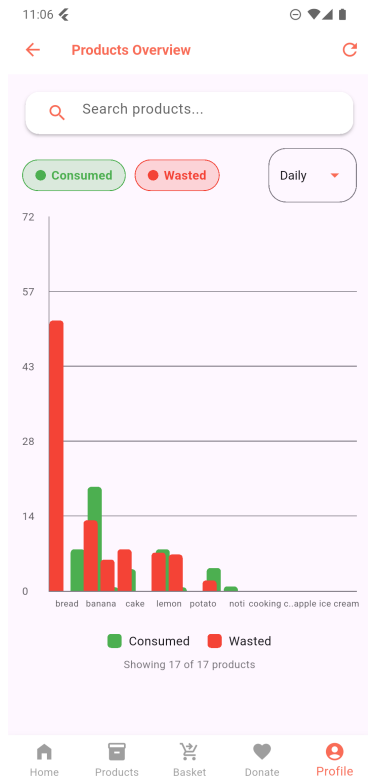
Profile

Figure 3.55: Analytics Dashboard – Choose how to visualize your data

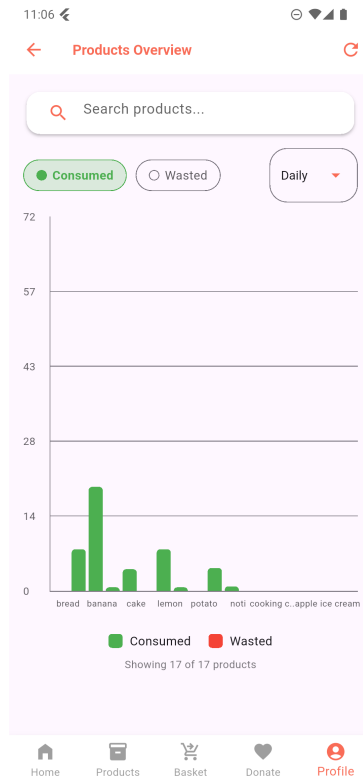
All Products Overview This section provides a comprehensive overview of the user's behavior in handling all products tracked in the application, focusing on both consumption and waste. It helps users evaluate their food habits and make more informed, sustainable decisions. The section includes:

- **Visual charts** displaying the total quantities of consumed and wasted products.
- **Filter options** to view only consumed products, only wasted products, or both.
- **Search functionality** to focus on specific products for detailed insights.
- **Time-based views** that allow switching between **daily** and **monthly** trends, helping users observe changes in consumption and waste over time.

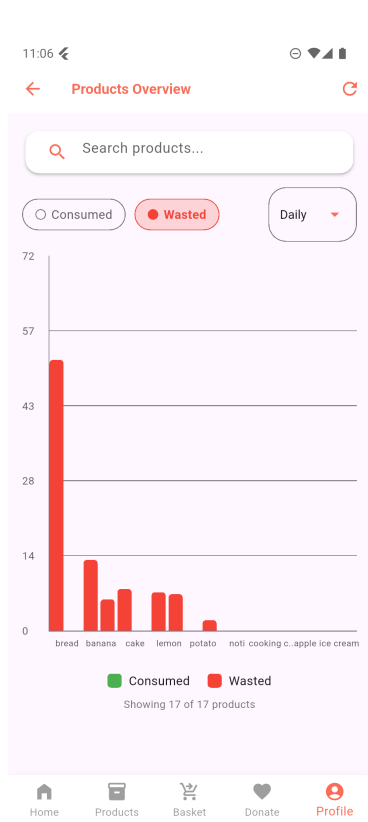
This interface helps users identify which products are most frequently consumed or wasted, and during which time periods, supporting better planning and smarter inventory management.



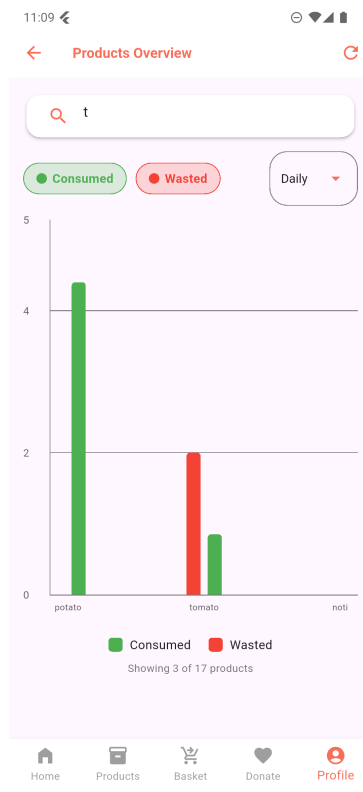
(a) Product donation form



(b) Filter: Consumed only



(c) Filter: Wasted only



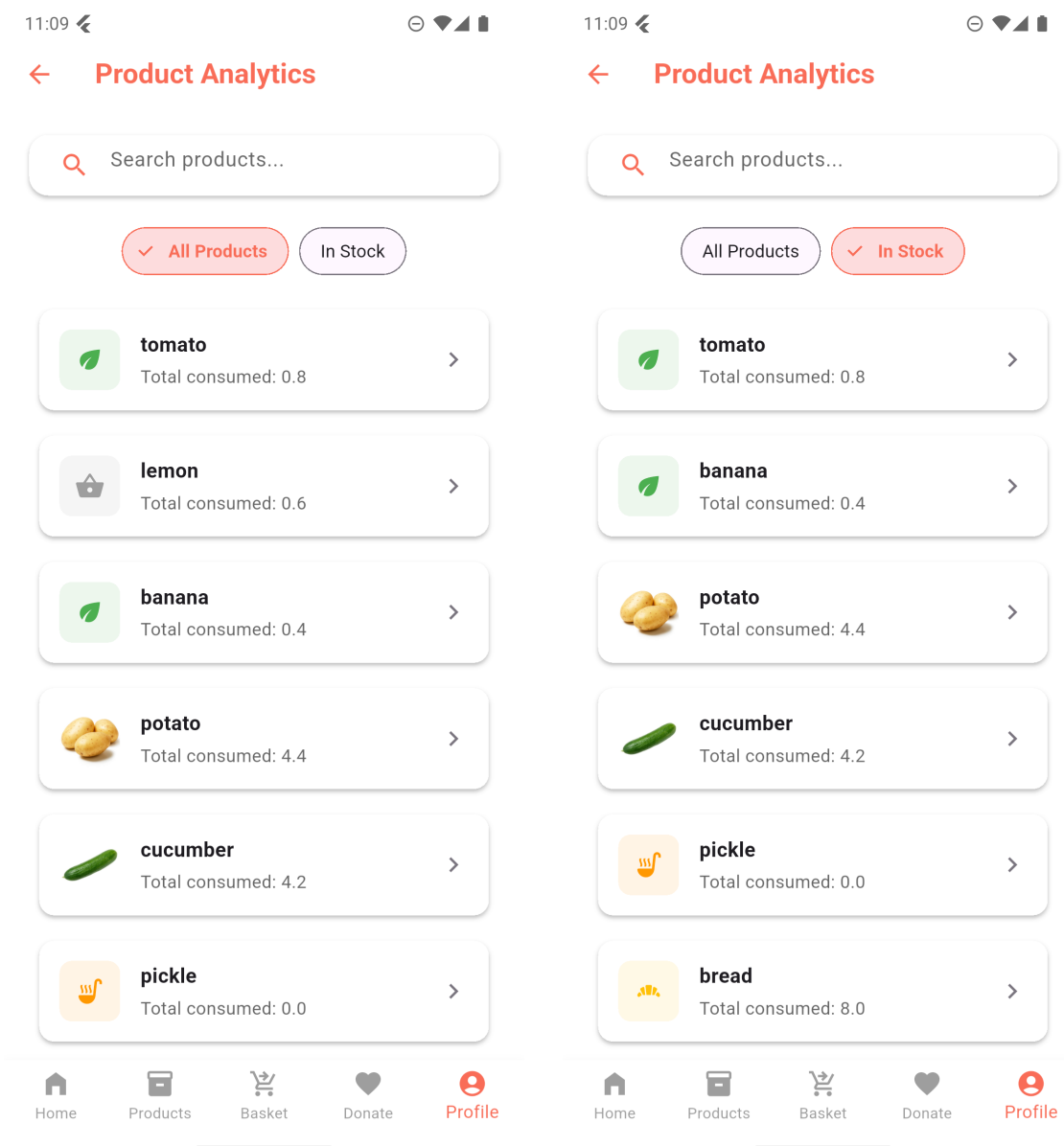
(d) Search results for specific products

Figure 3.56: All Products Overview – Filtering by type and name

Single Product Analysis

The **Single Product Analysis** option enables users to view detailed statistics for individual products. After selecting a product from the searchable list, the screen displays the **total consumed** and **total wasted** quantities. This view includes a daily consumption trend chart, allowing users to track usage patterns over time.

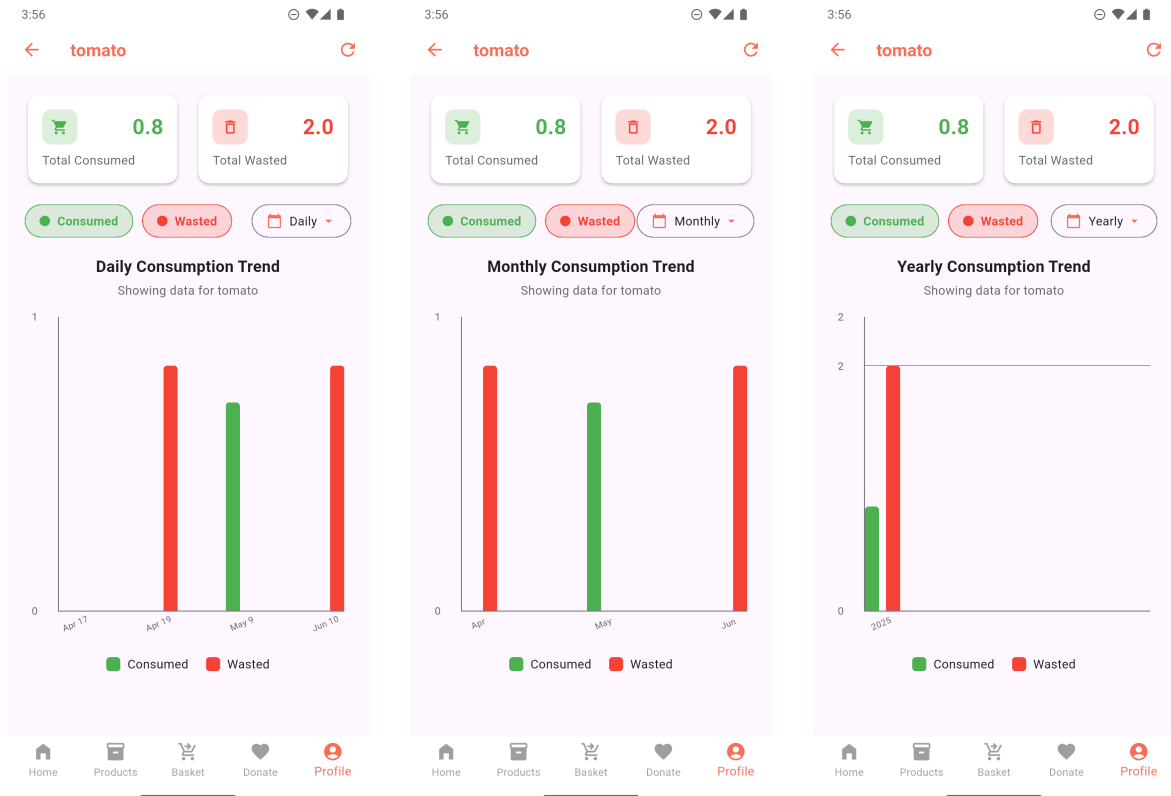
Users can filter the chart to display either consumed or wasted data, and the graph updates accordingly. Additionally, products can be filtered using the **In Stock** or **All Products** toggle, helping users focus on active items or review historical data. This feature provides insightful analytics to help users reduce waste and improve consumption efficiency.



(a) Select a product to analyze

(b) Filter products: All or In Stock

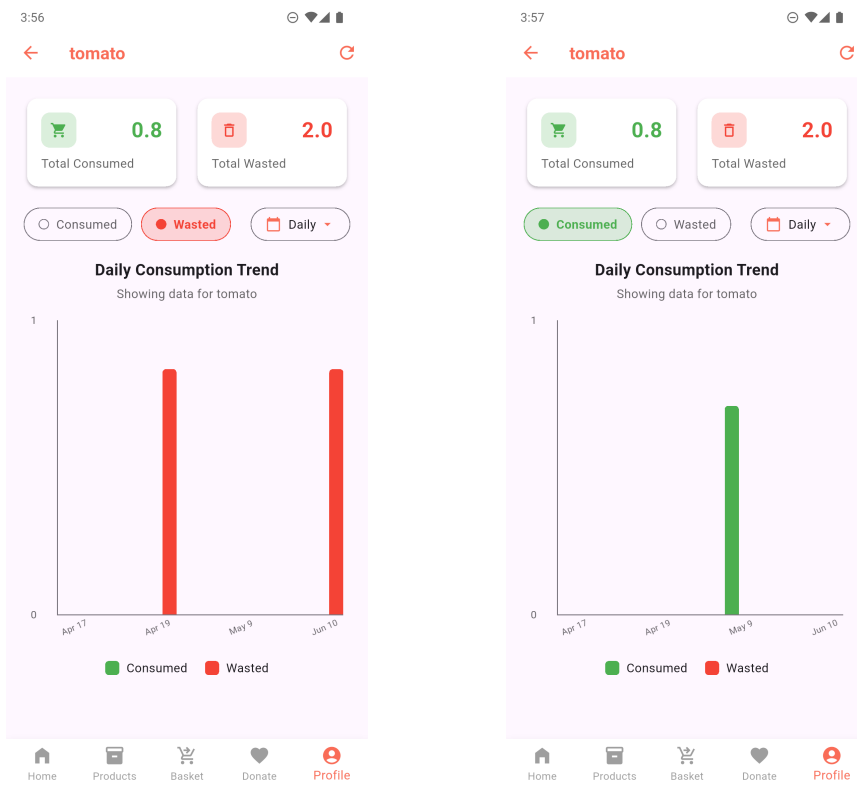
Figure 3.57: Accessing single product analytics



(a) Daily – Consumed vs Wasted

(b) Monthly – Consumed vs Wasted

(c) Yearly – Consumed vs Wasted



(d) Daily – Wasted only

(e) Daily – Consumed only

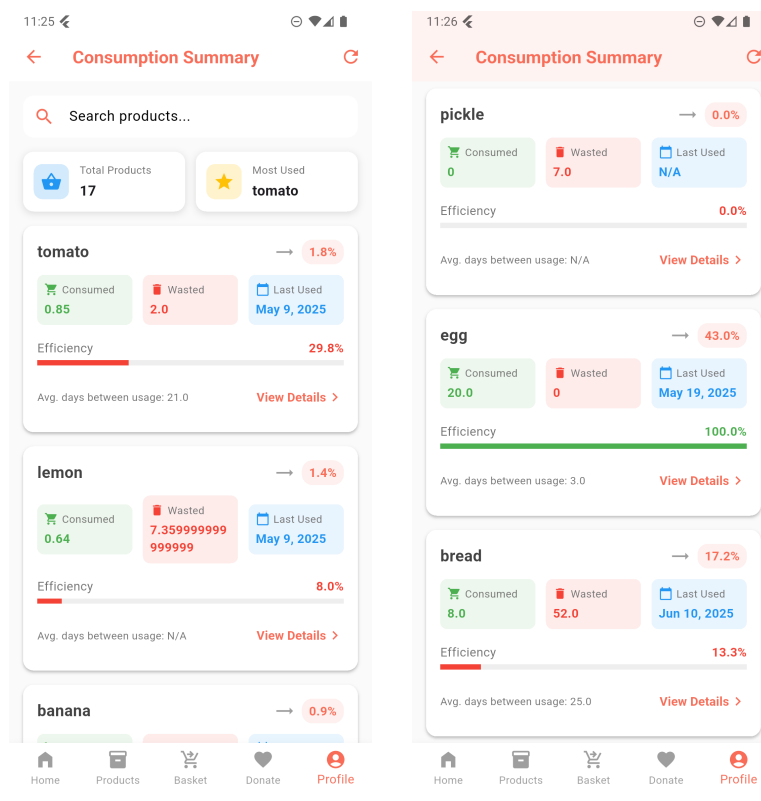
Figure 3.58: Consumption and Waste Trends for Product Across Different Timeframes

Consumption Summary

The **Consumption Summary** section offers users a high-level overview of their consumption efficiency across all products. This dashboard highlights:

- **Total number of tracked products**
- **Most used product**
- **Per-product details**, including:
 - Total quantity consumed and wasted
 - Last used date
 - Consumption efficiency (as a percentage and a progress bar)
 - Average number of days between usage

This screen helps users easily identify which products are being used effectively and which are frequently wasted. The summary is searchable by product name, and detailed views can be accessed for deeper insights.



(a) Total products and top-used item

(b) Detailed Consumption summary

Figure 3.59: Efficiency indicators and usage metrics for each product

Delete Account Feature

The **Delete Account** feature in the **Food Guard** app allows users to permanently remove their account and all associated data. Located within the **Profile** screen,

this option ensures users have full control over their data.

Upon tapping **Delete Account**, a confirmation dialog appears warning users that the deletion is irreversible. If confirmed, the app deletes the user's data and shows a success message. This flow enhances transparency, user control, and data privacy.

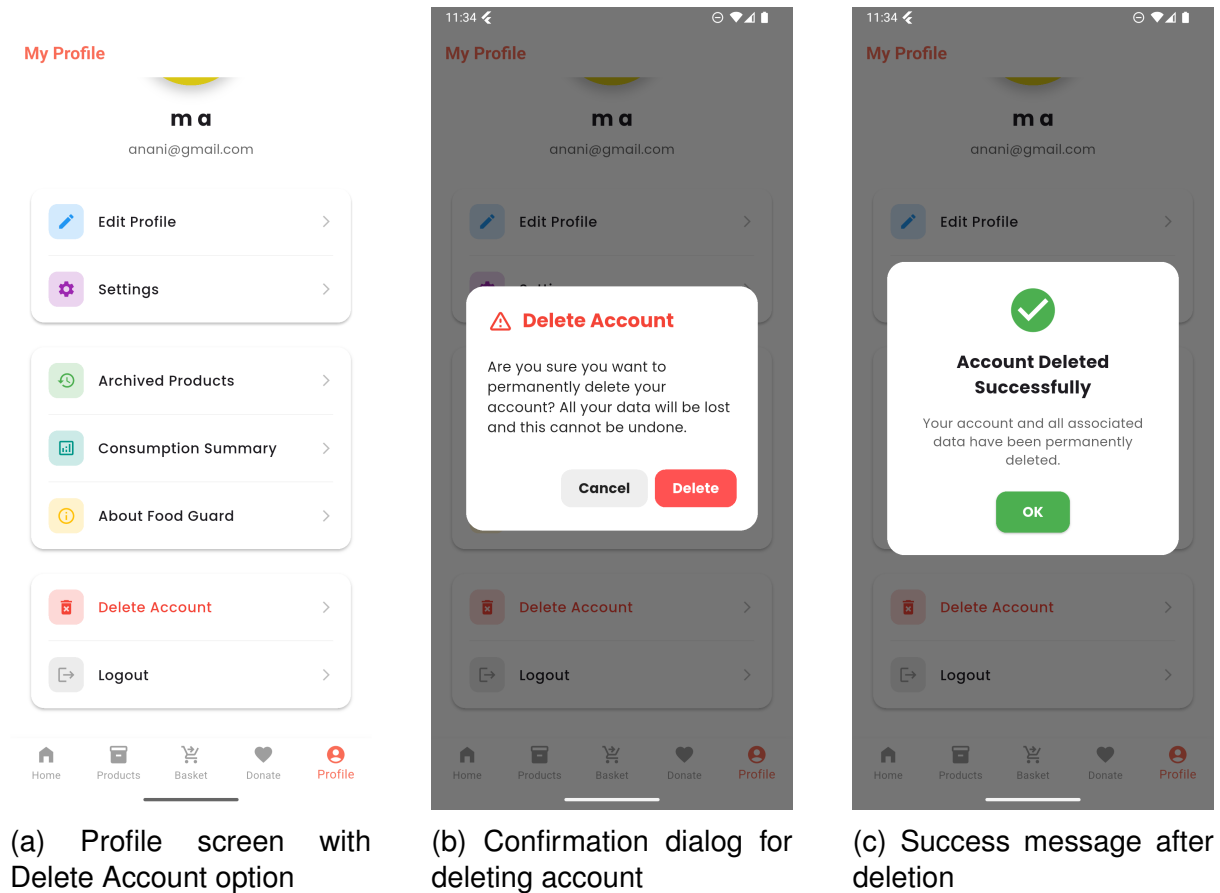
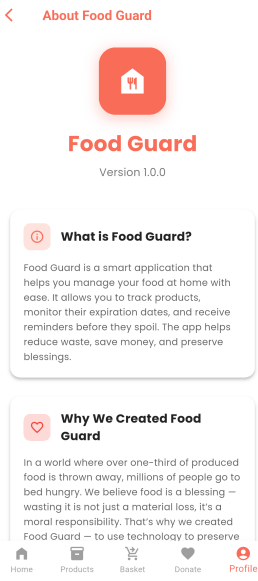


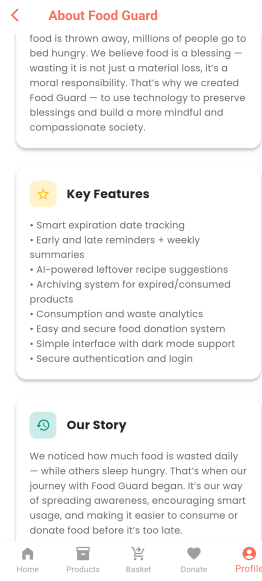
Figure 3.60: Flow of deleting a user account in the app

About Food Guard

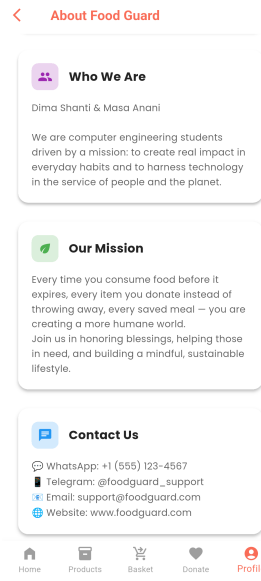
The **About** section in the **Food Guard** app presents the vision and purpose behind its development. It explains how the app helps users reduce food waste by tracking expiration dates, offering smart reminders, and encouraging donations. It also highlights the team's mission to promote sustainability through simple, user-friendly technology.



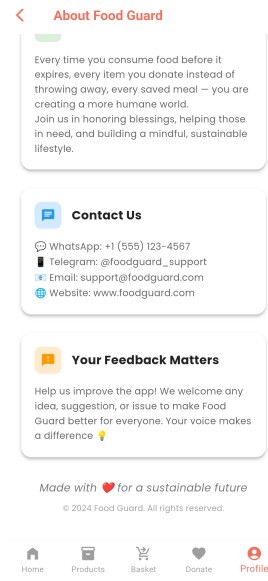
(a) About overview



(b) Key features



(c) Who we are



(d) Contact us

Figure 3.61: About Food Guard section overview

3.2.1.2 Use “Food Guard” as an Admin

The administrator in the **Food Guard** application acts as the main authority responsible for managing platform operations and user-generated content. Unlike a regular user, the admin oversees the system’s integrity, engagement flow, and campaign execution.

(a) Administrator Main Interface

The administrator interacts with the system through a dedicated dashboard and navigation drawer.

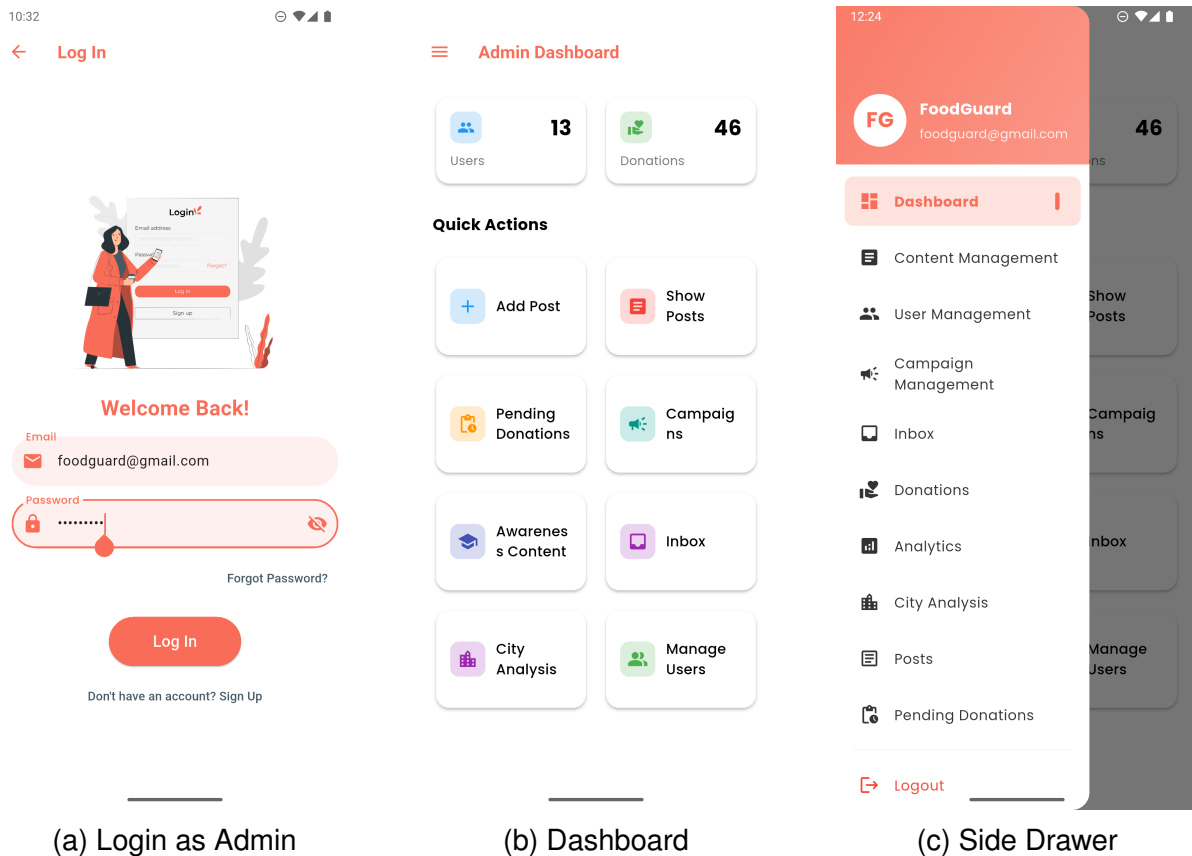


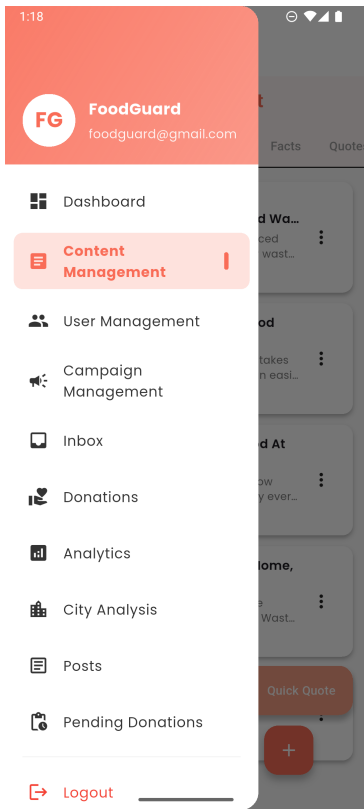
Figure 3.62: Admin Interface: Login, Dashboard Overview, and Navigation Drawer

This interface provides the foundation for managing users, posts, donations, and campaigns. Each of these aspects is presented in detail in the upcoming sections.

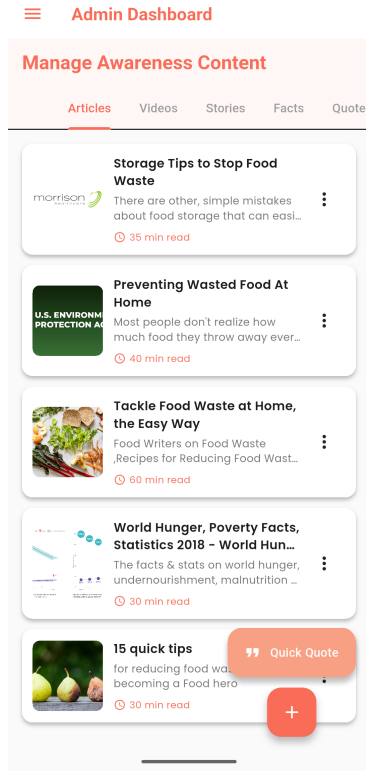
(b) Content Management by Admin

The admin in **Food Guard** is responsible for managing awareness content across the app. Below is a demonstration of the admin’s ability to view, delete, and add awareness materials.

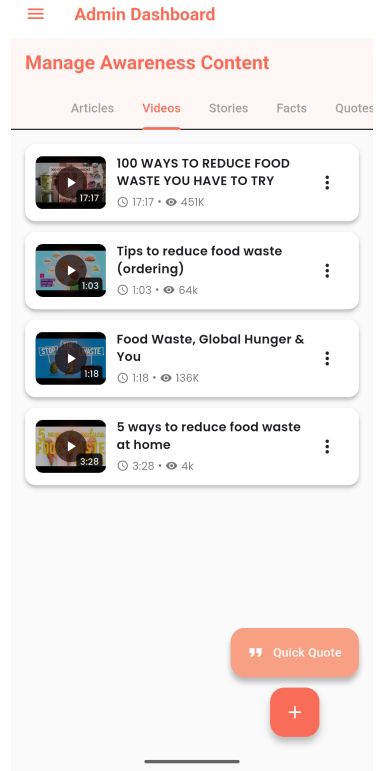
• Viewing Awareness Content



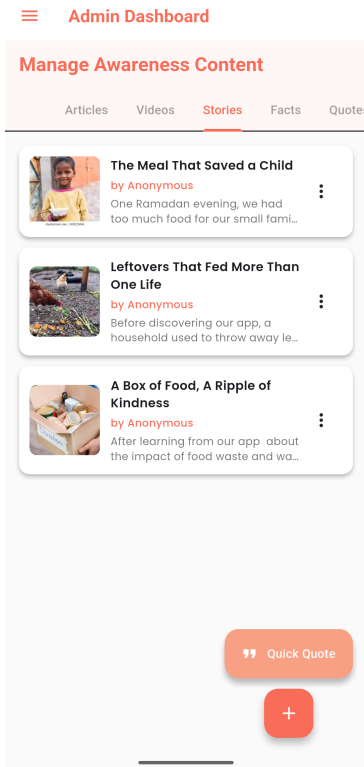
(a) Open management



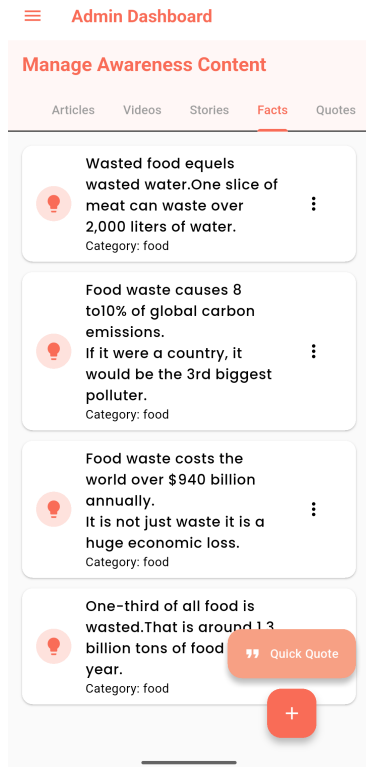
(b) Articles screen



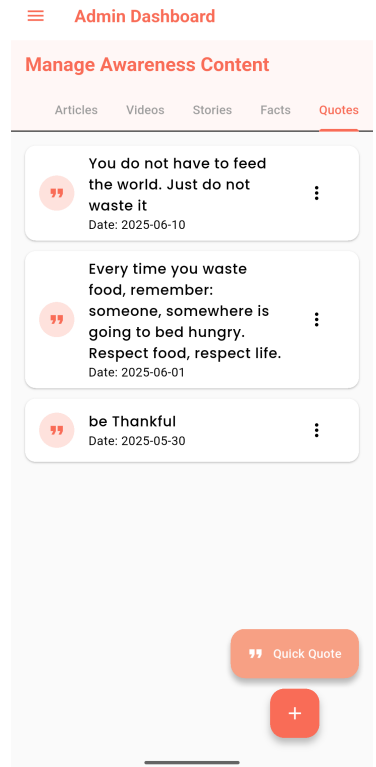
(c) Videos screen



(d) Stories screen



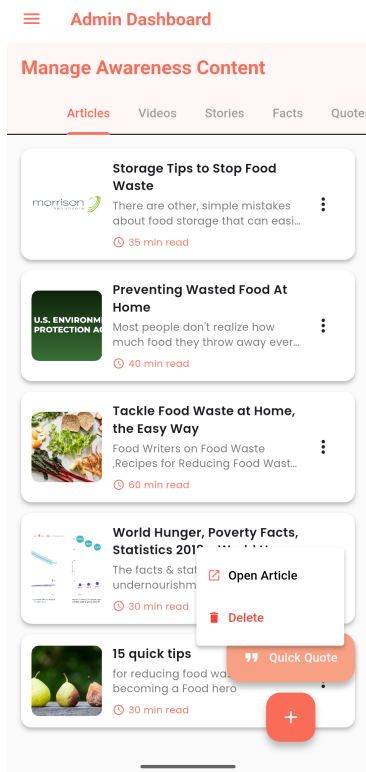
(e) Facts screen



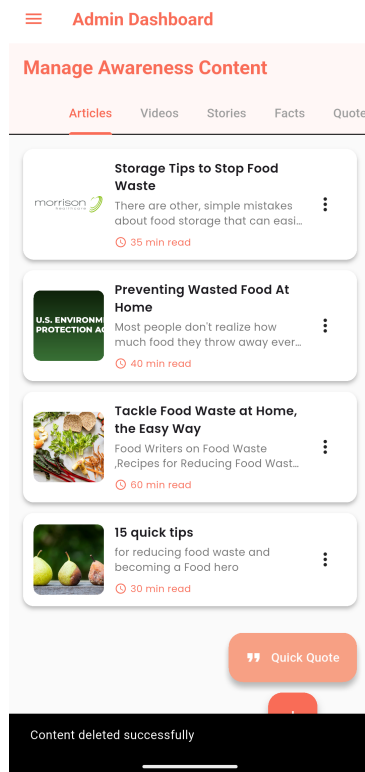
(f) Quotes screen

Figure 3.63: Admin can view and manage different awareness sections.

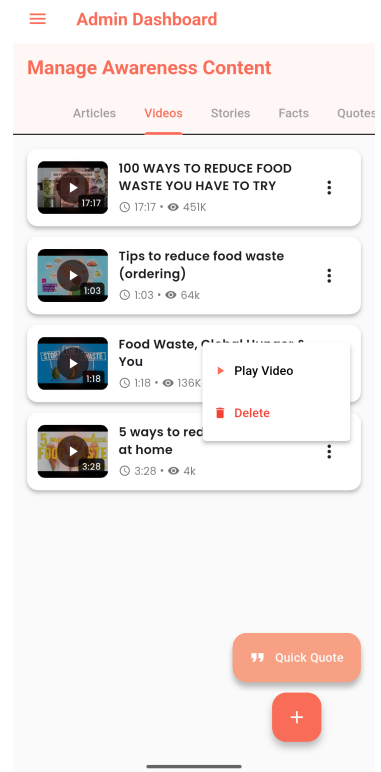
• Deleting Awareness Content – Part 1



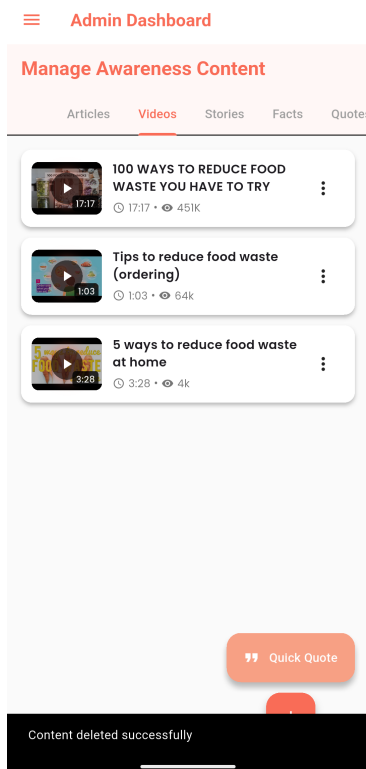
(a) Delete article



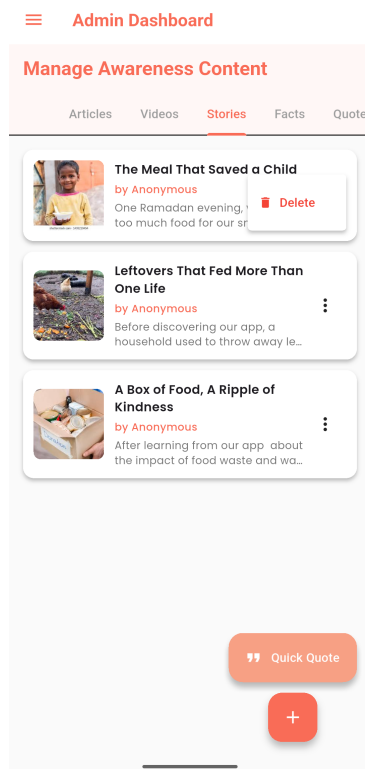
(b) Article deleted



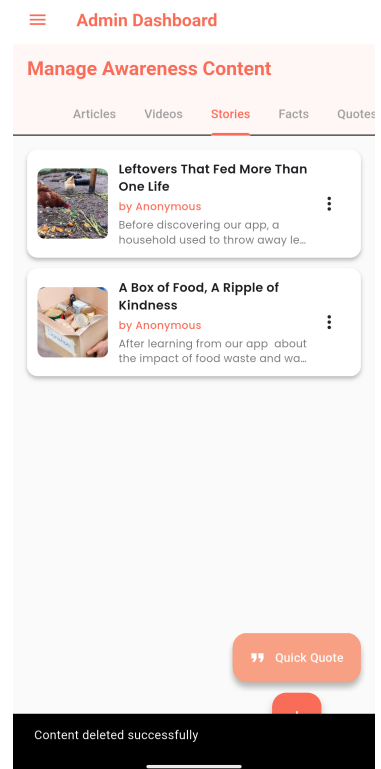
(c) Delete video



(d) Video deleted



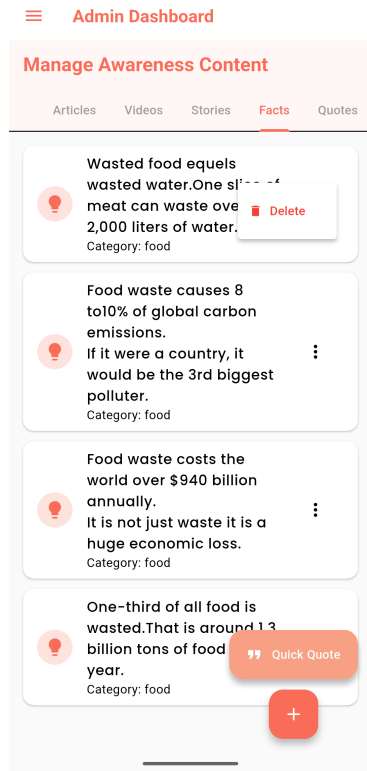
(e) Delete story



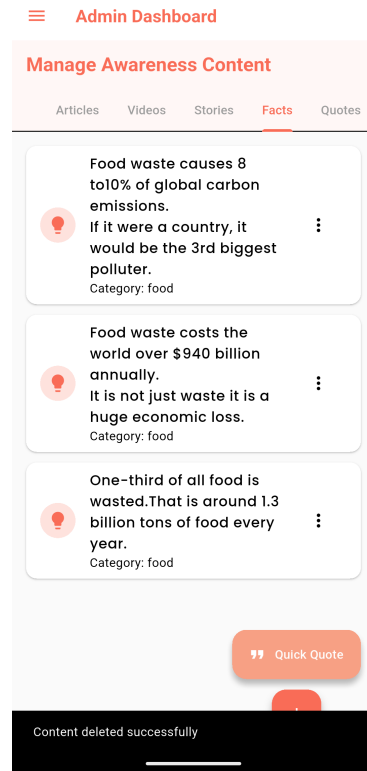
(f) Story deleted

Figure 3.64: Deleting articles, videos, and stories.

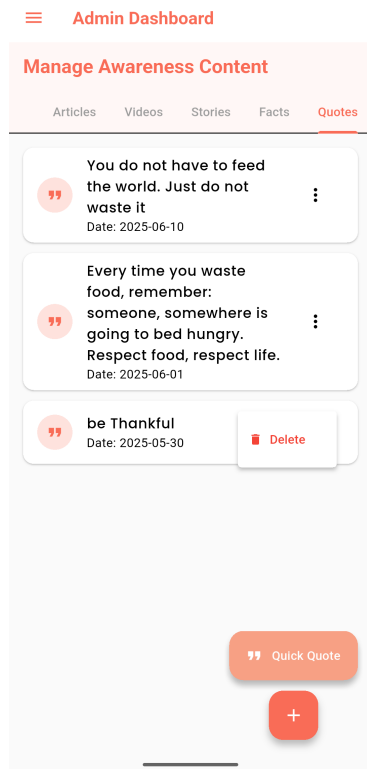
• Deleting Awareness Content – Part 2



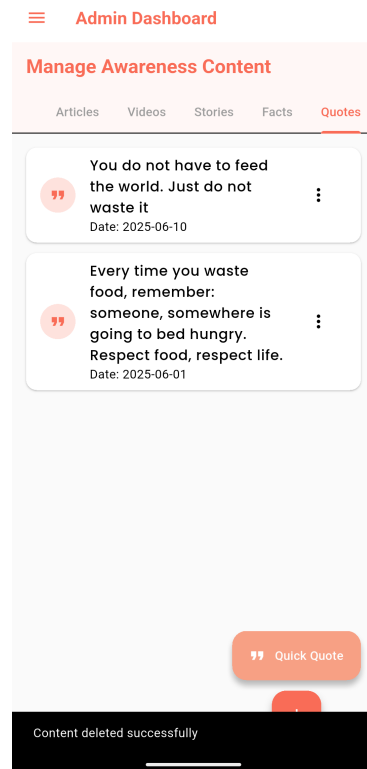
(a) Delete fact



(b) Fact deleted



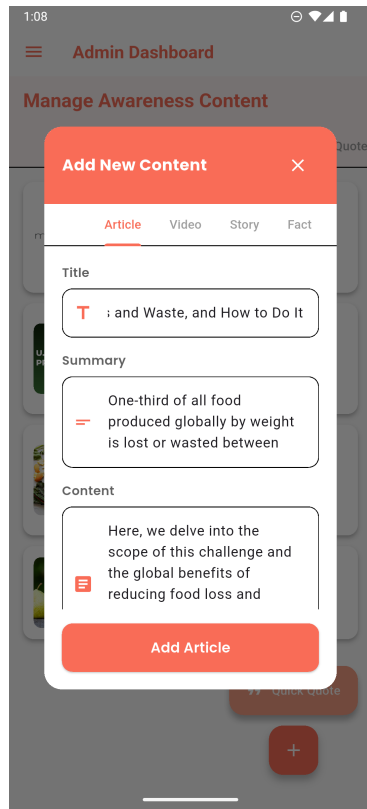
(c) Delete quote



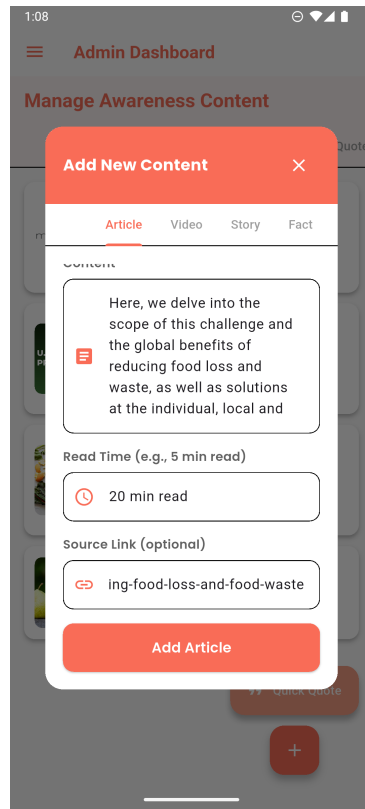
(d) Quote deleted

Figure 3.65: Deleting facts and quotes.

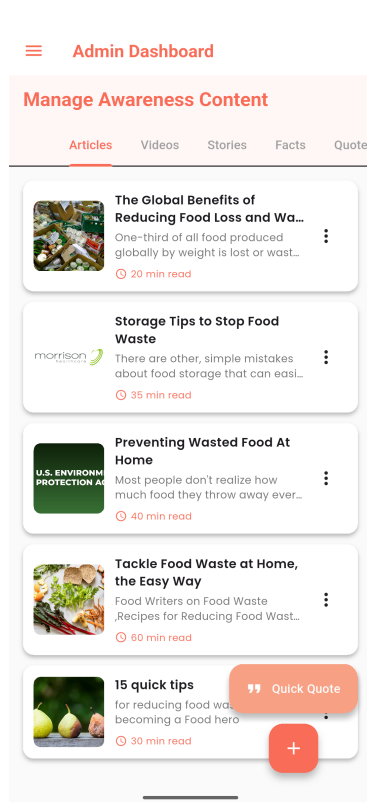
• Adding Awareness Content – Part 1



(a) Add article - Step 1



(b) Add article - Step 2



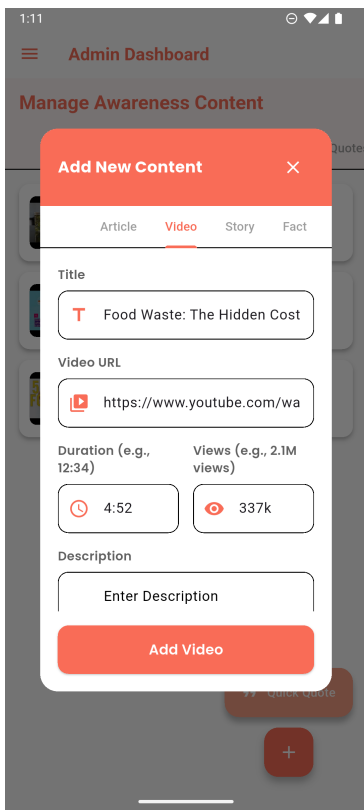
(c) Article added



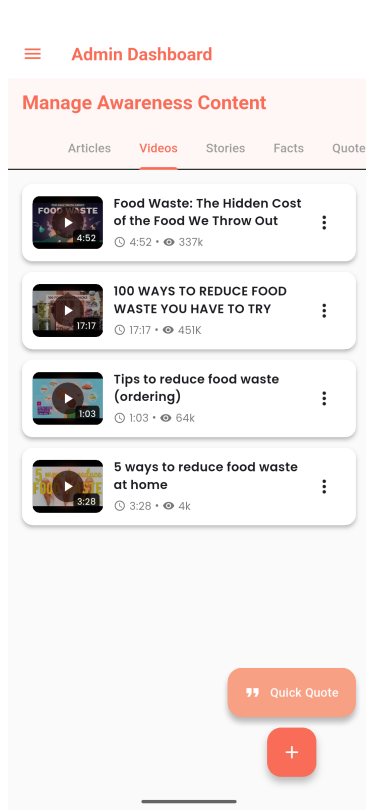
(d) Open article

Figure 3.66: Adding articles.

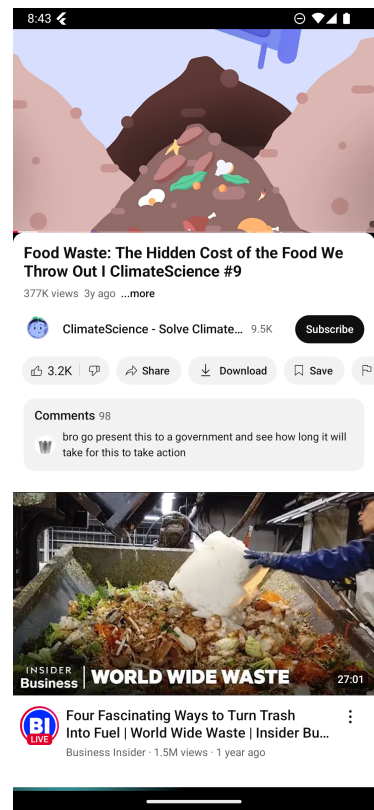
• Adding Awareness Content – Part 2



(a) Add video



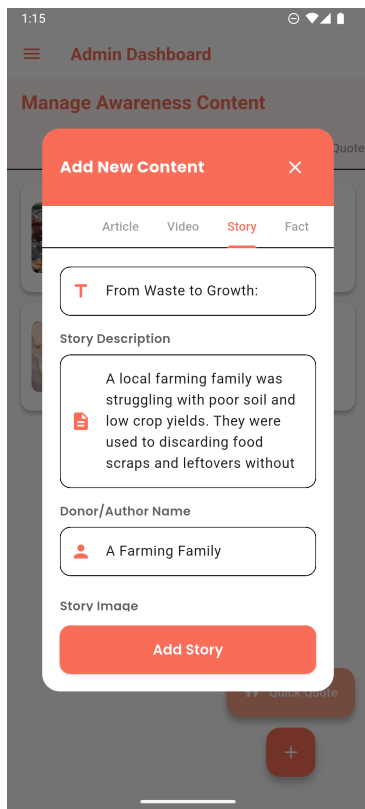
(b) Video added



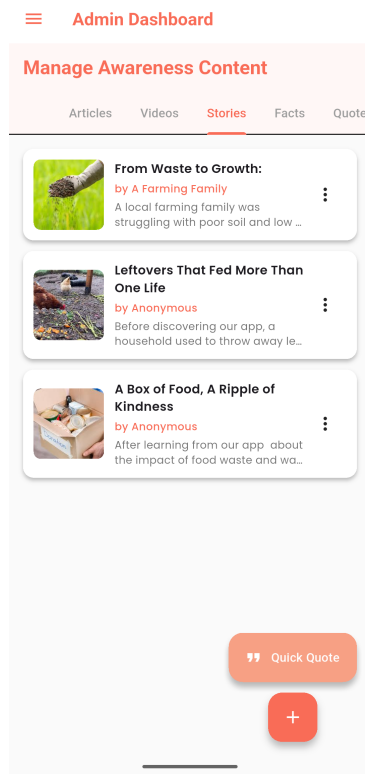
(c) Open video

Figure 3.67: Adding videos.

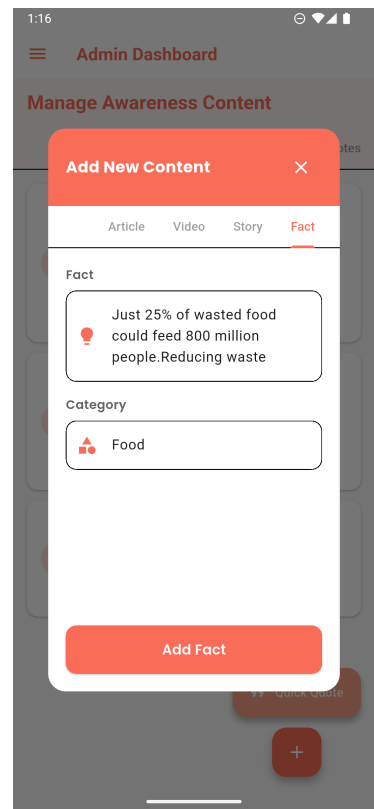
• Adding Awareness Content – Part 3



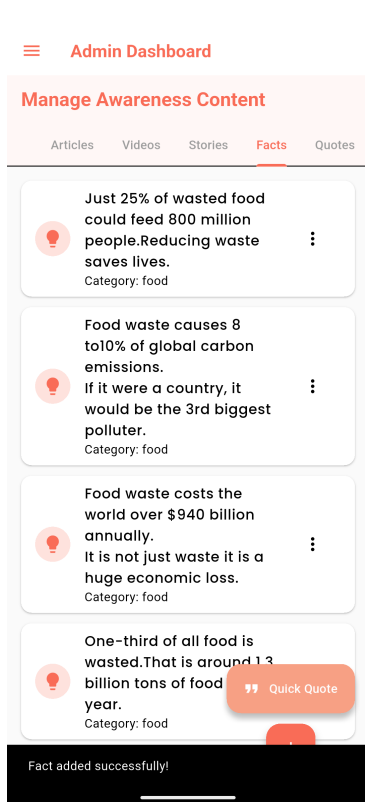
(a) Add story



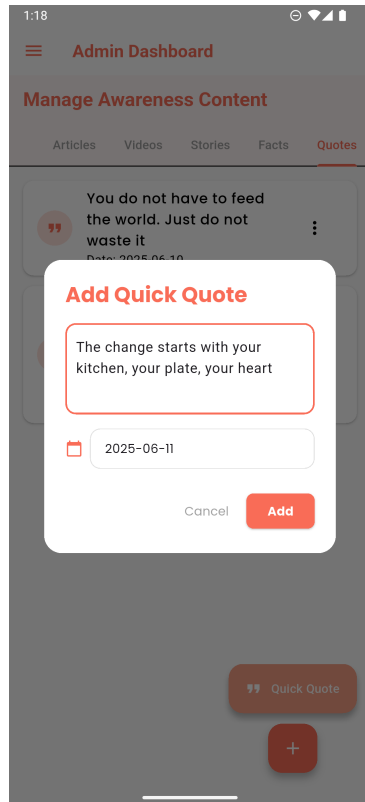
(b) Story added



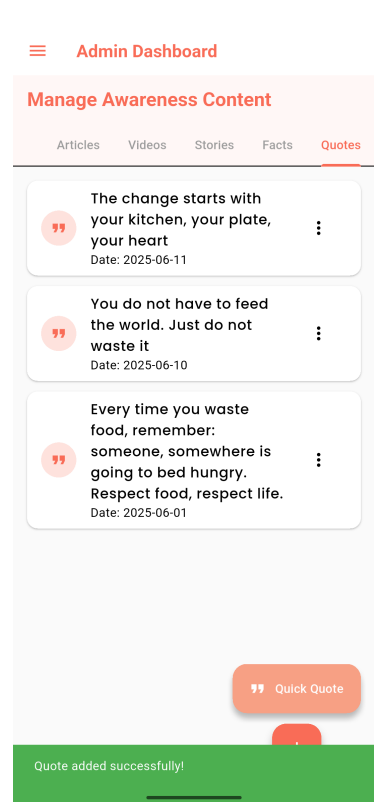
(c) Add fact



(d) Fact added



(e) Add quote



(f) Quote added

Figure 3.68: Adding stories, facts, and quotes.

(c) User Management

The administrator can view all registered users along with their basic information such as name, email, and phone number. No other personal details are shown. The admin can also:

- **Filter users** to quickly find specific ones.
- **Activate or deactivate accounts** to control user access.

This allows the admin to manage users efficiently while keeping the system organized and secure.

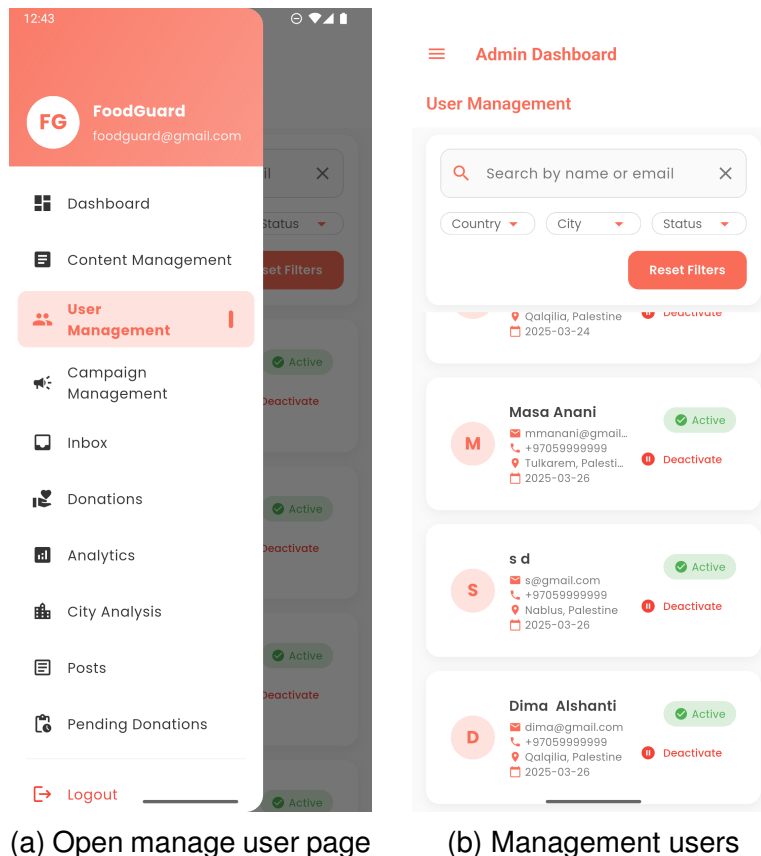
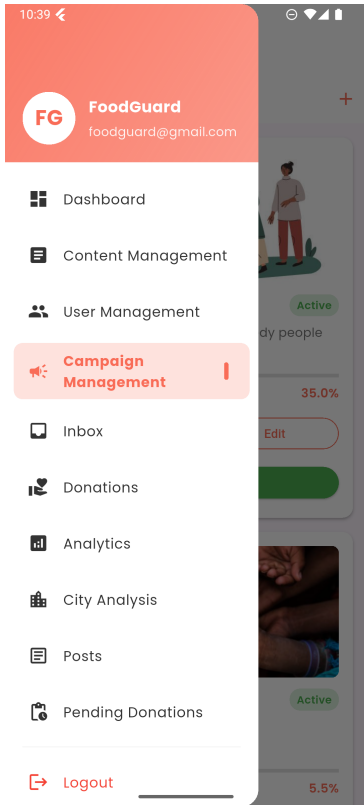


Figure 3.69: Admin can view, manage, and filter the users .

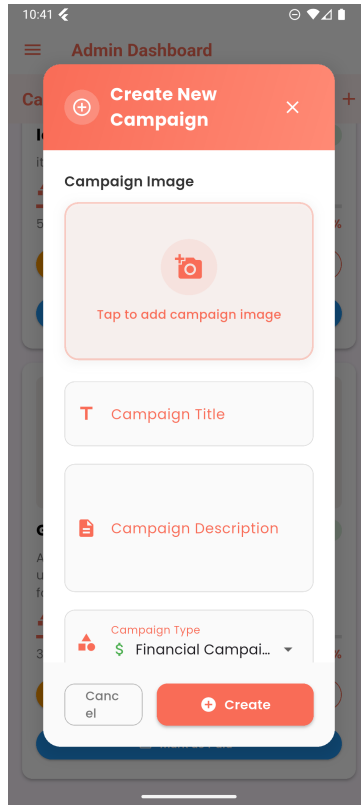
(d) Campaign Management

The admin can manage two types of campaigns: financial donation campaigns and food campaigns. The admin can:

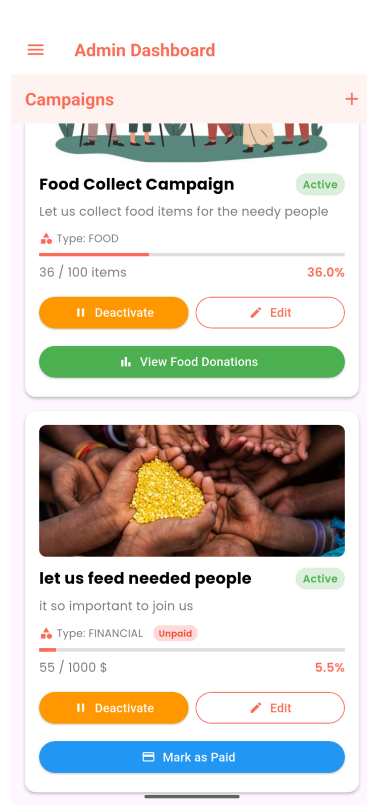
- Create, add, edit, view, and stop campaigns.
- View total received donations for each campaign.
- Manage in donations: submitted items appear as *Pending* until the admin receives them **physically by hand**, then marks them as *Received*.



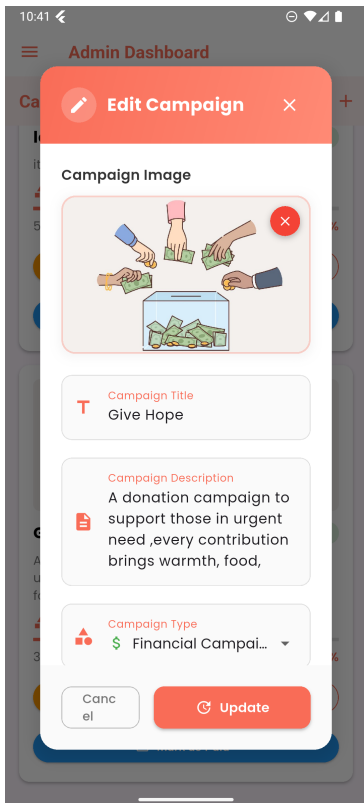
(a) Open campaign page



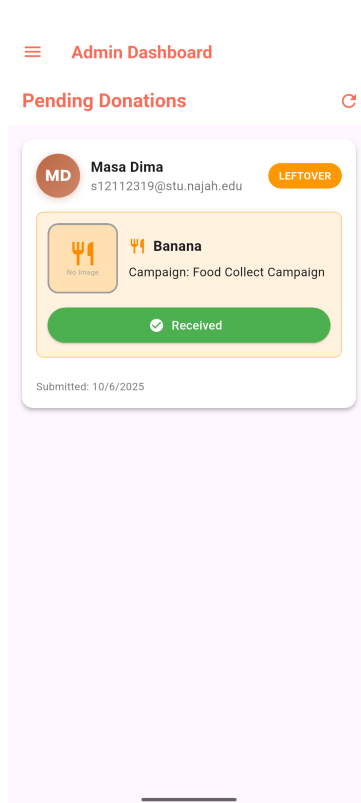
(b) Add campaign



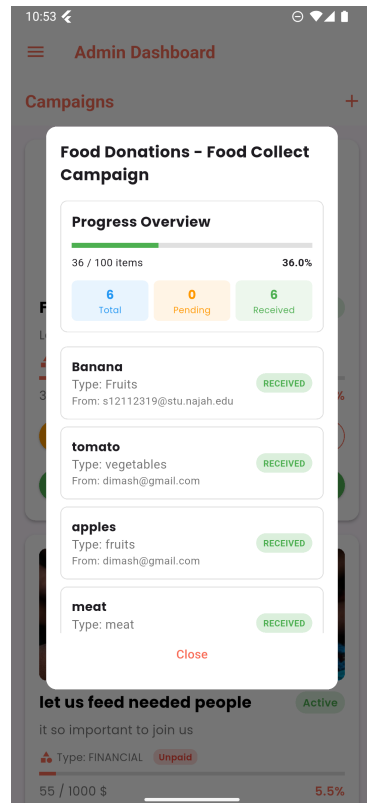
(c) Campaign page



(d) Edit campaign



(e) Pending Food Donations



(f) View total donations

Figure 3.70: Admin functionalities for managing charity campaigns and donations.

(e) **Admin Inbox**

The admin has access to an organized inbox where messages from users are received, including questions, requests, or support inquiries. The admin can view full conversations, reply with text or images, and manage communication efficiently. Each conversation displays a badge showing the number of unread messages, and the total count of unread messages is shown at the top, helping the admin quickly identify chats that need attention.

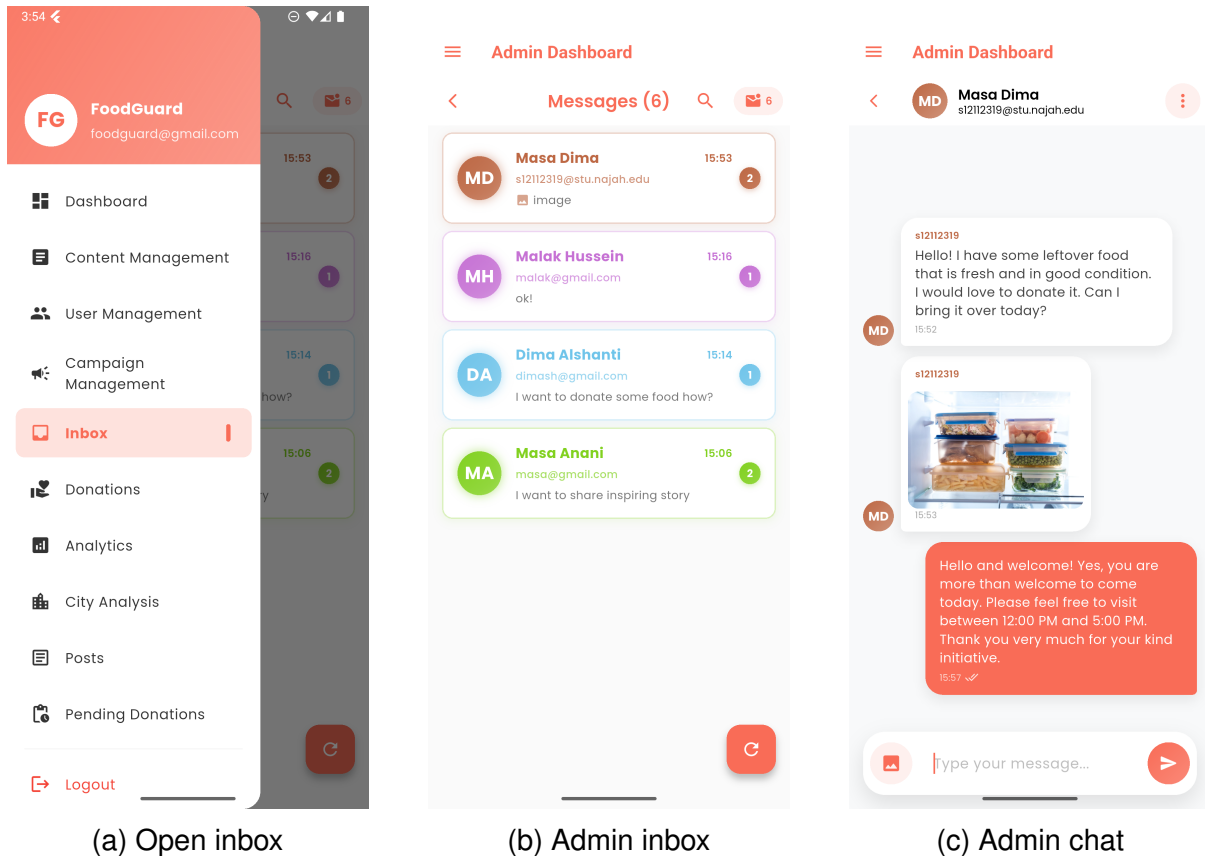
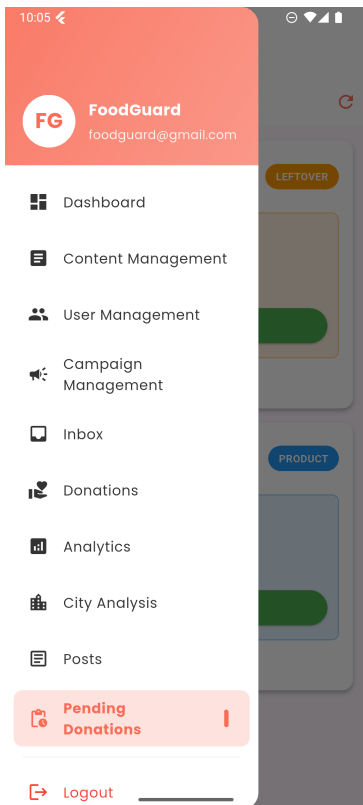


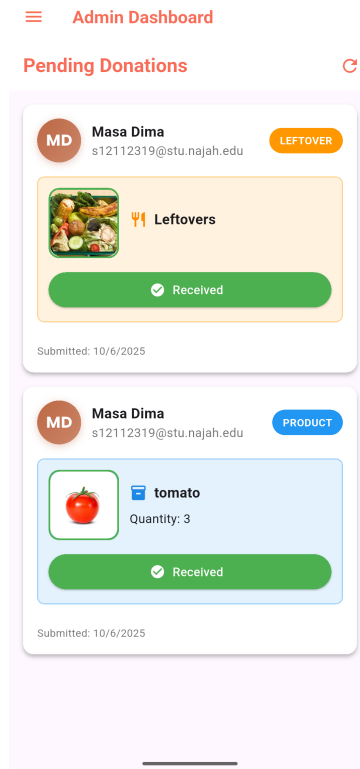
Figure 3.71: Admin inbox with unread message badges and chat management.

(f) **Pending Donations**

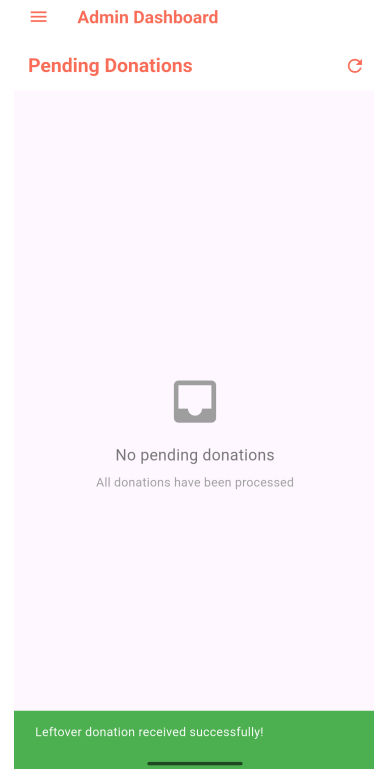
Pending donations refer to contributions—such as food items, leftover meals, or goods from donation campaigns—that have been offered by users but not yet physically received by the admin or organization. These donations remain in a “pending” state until they are verified and collected in person. Once the admin receives the items on the ground, the status is updated to “Received” to confirm successful handover.



(a) Open Pending page



(b) Pending Donations

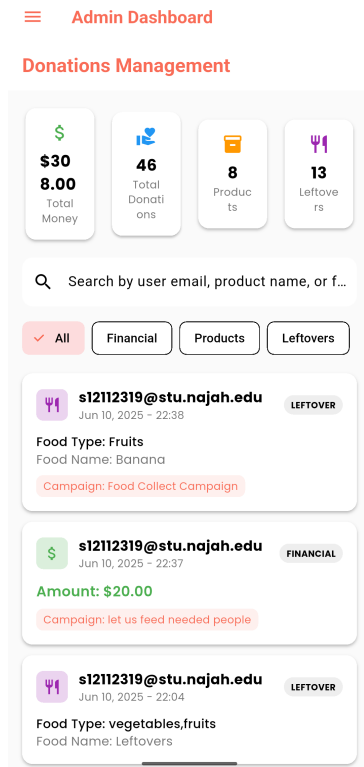


(c) received Donations

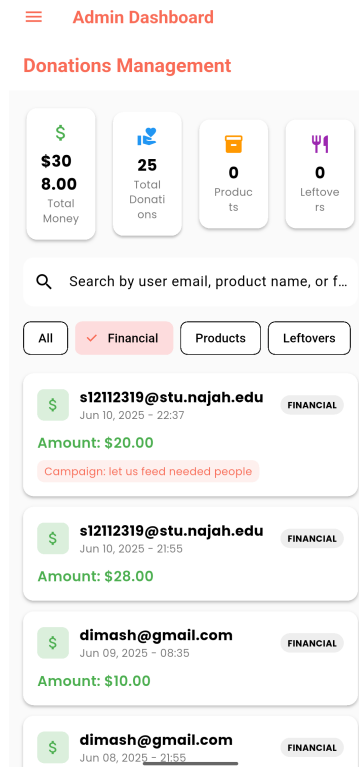
Figure 3.72: Managing pending and received donations within the admin interface.

(g) **Donations**

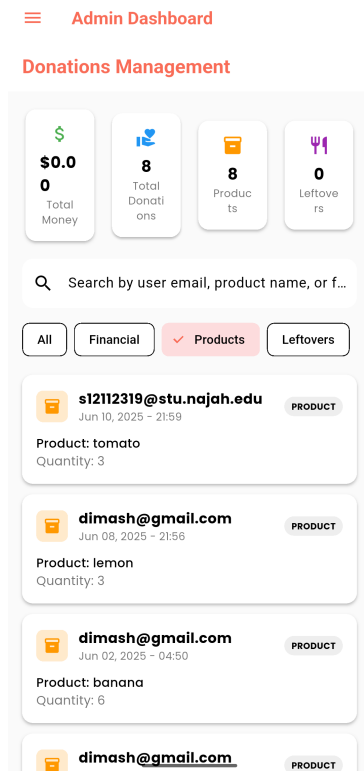
This section displays all received donations—whether financial, food items, or leftover meals—regardless of their source (campaign or direct donation). The admin can filter the view by type: All, Financial, Product, or Leftover. A search function is also available to quickly locate specific donations based on relevant details.



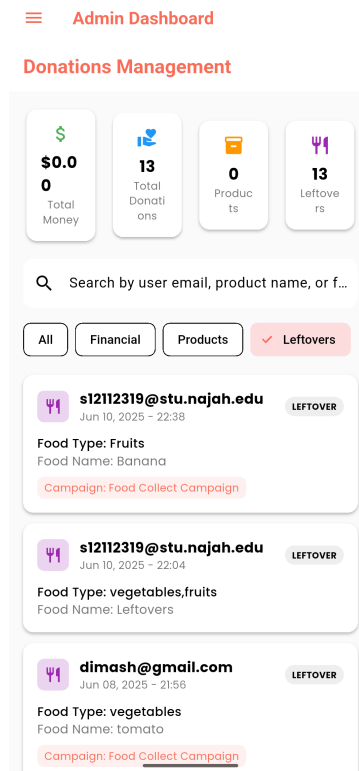
(a) Add donations



(b) Financial donations



(c) Products donations



(d) Leftovers donations

Figure 3.73: Donations.

(h) **Consumption Analytics**

The admin has access to consumption analytics that provide insights into how products are being used or wasted across the platform. These statistics are anonymous and focus only on product-level data, such as total consumed, total wasted, efficiency rates, and number of users per product. The dashboard includes global summaries and detailed breakdowns by product to support planning and awareness efforts without revealing any user identities.

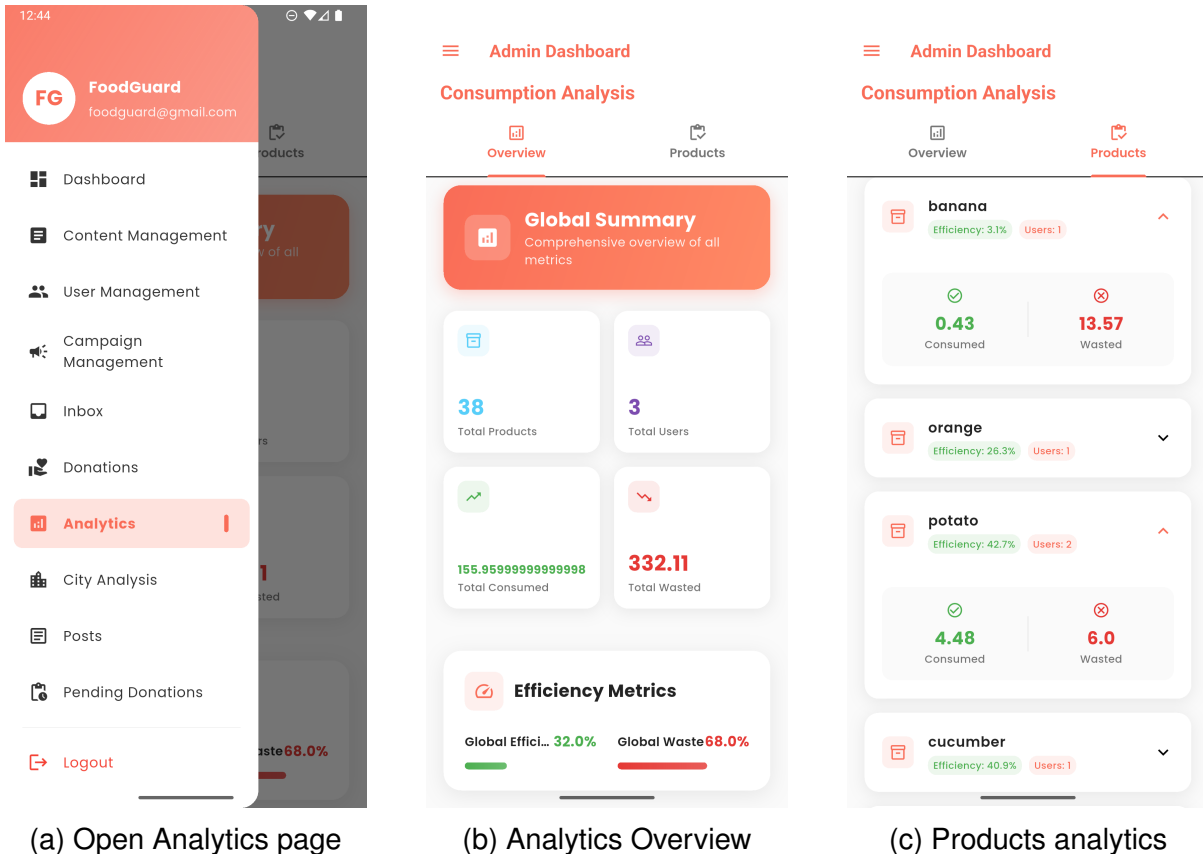
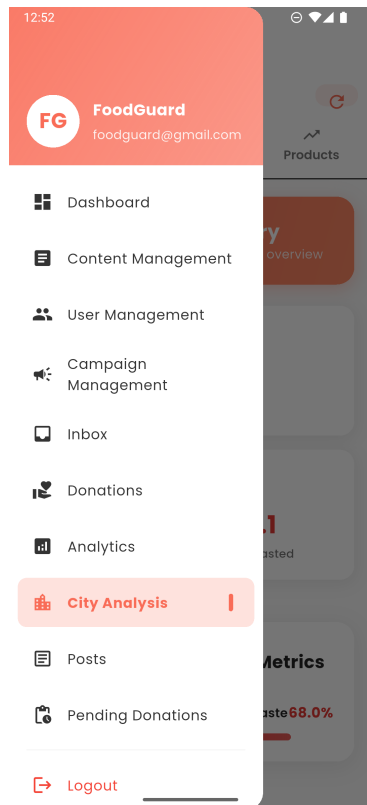


Figure 3.74: Admin consumption dashboard showing product-level statistics such as usage, waste, and efficiency .

(i) **Geographical Analysis**

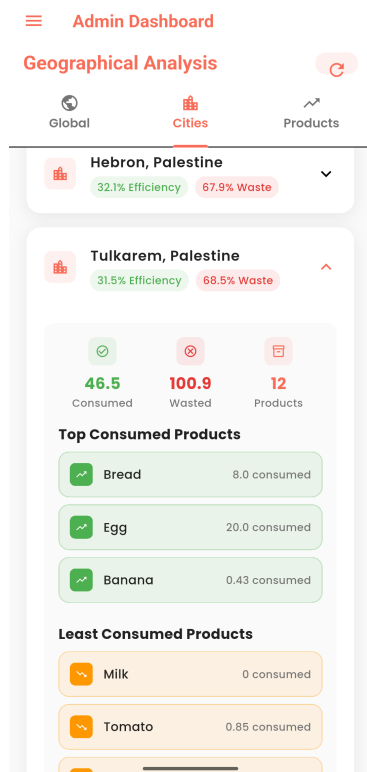
The admin dashboard includes a geographical analysis that presents consumption and waste statistics categorized by city. The data includes total consumed and wasted quantities, efficiency rates per city, and highlights of the most and least consumed products. This analysis helps in identifying regional trends without revealing personal user data, supporting more targeted awareness or planning strategies.



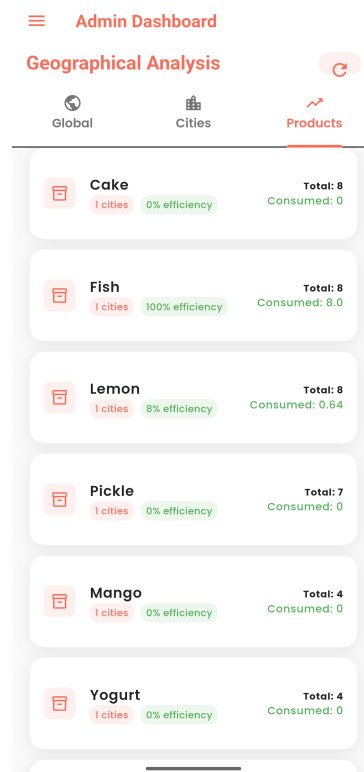
(a) Open city Analysis



(b) Global Analysis



(c) Cities Analysis



(d) Products Analysis.

Figure 3.75: Geographical consumption dashboard showing efficiency and waste statistics by city, including top and least consumed products.

(j) **Add Posts by Admin**

The Admin Post Management feature allows administrators to create and publish informative content that serves as the primary communication channel with the user community. Admins can:

- Share educational posts about food waste reduction.
- Announce weekly saving goals and platform statistics.
- Provide practical food preservation tips.
- Inform users about donation locations where they can contribute surplus food.

These posts aim to raise awareness, promote sustainable practices, and facilitate community collaboration for food-sharing initiatives.

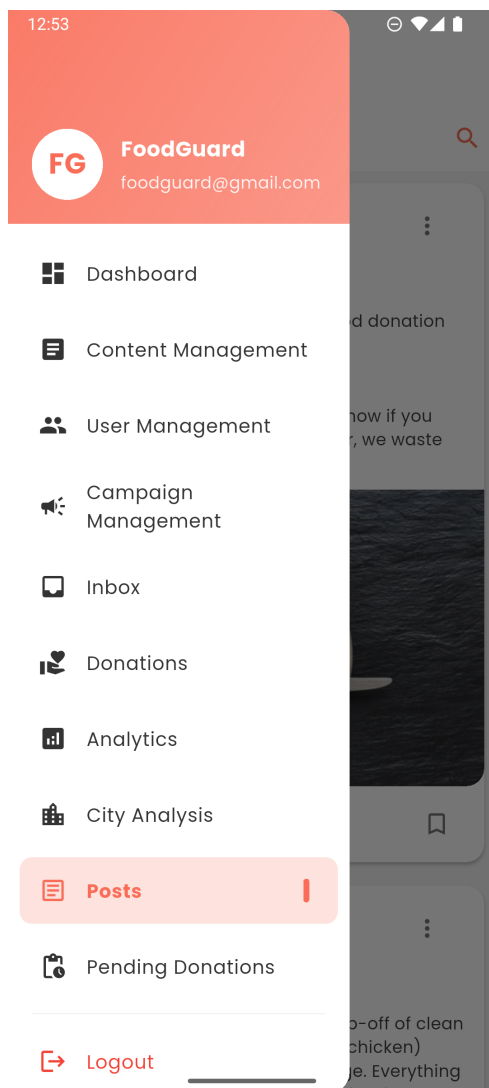


Figure 3.76: Open Admin Posts

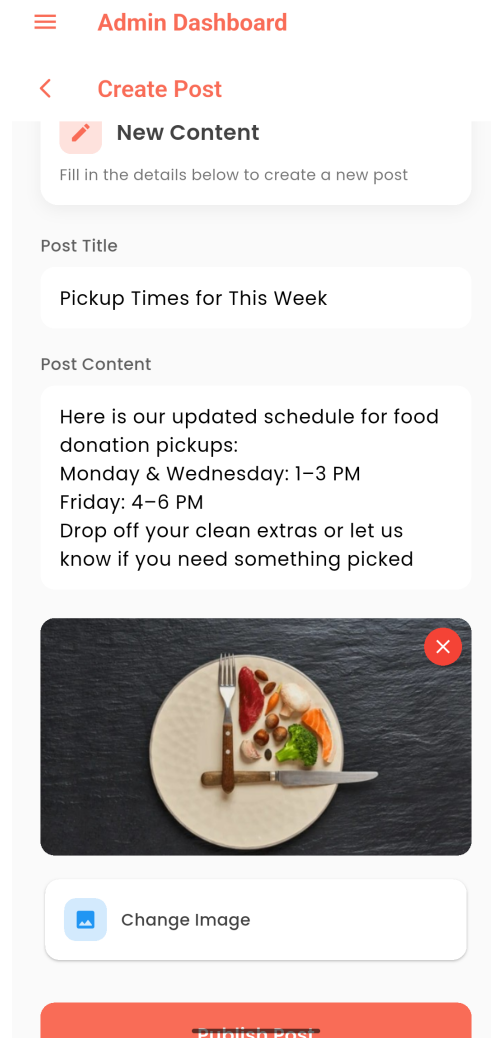
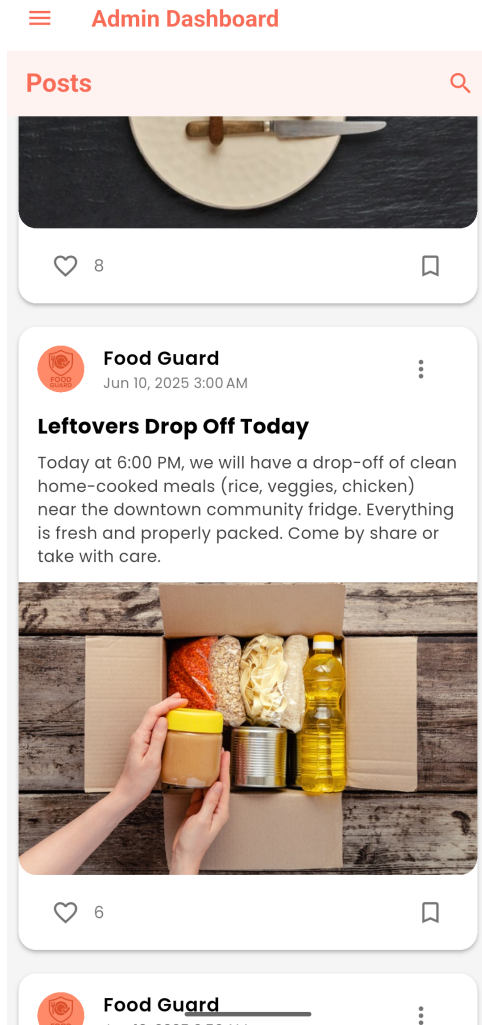
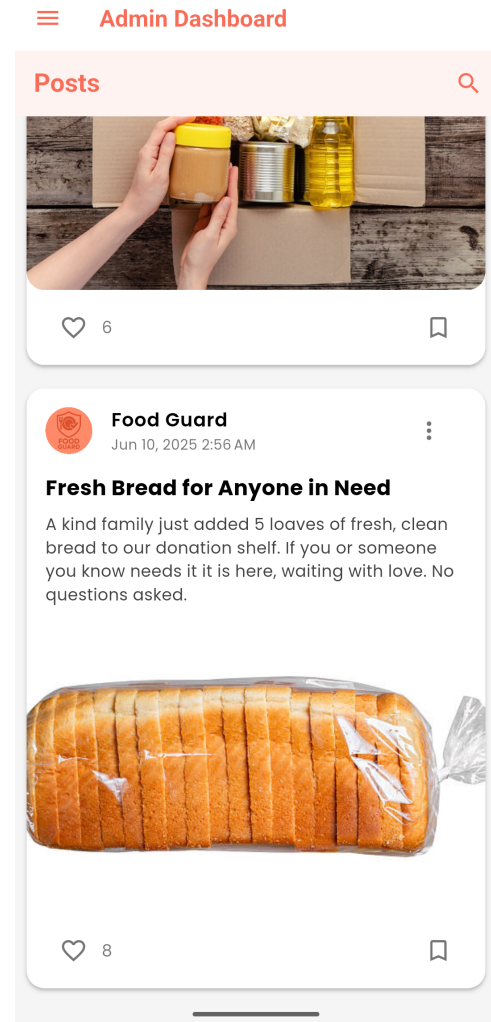


Figure 3.77: Admin Adding a Post

The admin post views provide a clear and organized interface to browse, review, and manage all published posts efficiently.



(a) Posts screen 1



(b) Posts screen 2

Figure 3.78: Admin view of published posts.

The admin has the ability to **edit** and **delete** any post, ensuring full control over the content presented to users. The following screenshots illustrate the edit process in action:

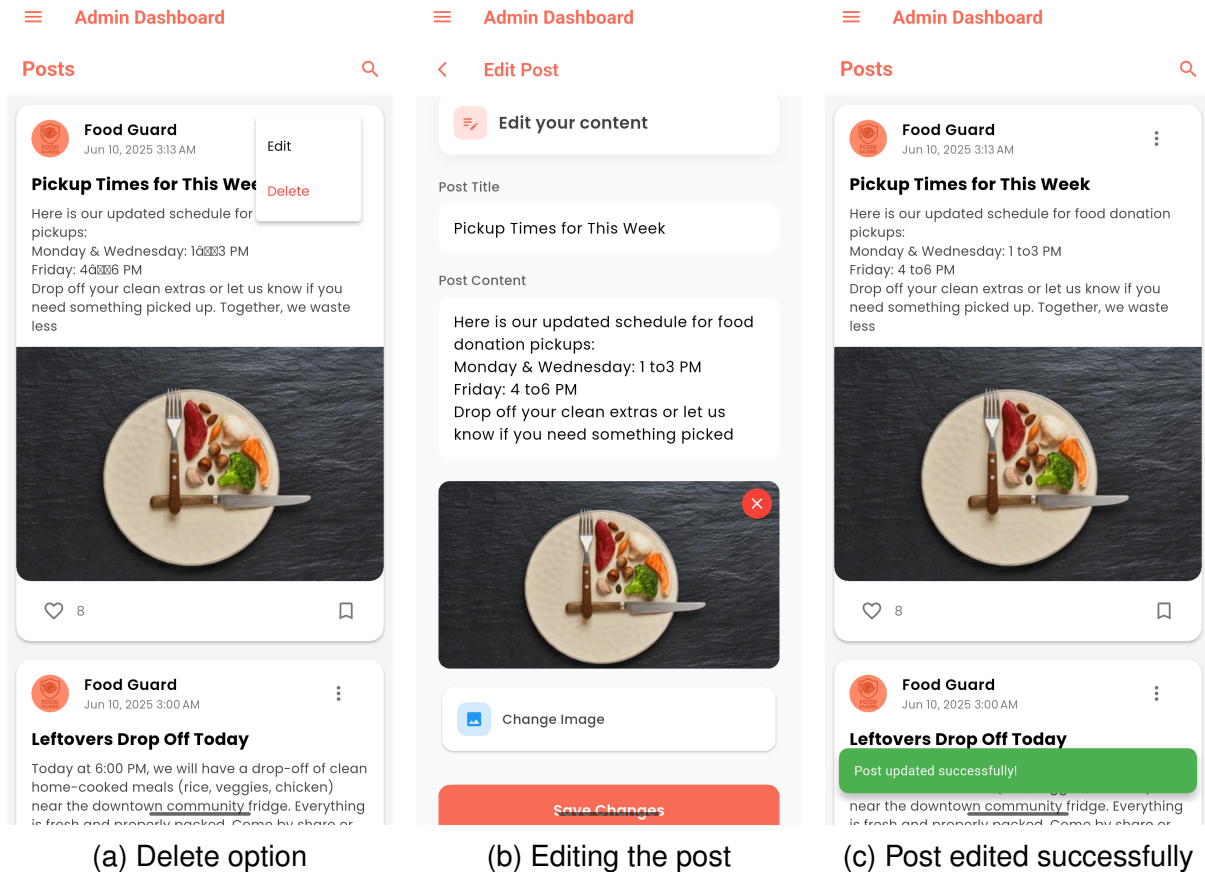


Figure 3.79: Admin managing posts through the edit feature.

3.2.2 WEBSITE

In addition to the mobile application, **Food Guard** was also implemented as a web platform to ensure broader accessibility and administrative efficiency. The web version maintains all the core features and functionalities available in the mobile application—such as donation tracking, campaign management, expiry alerts, and user communication—but adapts them to suit a desktop browsing experience.

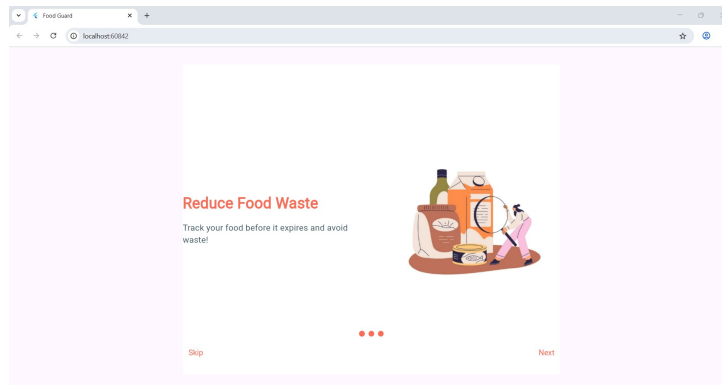
The interface was redesigned to reflect standard web design practices. For instance, navigation elements such as the sidebar replace bottom navigation to utilize the wider screen and management tools are more space-optimized to allow administrators and users to work efficiently on larger screens.

Users can log in or sign up through a responsive authentication interface. Once authenticated, they have access to the same roles and privileges they would on

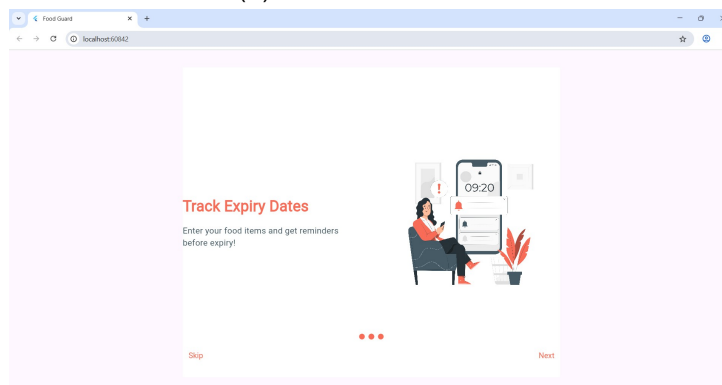
the mobile app. The web platform is especially useful for administrators who may prefer managing tasks—such as reviewing donations, responding to messages, or posting awareness content—through a larger interface with a keyboard and mouse.

By providing both mobile and web access, **Food Guard** ensures an inclusive, flexible, and user-friendly experience for all participants in the food donation and sustainability ecosystem.

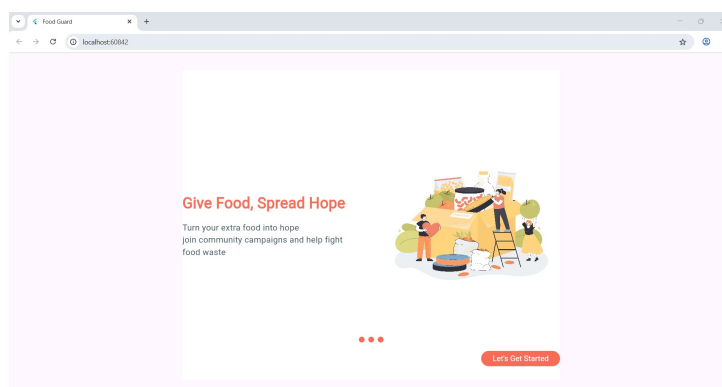
- **Introduction screens**



(a) First intro screen.



(b) Second intro screen.

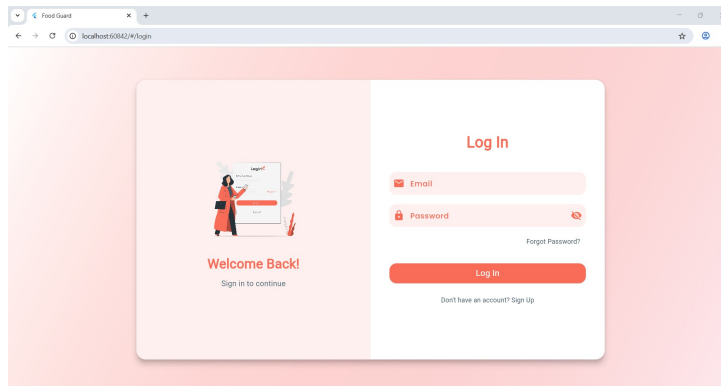


(c) Third intro screen.

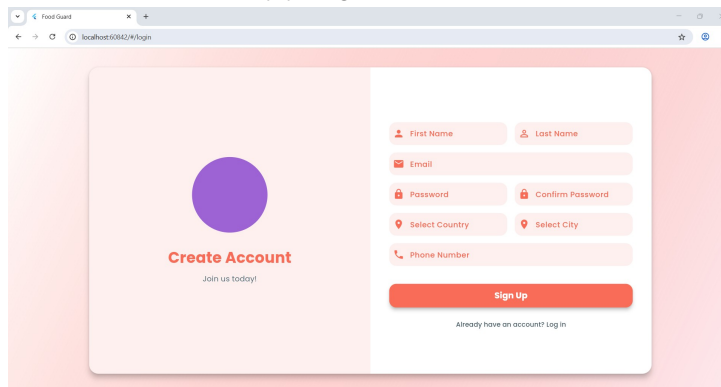
Figure 3.80: Introduction screens on the web interface.

- **Authentication Screens**

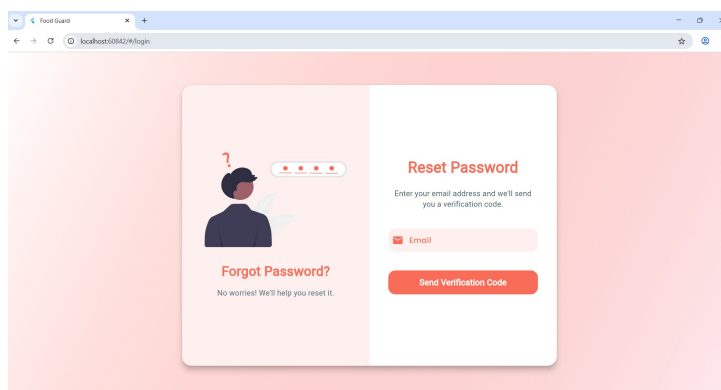
All user inputs throughout the system undergo validation checks to ensure data integrity, including required fields, correct formats, and logical constraints.



(a) Login screen.



(b) SignUp screen.



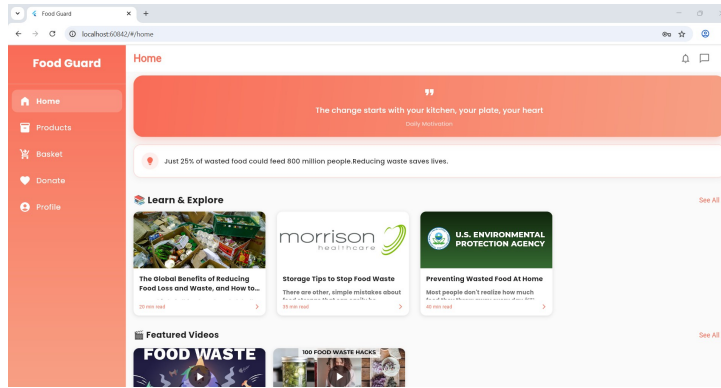
(c) Forgot Password screen.

Figure 3.81: Authentication Screens on the web interface.

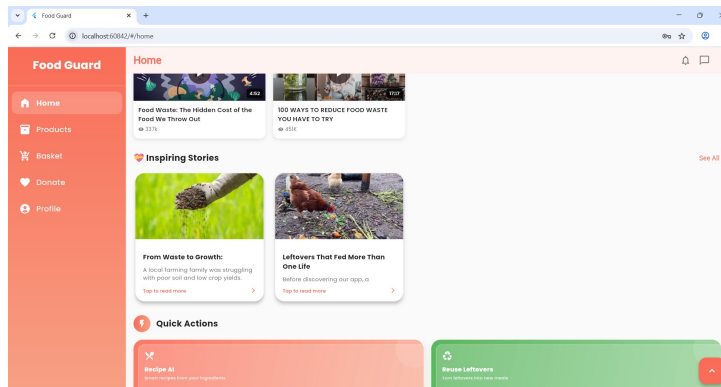
3.2.2.1 Use “Food Guard” Website as a USER

- **User Home Page**

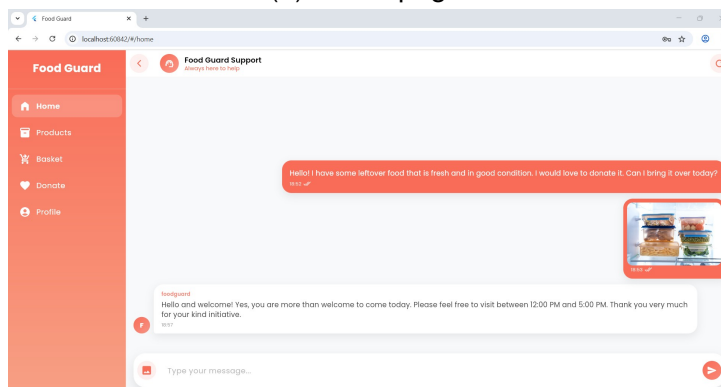
3.2.2.2 Use “Food Guard” Website as an Admin



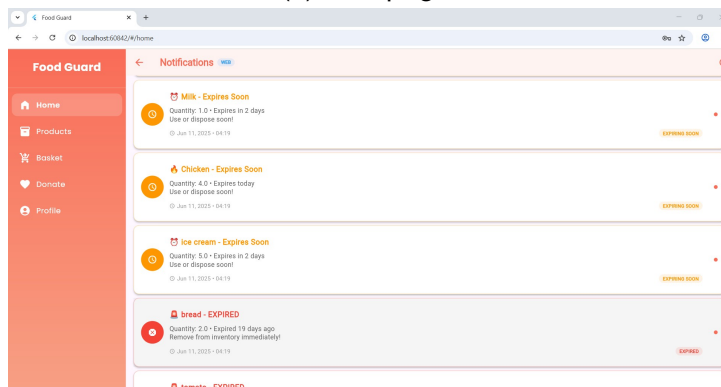
(a) Home page.



(b) Home page.

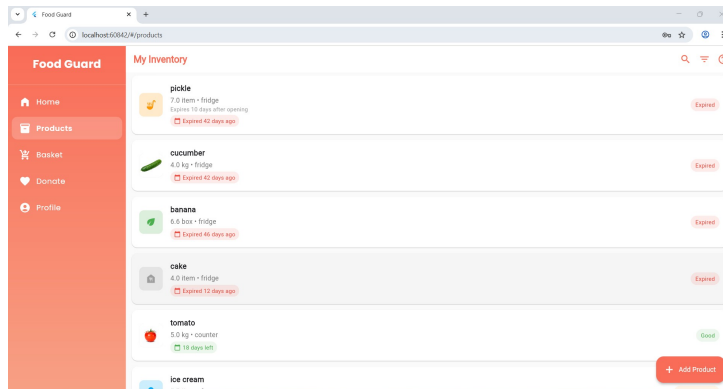


(c) chat page.

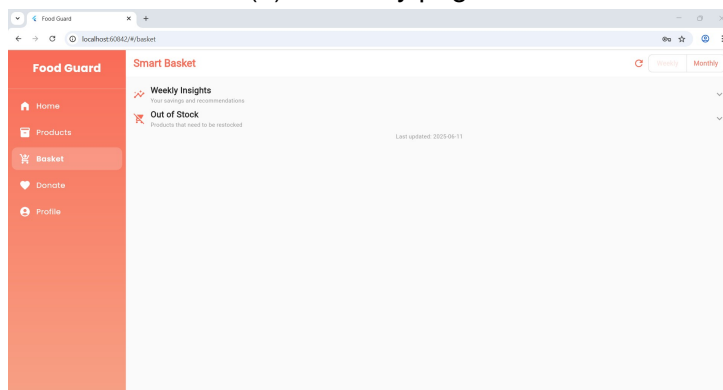


(d) Notifications page.

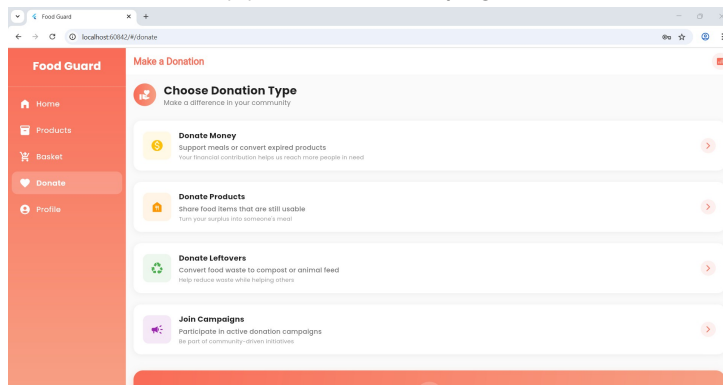
Figure 3.82: Home screens on the web interface.



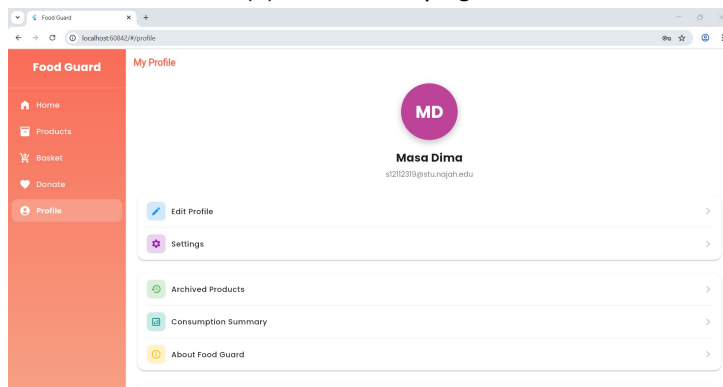
(a) Inventory page.



(b) Smart basket page.

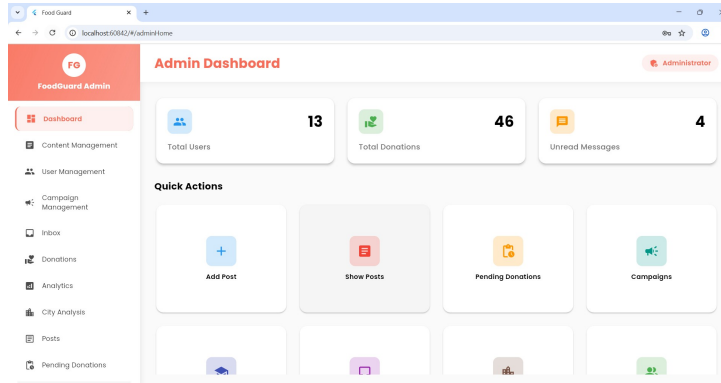


(c) Donations page.

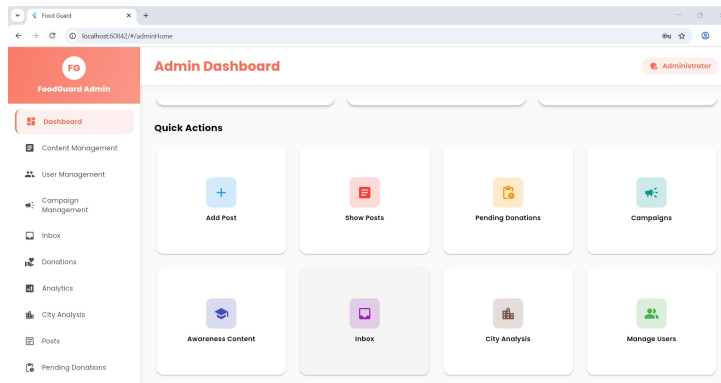


(d) Profile page.

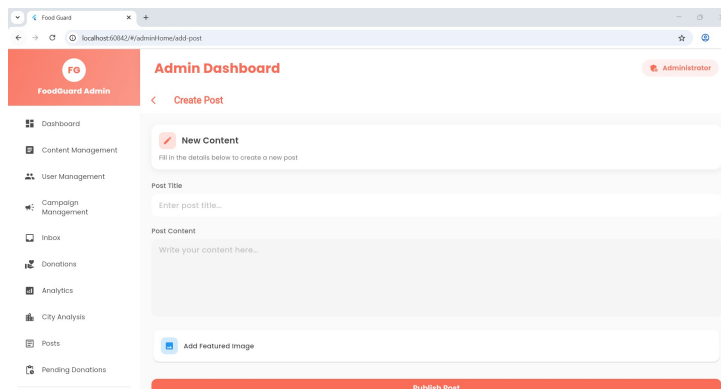
Figure 3.83: Inventory, Smart basket, Donations, and Profile screens on the web interface.



(a) Admin dashboard.

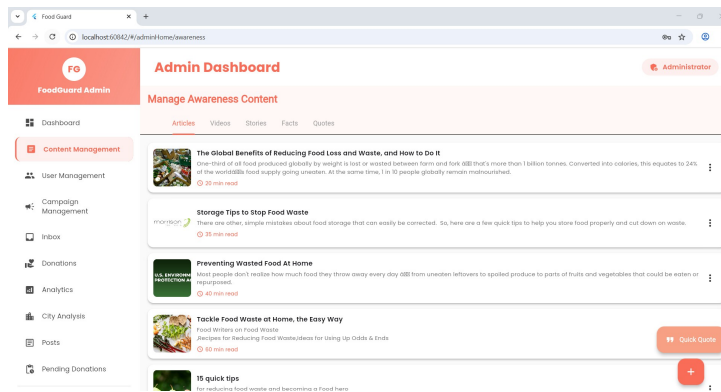


(b) Admin dashboard.

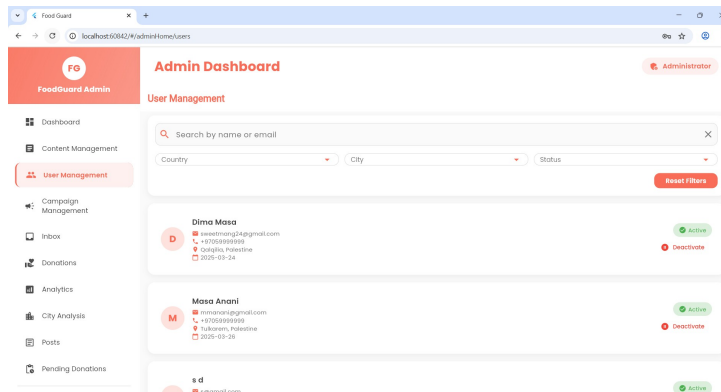


(c) Add post.

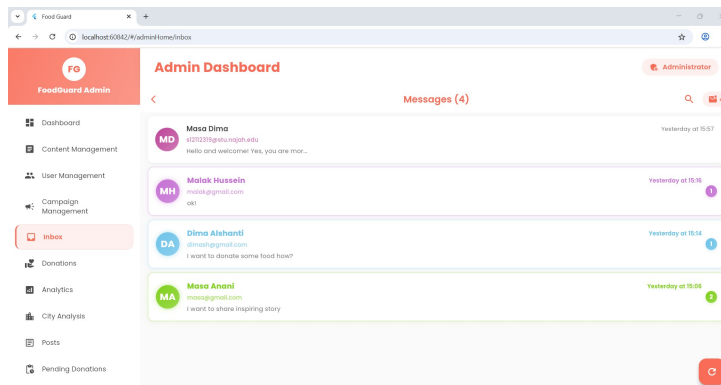
Figure 3.84: Admin dashboard and add post Screens on the web interface.



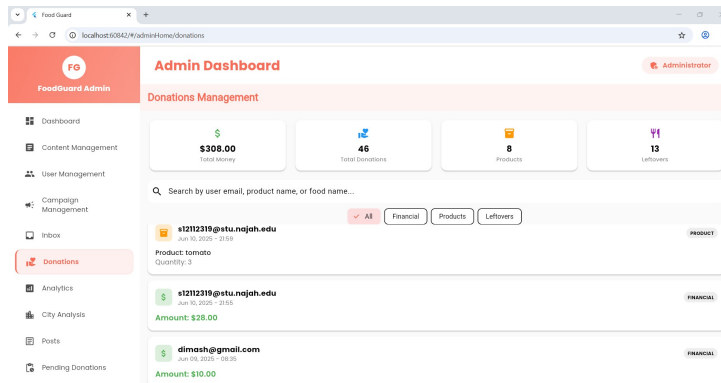
(a) Content Management.



(b) User Management.



(c) Inbox.



(d) Donations.

Figure 3.85: Content Management, User Management, Inbox and Donations Screens on the web interface.

Chapter 4

Results and Analysis

In conclusion, we successfully developed a mobile application that fulfills its primary goal of helping users manage their food inventory and reduce waste. The app enables users to add and track products, receive smart alerts about expiration dates, log full or partial consumption, and donate excess food — all through an intuitive and user-friendly interface.

We also developed an admin dashboard that allows administrators to publish awareness content, manage user interaction, and promote sustainable consumption practices. Admins can add articles, stories, videos, and tips to raise awareness and encourage responsible food behavior.

We expect the application to attract wide interest upon launch, especially among environmentally conscious individuals who value sustainability, appreciate food blessings, and are against waste. The idea as a whole, combined with the app's ease of use and feature diversity, shows strong potential for making a real impact on users' lives.

Moreover, the backend data analytics provide tools to understand consumption patterns, supporting more informed decision-making, reducing waste, and fostering long-term sustainable eating habits.

Chapter 5

Discussion

The **Food Guard** application was designed to reduce household food waste through practical technical solutions, including expiration date tracking, smart notifications, and consumption analytics, as well as the ability to donate excess food. During the testing phase, the application demonstrated its effectiveness in achieving this goal, highlighting the strength of its design and the integration of its features.

5.1 Goal Achievement

The results showed that users were able to reduce waste by consuming products on time or deciding to donate before spoilage. The various types of notifications (early, late, and summary) played a key role in raising awareness and increasing user interaction. Moreover, the partial consumption feature proved helpful in managing multi-use products more effectively.

5.2 Actual Contribution

Food Guard offers a comprehensive solution to the issue of food waste at the individual level. The system includes rare features not commonly found in similar applications, such as:

- Tracking products after opening with automatic expiry date updates.
- An admin interface for publishing educational and awareness content.
- A complete log of all operations (add, consume, delete, donate, spoil).
- Individual consumption analytics, with the potential to be expanded for group-level analysis in the future.

5.3 Strengths and Limitations

One of the main strengths of the application is its simplicity and user-friendliness, in addition to its interactive nature and the integration between product tracking

and consumption pattern analysis. Its flexible design makes it suitable for different user types, offering an efficient and straightforward user experience.

However, several challenges were encountered during the development and testing phases. One key limitation was the small number of users involved in testing, which limited the ability to realistically and broadly evaluate performance. Additionally, some data was manually entered, which could introduce human errors.

Another major challenge was handling the wide variety of food conditions and storage methods—ranging from storage environments, shelf life variability, and product behavior after opening. While we attempted to cover as many of these cases as possible within the available resources, there remains a need to expand the database and improve recommendation algorithms based on more realistic and diverse scenarios.

Furthermore, some features, such as the donation system, were not tested in real-world environments and still require field validation.

Chapter 6

Conclusions and Recommendations

6.1 General Conclusions

The Food Guard project demonstrates that technology can play a vital role in improving consumption behavior and reducing food waste. Through smart features and effective notifications, users became more aware of managing their food inventory. The experience also showed that simple user interfaces greatly facilitate the real-world adoption of any technological system.

6.2 Recommendations for System Improvement

- Automate data entry using barcode scanners or invoice recognition technologies.
- Enhance AI capabilities to provide personalized tips and intelligent recipe suggestions.
- Add language support to expand the user base across the Arab world and other regions.
- Improve alert accuracy by customizing notifications based on product type and spoilage rate.

6.3 Opportunities for Future Expansion

Food Guard is not limited to individual use; it has the potential to serve the broader community. Key ideas for future expansion include:

- Integrating local charity organizations to connect users with surplus food to families in need.
- Collaborating with food manufacturers to utilize app data in identifying areas with high product demand.

- Partnering with restaurants and supermarkets to streamline the donation of surplus meals or products before expiration.
- Creating a community network among users for exchanging surplus products, especially within local neighborhoods or residential areas.

6.4 Open Work

- Conducting large-scale testing with thousands of users.
- Establishing real integrations with food-related organizations and sectors.
- Developing prediction algorithms to estimate the optimal quantity of each product based on consumption history.

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