
Software Requirements Specification

for

FoWRA

Version 1.0

Prepared by

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Course : SSE3301-1 : Software Requirements Engineering

Date : 23 June 2023

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Revision History

Version	Primary Author(s)	Description of Version	Date Completed
Draft Version 1.0	Amylia Natasya, Nurin Adni, Nur Akmal, Muhammad Ariq	The draft of SRS document version 1 is completed	23/6/2023

1. Introduction

1.1 Purpose

The purpose of this SRS is to attract developer / stakeholder interaction by outlining the functional and non-functional requirements of food waste reduction apps. Therefore, this document serves as a crucial foundation for effectively completing the project in alignment with the stakeholders' needs. Addressing various user groups, including individuals, businesses, and organisations, this SRS aims to deliver and validate all necessary features and establish contractual agreements among the involved parties.

1.2 Scope

Food waste is recognized to be a huge problem worldwide and is particularly severe in developed countries. Therefore this inspires us to create a software product called **FoWRA: Food Waste Reduction App** that is almost similar like other food waste app such as OLIO and Kitche but with additional features. This app have inventory management features where user can track the food items they have at home and receive notifications about items that are approaching their expiration date. The app also can suggest recipes based on the ingredients that the user have in their inventory to help them use up their food before it goes bad. It can scan food products barcodes and use the information to alert user about the expiration date, so they can plan to use or donate the food item before it goes bad. Tips and tricks for reducing food waste, such as proper storage techniques, meal planning, and composting also provided by the app. User can connect with other app user in their community to share tips, recipes, and ideas for reducing food waste.

FoWRA aims to help user reduce the amount of food they waste. This helps the user to save money and encourage a more sustainable lifestyle. User can make more informed choices about their food consumption which will educate them about the environmental impact of food waste. This will undoubtedly improve food safety which helps to prevent foodborne illnesses.

1.3 Definitions, Acronyms, and Abbreviations

Definitions of all terms, acronyms and abbreviation used are to be defined here.

Term	Description
Application	A software program that runs on your computer
Food Waste	Any edible food that is discarded or goes uneaten, including both perishable and non-perishable

Expiration Date	The date specified on a food product by manufacturer or producer indicating the recommended last day of consumption for optimal quality and safety
Inventory Management	The practice of tracking and controlling the quantity and flow of food items in stock, including purchasing, storage, and monitoring for waste reduction
Recipe Suggestions	Recommendations or ideas provided by the app to utilise leftover ingredients or items nearing their expiration to minimise food waste.
Food Tracking	The act of recording or logging food purchases, consumption and waste within the app to gain insights and make more informed decisions
Push Notifications	Messages or alerts sent by the app to users' devices to provide reminders, updates, or personalised recommendations.

Acronym	Description
SRS	Software Requirement Specification
SQL	Structured Query Language
SSL	Secure Socket Layer
TLS	Transport Layer Security
MQTT	Message Queuing Telemetry Transport
FoWRA	Food Waste Reduction App
MTTR	Mean Time To Repair
MTBF	Mean Time Between Failure

1.4 References

- IEEE Recommended Practice for Software Requirements Specifications, IEEE Standard 830, 1998.
- Wiegers, K.E. (2003, April). Software Requirements (2nd ed.). Microsoft Press.
- Gheoldus, M. (n.d.). *Food waste definition*. Retrieved March 24, 2023, from <https://www.eu-fusions.org/index.php/about-food-waste/280-food-waste-definition#:~:text=Food%20waste%20refers%20to%20food,date%20or%20left%20to%20spoil>.
- *The problem of food waste*. OLIO. (n.d.). Retrieved March 24, 2023, from <https://olioex.com/food-waste/the-problem-of-food-waste/>
- Buzby, P. by J. (2022, January 24). *Food waste and its links to greenhouse gases and climate change*. USDA. Retrieved March 24, 2023, from <https://www.usda.gov/media/blog/2022/01/24/food-waste-and-its-links-greenhouse-gases-and-climate-change#:~:text=Food%20loss%20and%20waste%20also,even%20more%20potential%20greenhouse%20gas>.

2. Overall Description

2.1 User Classes and Characteristics

1. Individual User :
 - Characteristics: Individual user are regular consumers who want to reduce food waste in their households. They use the app to manage their food inventory, receive expiration date notifications, explore recipe suggestions, and engage with the community.
2. Community Contributors :
 - Characteristics: Community contributors are user who actively participate in the FoWRA app's community features. They share tips, recipes, and ideas for reducing food waste with other users. They may also engage in discussions and provide feedback on other users' content.
3. Local Organisations and Charities :
 - Characteristics: Local organisations and charities are entities that work with the FoWRA app to receive donated food items. They connect with individual user through the app to receive donations, coordinate pickups, and distribute food to those in need. FoWRA will become a reliable platform to receive timely information about available food donations and logistics coordination.

4. Educators and Researchers :

- Characteristics: Educators and researchers are professionals or academics in the field of food waste reduction or sustainability. They may use the FoWRA app to gather data, conduct research, or educate others about food waste reduction. Educators and researchers may require access to aggregated and anonymized data from the app for analysis and educational purposes.

5. App Administrators :

- Characteristics: App administrators are responsible for managing and maintaining the FoWRA app's backend, database, and infrastructure. They oversee user management, data security, performance monitoring, and system updates. App administrators require administrative tools, analytics dashboards, and access to logs for monitoring, troubleshooting, and ensuring the app's smooth operation.

2.2 Operating Environment

- IOS
- Android

2.3 Design and Implementation Constraints

This application is constrained by the device variability where it has been designed to work seamlessly across a range of devices with varying screen sizes, resolutions and hardware capabilities. FoWRA also is optimised for efficient performance , with response times and minimal loading or processing delays. Next, the network connectivity for the application can handle scenarios with limited or intermittent network connectivity and ensure seamless data exchange between the application and backend servers.

2.4 Assumptions and Dependencies

One assumption about the product is that it can always be used in any gadgets especially mobile phones where they will have enough and better performance. Next, the product also will work with a specific version of a database or operating system.

3. External Interface Requirements

3.1 User Interfaces

The food waste reduction app incorporates a vibrant and visually appealing colour scheme, with pink as the primary colour to signify freshness. The colour scheme is consistent throughout the app, including background elements, icons, buttons, and text. It creates a cohesive and recognizable visual identity, resonating with user and reinforcing the app's mission.

- All fonts will be Canva Sans & Playfair Display Black.
- The “Food Waste Reduction App (FoWRA)” can be displayed in both portrait and landscape orientation.
- The “Food Waste Reduction App (FoWRA)” supports all types of screen resolution.
- Colour in this system mainly uses:
 - ❖ Floral White (#FFFDF6)
 - ❖ Light Pink (#FFA9F9)
 - ❖ Light Yellow (#FFF7AD)

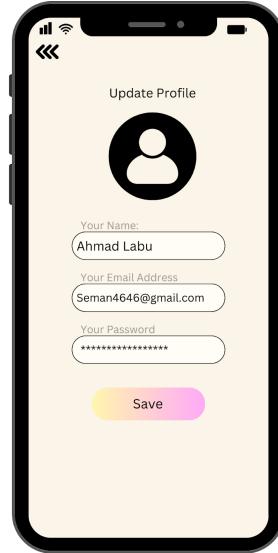
1. Register and Login Interface

The login interface is the initial screen displayed when initiating any action within the app. It prominently features two input dialog boxes, allowing user to securely enter their email and password for authentication. On the other hand, the register interface provides an intuitive layout with three input dialog boxes, enabling user to enter their name, email, and password when creating a new account.



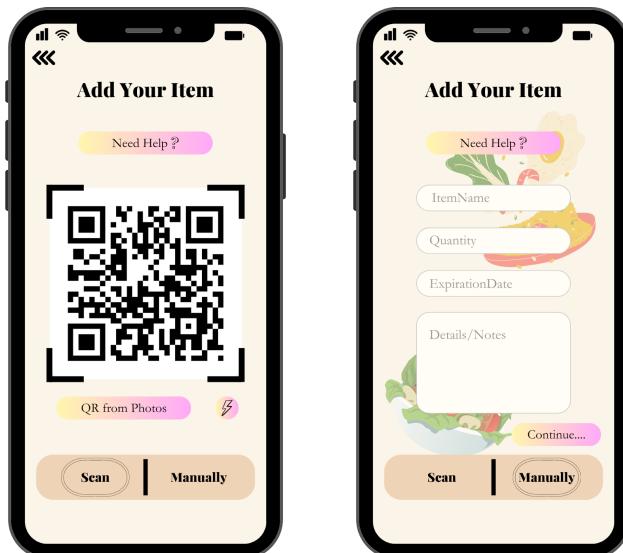
2. Update User's Profile

The update profile interface is displayed every time a user wants to update their profile. It provides three dialog input boxes for user to update their name, email or password.



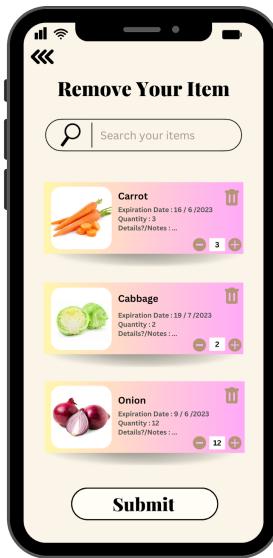
3. Add Item to the Inventory

There are two interfaces available for adding items to the inventory. The first interface offers a camera viewfinder, allowing user to align the item's barcode within the frame. The app then retrieves the corresponding product information automatically. Alternatively, the second interface provides four dialog input boxes where user can manually enter the product information.



4. Remove item in the Inventory

The "Remove Item" interface displays a comprehensive list of the items in the user's inventory, along with detailed information about each item. Additionally, a dustbin icon is provided next to each item, allowing user to easily remove the items by tapping it if they no longer need or want.



5. Food Expiration Tracking

The food expiration interface allows user to manually set the expiration dates for their food items. User have the flexibility to customise their notification preferences and set reminders for specific items based on their individual preferences. The interface also includes a convenient toggle button to enable or disable reminders as needed.



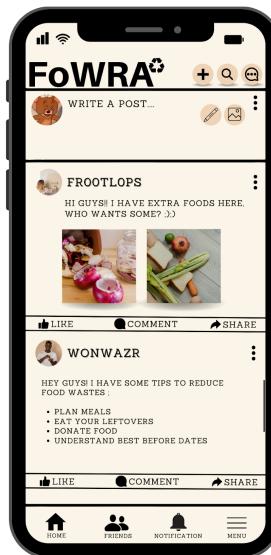
6. Recipe Suggestions

The recipe suggestions interface features a user-friendly search engine where user can enter ingredients. Once entered, a comprehensive list of recipes will be displayed, accompanied by their cooking time, calorie count, and appetising pictures. Each recipe is accompanied by a heart-shaped icon that allows user to save their favourite recipes simply by tapping it.



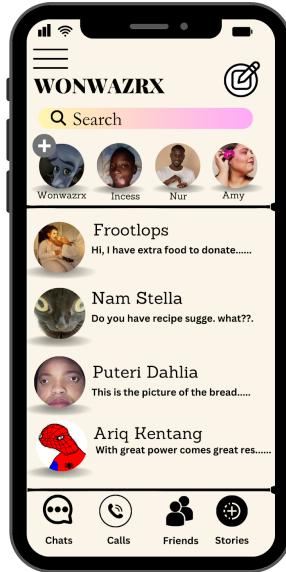
7. Write a post

The "Write a Post" interface in the app features a pencil icon, providing user with the ability to create and share new posts. The picture icon allows user to easily attach images to their posts and on the home page, user can view posts created by other app user. To encourage engagement, the interface includes intuitive buttons for liking, commenting, and sharing posts, enabling user to interact and share their thoughts on the content.



8. Public Chat

The "Public Chat" interface in the app includes a pencil icon for composing and sending new messages. It also has a search box for easily searching through the chat history. A list of previous chats is displayed, allowing users to quickly access their past conversations.



9. Food Donations

The food donations interface begins with two options boxes, giving user the choice to make a donation or view their donation history. Below these options, there are user-friendly input boxes where user can provide details for their food donation requests. User also can track their live donations and access information about their past donations.



3.2 Hardware Interfaces

The FoWRA app interacts with various hardware components, including the device's touchscreen, accelerometer, camera, and microphone for input, barcode scanning, and multimedia content capture. It utilises push notification services like APNS for iOS devices and FCM for Android devices to send notifications to user.

The app also uses location services such as GPS to offer location-based features, accessing device APIs like Core Location (iOS) or Google Play Services Location API (Android). Internet connectivity is crucial for FoWRA to communicate with remote servers and exchange data, including inventory information and recipe suggestions.

3.3 Software Interfaces

The FoWRA will interface with a Database Management System (DBMS) that caters to the electronic and digital records to extract useful information and stores the information for FoWRA to operate. The DBMS that will be connected in FoWRA is MySQL. The DBMS must be able to easily configure user accounts, define access policies, and modify restrictions. In addition, it should manage data backups and snapshots by providing a simpler and straightforward interface for FoWRA.

3.4 Communications Interfaces

FoWRA requires Real-Time Messaging Communication:

- Communication Function: Sending and receiving real-time messages between user.
- Communication Protocol: MQTT (Message Queuing Telemetry Transport)
- Message Formatting : Messages will be formatted as per the protocol specifications, such as JSON or custom message formats.
- Communication Security : Secure communication will be supported through SSL/TLS encryption for MQTT over TLS.

For the web version, the network protocol used is the TCP to ensure the security of the message. Besides, The system shall send email to user using mail services.

4. System Use Cases

The system features include :

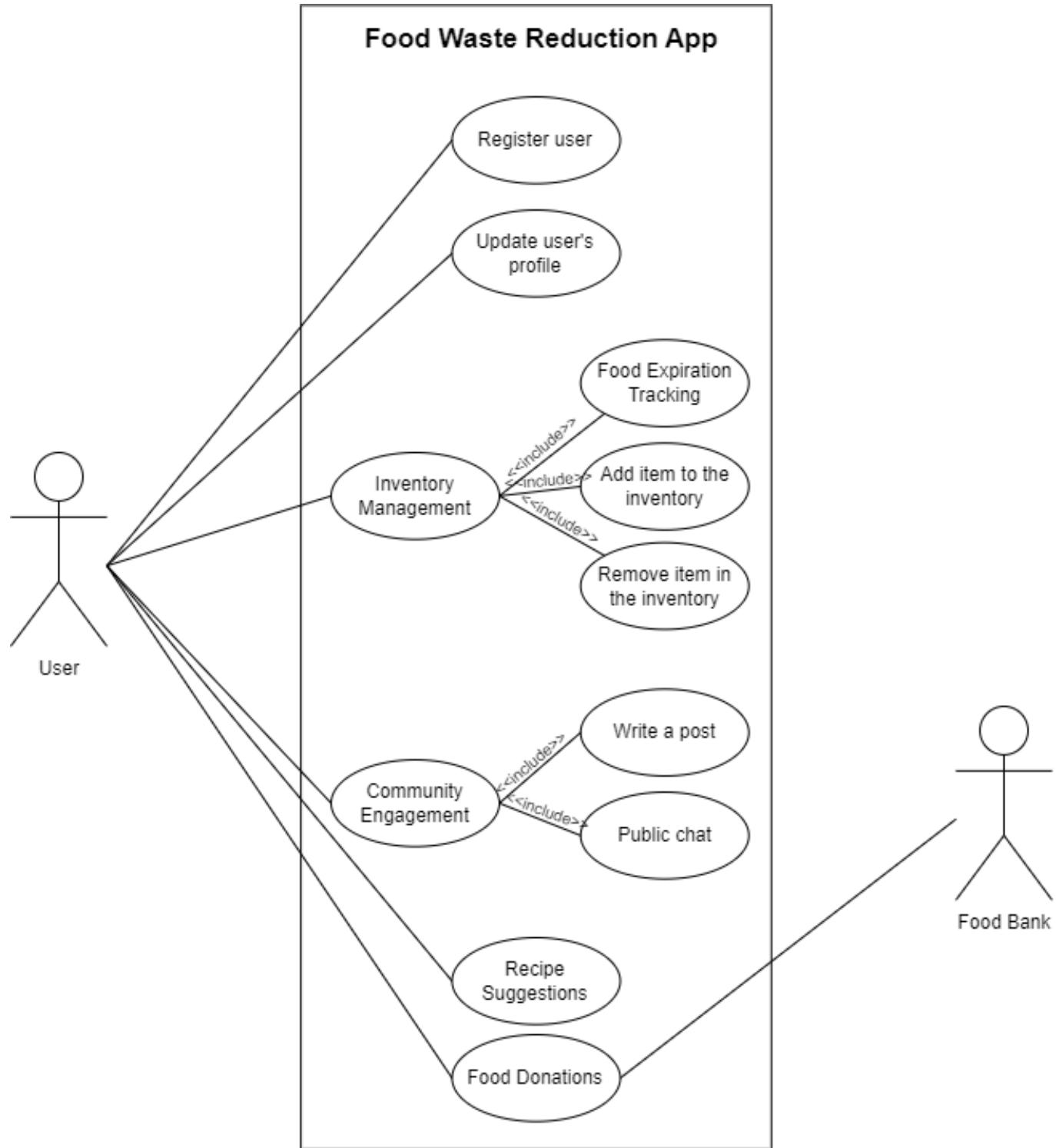


Figure 4 : Use Case Diagram for Food Waste Reduction App (FoWRA)

4.1 Register User (A01)

ID	UC01
Use Case	Register User
Priority	High
Actors	User
Pre-Conditions	The user has not yet registered an account in the app
Post-Conditions	The user has a registered account in the app, which allows them to log in and access its features
Flow Of Events	<ol style="list-style-type: none"> 1. The app presents a registration form, prompting the user to enter their personal details such as name, email address and password 2. The user fills in the required information in the registration form 3. The app validates the entered information, checking for any missing or any invalid data 4. The app stores the user's account information securely 5. The app confirms successful registration and displays a notification or a welcome message to the user 6. The user is now registered and can log in to access the app's features.
Alternative Flow Of Events	<ol style="list-style-type: none"> 1. If the email address already exists, the system notifies the user and prompts them to choose another email. 2. If the user decides not to proceed with the registration, they can go back to the previous screen or exit the app 4. If there are any errors, the app displays appropriate error messages and prompts the user to correct the information 5. If the entered information is valid, the app creates a new user account using the provided details
Includes	None
Notes/Issues	None

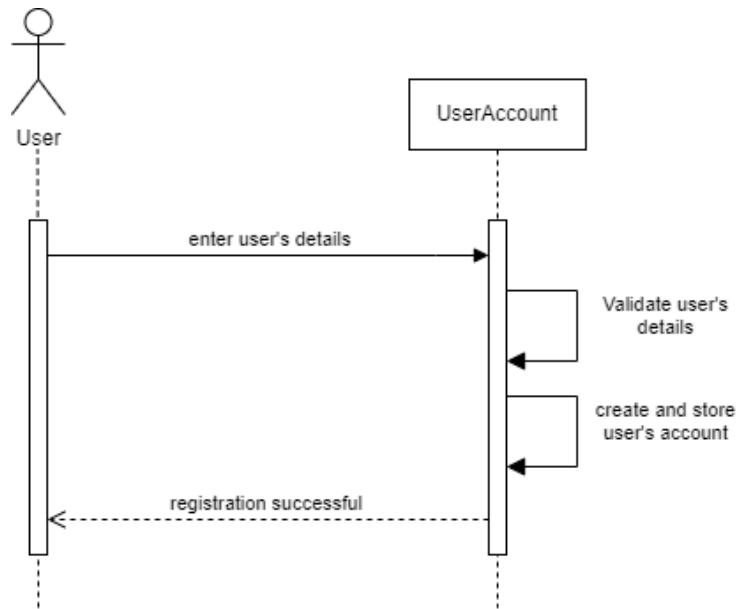


Figure A: Sequence Diagram for Register User (A01)

4.2 Update User's Profile (A02)

ID	UC02
Use Case	Update User's Profile
Priority	Medium
Actors	User
Pre-Conditions	The user is logged into their account in the app
Post-Conditions	The user's profile information is updated and reflected in the app
Flow Of Events	<ol style="list-style-type: none"> 1. The user navigates to the "Profile" section within the app 2. The app displays the user's current profile information, including name, email address, and other relevant details 3. The user selects the option to edit their profile information 4. The app presents a form or interface that allows the user to modify their profile information 5. The user makes the desired changes, such as updating their name, email address, or password 6. The app validates the entered information, checking for any missing or invalid data 7. The app updates the user's profile with the new details 8. The app stores the updated profile information securely 9. The app confirms successful profile update and displays a

	notification or message to the user 10. The user's profile information is now updated in the app
Alternative Flow Of Events	3. The user cancel or goes back to the previous screen without modifying their profile information. 7. If there are any errors, the app displays the appropriate error messages and prompts the user to correct the information
Includes	None
Notes/Issues	None

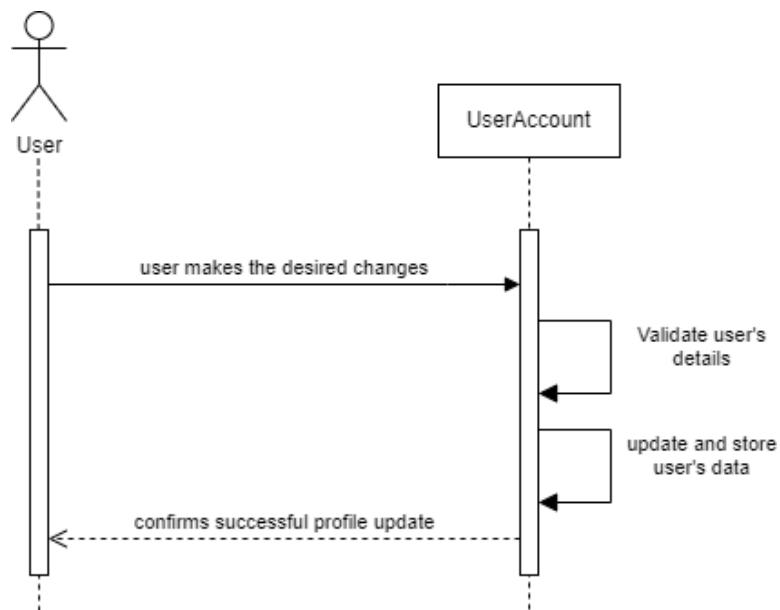


Figure B: Sequence Diagram for Update User's Profile (A02)

4.3 Add item to the inventory (A03)

ID	UC03
Use Case	Add item to the inventory
Priority	High
Actors	User
Pre-Conditions	User chooses the "Add Item" option in the inventory tab from the main menu
Post-Conditions	The item is successfully added to the user's inventory
Flow Of Events	<ol style="list-style-type: none"> If the user select “add item”, the system prompts the user to scan the barcode or manually enter the item information. The user can add any details or notes about the item then submit it. The system adds the new item to the inventory list with the item’s details, including the quantity available. The system will present the new list of items in the inventory.
Alternative Flow Of Events	<ol style="list-style-type: none"> The user can click the “undo” option if there is any problem with the quantity of items that has been added.
Includes	None
Notes/Issues	None

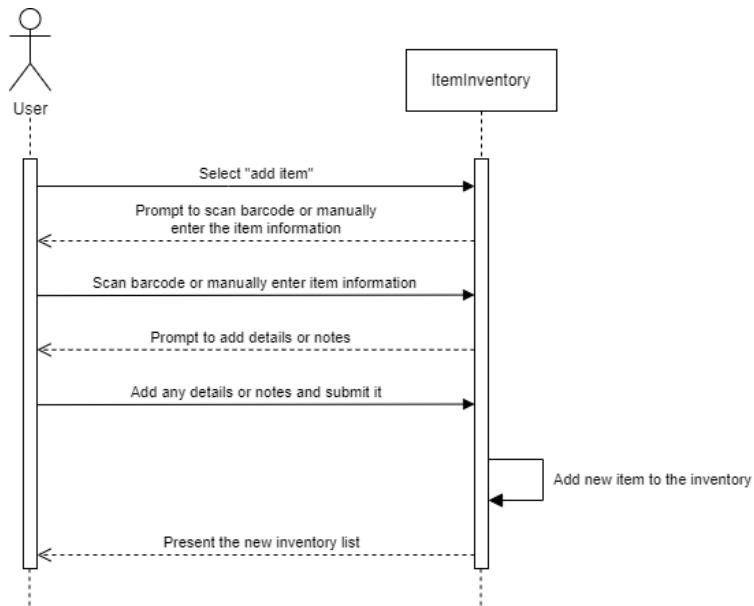


Figure C: Sequence Diagram for Add item to the inventory (A03)

4.4 Remove item in the inventory (A04)

ID	UC04
Use Case	Remove item in the inventory
Priority	High
Actors	User
Pre-Conditions	User chooses the "Remove Item" option in the inventory tab from the main menu
Post-Conditions	The item is successfully removed from the user's inventory
Flow Of Events	<ol style="list-style-type: none"> If the user select “remove item”, the system presents the list of items in the inventory. The user can choose to remove the items based on the quantity of items that they want. The user save the new inventory list. The system will present the new list of items in the inventory.
Alternative Flow Of Events	3.The user can click the “undo” option if there is any problem with the quantity of items that has been removed.
Includes	None
Notes/Issues	None

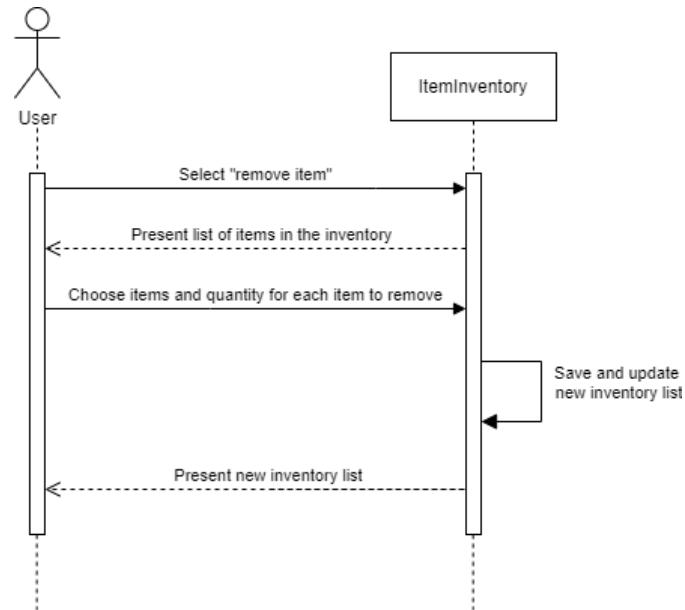


Figure D: Sequence Diagram for Remove item in the inventory (A04)

4.5 Food Expiration Tracking (A05)

ID	UC05
Use Case	Food Expiration Tracking
Priority	High
Actors	User
Pre-Conditions	User set the expiration date for the food that has been added into the inventory.
Post-Conditions	User receives notifications about upcoming or expired food items
Flow Of Events	<ol style="list-style-type: none"> 1. The system automatically tracks the expiration date for the food that has been put to the inventory. 2. The system asks the user to set the notification and reminder for the expiration date automatically or manually. 3. If the user choose to set it automatically, the system will set the notification and the reminder based on the type of foods or items that has been added. 4. The user can choose to receive notifications through various channels such as email, SMS or mobile app notifications. 5. The system will remove the reminder if the item has been deleted from the inventory.
Alternative Flow Of Events	<p>4. If the user choose to set it manually, the user can set the date or days for the notification and the reminder to pop up before the expiration dates.</p>
Includes	None
Notes/Issues	None

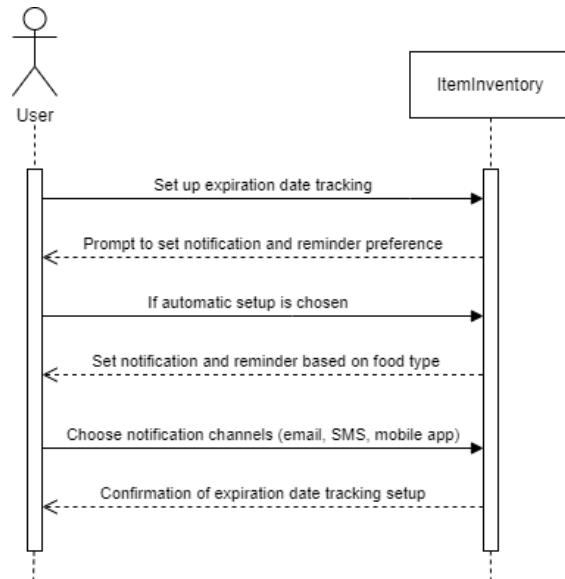


Figure E: Sequence Diagram for Food Expiration Tracking (A05)

4.6 Recipe Suggestions (A06)

ID	UC06
Use Case	Recipe Suggestions
Priority	High
Actors	User
Pre-Conditions	User inputted the ingredients they have on hand
Post-Conditions	The user can view a selected recipe and its details and save the recipe to their favourites
Flow Of Events	<ol style="list-style-type: none"> 1. User inputs the ingredients into the app. 2. The app searches its recipe database for recipes that include the user's inputted ingredients or ingredients that user have in the inventory. 3. The app displays a list of recipe suggestions. 4. User selects a recipe and is directed to the recipe page. 5. The recipe page displays the ingredients, steps, and cooking time for the selected recipe. 6. User can save the recipe to their favourites, or return to the recipe suggestions page.
Alternative Flow Of Events	<ol style="list-style-type: none"> 3. If the app can't find any recipe suggestions based on the user's inputted ingredients, it will prompt the user to try a different combination of ingredients (return to step 2)

Includes	None
Notes/Issues	None

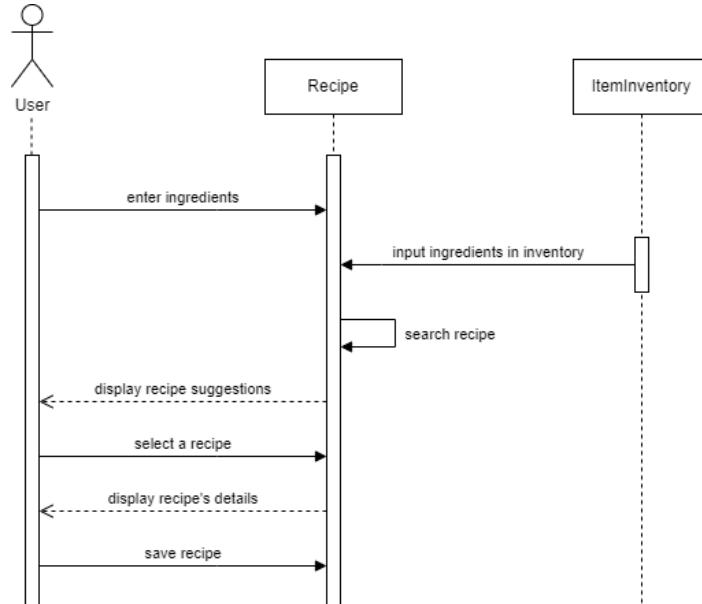


Figure F: Sequence Diagram for Recipe Suggestions (A06)

4.7 Write a Post (A07)

ID	UC07
Use Case	Write a Post
Priority	High
Actors	User
Pre-Conditions	User select the “Community” tab from the main menu to write a post
Post-Conditions	User’s posts are published successfully to the platform and can be viewed by the other user
Flow Of Events	<ol style="list-style-type: none"> 1. User selects the “Create a post” option. 2. User writes the post content and attaches any relevant images and videos. 3. System will display the preview of the post and make any necessary edits. 4. User publish the post 5. System saves and posts the contents to the community. 6. System will display the finalised posts

Alternative Flow Of Events	4. User wants to continue editing the post and save it as draft. User also confirm cancellation, and will be redirected back to the community section without posting the content.
Includes	None
Notes/Issues	None

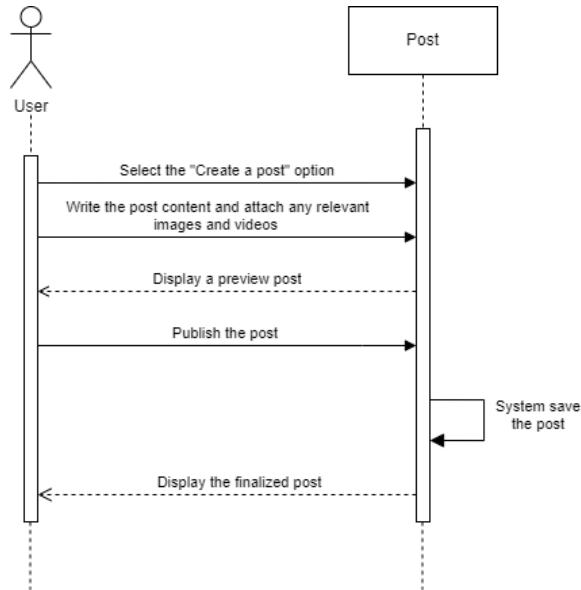


Figure G: Sequence Diagram for Write a Post (A07)

4.8 Public Chat (A08)

ID	UC08
Use Case	Public Chat
Priority	High
Actors	User
Pre-Conditions	The use case starts when the user has access to the public chat platform that is available in the application.
Post-Conditions	User successfully joined the public chat in the application.
Flow Of Events	<ol style="list-style-type: none"> 1. User joins the chat room. 2. The user sends messages. 3. The system broadcasts the messages to all the connected user in the app. 4. User receives the messages.

Alternative Flow Of Events	1. User can leave the chat room when desired. 2. User can also choose to send private messages to other user.
Includes	None
Notes/Issues	None

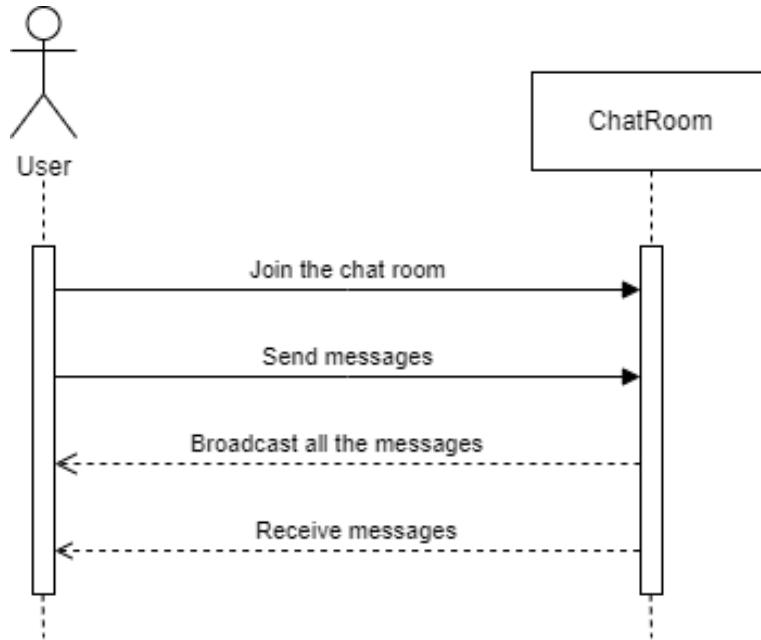


Figure H: Sequence Diagram for Public Chat (A08)

4.9 Food Donations (A09)

ID	UC09
Use Case	Food Donations
Priority	High
Actors	User, Food Banks
Pre-Conditions	User or grocery stores have a surplus food to donate
Post-Conditions	User receives a confirmation of the successful donation
Flow Of Events	<ol style="list-style-type: none"> 1. User select the donation option from the home page. 2. The app will prompt the user to select a nearby food bank that is participating in the program and available pickup times. 3. Once a food bank and pickup time is selected, the user confirms their donation. 4. The food bank receives the donation information and ready to pick up the food.

	5. A representative from a local food bank will pick up the donated food at the designated time. 6. The user receives a notification confirming the successful donation and can track the status of their donation in the app.
Alternative Flow Of Events	2. App displays an error message stating that there are currently no participating organisations available in the user's area.
Includes	None
Notes/Issues	None

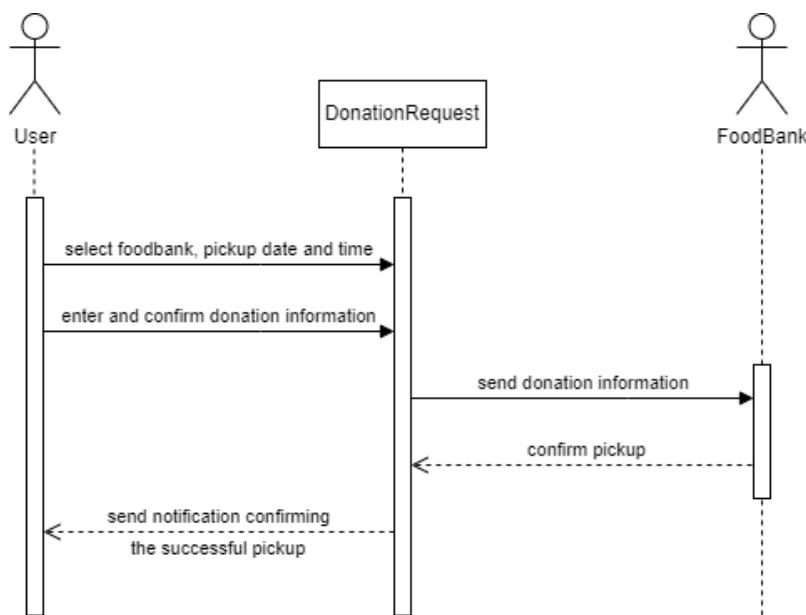


Figure I: Sequence Diagram for Food Donations (A09)

5. Other Non-functional Requirements

5.1 Performance Requirements

PR01 Response Time

FoWRA has a maximum response time of 1 second for all user interactions, including navigating between screens, adding or editing items in the inventory, and accessing recipe suggestions.

PR02 Operation Time

FoWRA can efficiently manage a minimum of 500 food items in a user's inventory without any noticeable slowdown in performance. Adding, editing, or deleting items from the inventory should be completed within 500 milliseconds.

PR03 Notification Delivery Time

FoWRA will send timely and accurate notifications to user as food items approach their expiration dates based on the reminders that have been set by the user. The notification delivery time will be within 5 seconds of the scheduled notification.

PR04 Real-time Recipe Generator

FoWRA should generate recipe suggestions accurately within 2 seconds or less after the user selects the ingredients.

PR05 Barcode Scanning Time

FoWRA will scan food product barcodes and retrieve relevant information within 3 seconds. Barcode scanning accuracy should be at least 95% for recognizing and extracting expiration date information.

PR06 User Interactions Time

Users should be able to load and view community-generated content, including tips, recipes, and ideas, within 2 seconds. User interactions within the community feature, such as posting or commenting, should have a response time of less than 1 second.

PR07 Scalability

FoWRA should be able to handle a concurrent user load of 10,000 user without a significant impact on response time or performance. The database and server infrastructure should be scalable to accommodate an increasing user base and data volume.

5.2 Safety Requirements

SFR01 Safe Food Handling

The system shall provide clear instructions and guidelines to user regarding safe food handling practices and proper interpretation of expiration dates. Therefore, the system shall display safety guidelines and recommendations for proper food storage to user when adding items to the inventory.

SFR02 Content Moderation

The system shall have mechanisms in place to moderate and filter user-generated content to prevent the posting of harmful, inappropriate, or misleading information. Hence, the system shall provide user with the ability to report and flag inappropriate or offensive posts or chats for review.

SFR03 Allergy and Dietary Restrictions

The system shall include disclaimers and warnings regarding possible allergies or dietary restrictions associated with the provided recipe suggestions. Hence, the system shall not promote or suggest recipes that involve potentially hazardous food handling practices or unsafe ingredients.

5.3 Security Requirements

SR01 User Data Protection

The system shall ensure that user registration information is encrypted and securely stored to protect users' personal data. Therefore, the system shall implement password strength requirements and secure password storage techniques to prevent unauthorised access to user accounts

SR02 Regular Updates

The system is regularly updated with security patches and bug fixes to address vulnerabilities and ensure that it remains resistant to emerging security threats. This is required to avoid any bugs in the apps.

SR03 Privacy Policy

The system has a clear and comprehensive privacy policy that outlines how user data is collected, used, and shared. User should be provided with control over their personal information and comply with relevant data protection regulations.

5.4 Software Quality Attributes

5.4.1 Usability

On user satisfaction surveys, the system should receive a minimum usability score of 85%. A usability test can be carried out in this situation with a sample of user to gather comments on the usability, intuitiveness, and overall user experience.

5.4.2 Availability

The system should have an uptime of at least 99.9% per month, allowing for scheduled maintenance windows. To make sure availability matches the required level, track any scheduled maintenance windows and monitor app uptime using reliable monitoring tools.

5.4.3 Reliability

The system should have a mean time between failures (MTBF) of at least 1,000 hours, with a mean time to repair (MTTR) of less than 1 hour. The MTBF and MTTR should be calculated based on actual data gathered over a predetermined period of time.

5.4.4 Maintainability

The average time required to fix a bug or implement a change request should not exceed 8 hours. Keep track of how long it takes to address bug reports and implement change requests, and determine how much time is typically spent on maintenance chores.

5.4.5 Robustness

The system should handle a minimum of 10,000 concurrent user without significant performance degradation. To make sure it reaches the required threshold in this situation, load testing with a simulated number of concurrent user and system performance monitoring should be carried out.

5.4.6 Security

Achieve a minimum score of 95% on security vulnerability assessments and penetration testing. The security assessment and penetration testing should be conducted regularly to ensure the specified security score is achieved.

5.4.7 Portability

The system should be compatible with major operating systems, such as iOS and Android, allowing user to access the app on their preferred platform.

5.4.8 Reusability

Modular and reusable components should be included in the system's design to encourage code reuse and lower the effort required to create future improvements.

6. Data Dictionary

Variable	Priority	Type	Source	Use Case	Description
A01 - Register User	High	Functional	Mrs. Laila (user)	UC01	Users sign up to the application
A02 - Update User's Profile	Medium	Functional	Mr. Ahmad (user)	UC02	Users can update their new name, email and password
A03 - Add item to the inventory	High	Functional	Mrs. Putri (user)	UC03	Users can add their new item to the inventory either by scanning the barcode or by manually .
A04 - Remove item in the inventory	High	Functional	Mrs. Laila (user)	UC04	Users can delete an item or reduce the quantity in the the inventory
A05 - Food Expiration Tracking	High	Functional	Mr.Hazif (Head of Food Aid Foundation)	UC05	Users need to set the reminder for all the items that have been added either automatically or manually.
A06 - Recipe Suggestions	High	Functional	Ms. Azra Danisha (Sustainability scientist)	UC06	Users can search the recipe for the specific item that they wanted.
A07 - Write a Post	High	Functional	Ms. Azra Danisha (Sustainability scientist)	UC07	Users write the post content and attach any relevant images and videos.
A08 - Public Chat	High	Functional	Ms. Azra Danisha (Sustainability scientist)	UC08	Users can send messages to the other user in the chat room.
A09 - Food Donations	High	Functional	Mr. Mujahid & Mr. Hazif (Head of Food Aid Foundation)	UC09	Users can donate their surplus food to the other users by putting it at the food bank.

7. Requirements Dependency Traceability Matrix

Functional Requirement	Use Case								
	UC01	UC02	UC03	UC04	UC05	UC06	UC07	UC08	UC09
UC01	↔								
UC02	↔	↔							
UC03			↔	↔					
UC04			↔	↔					
UC05				↔	↔				
UC06			↔			↔			
UC07							↔		
UC08								↔	
UC09			↔						↔

Appendix A: Analysis Models

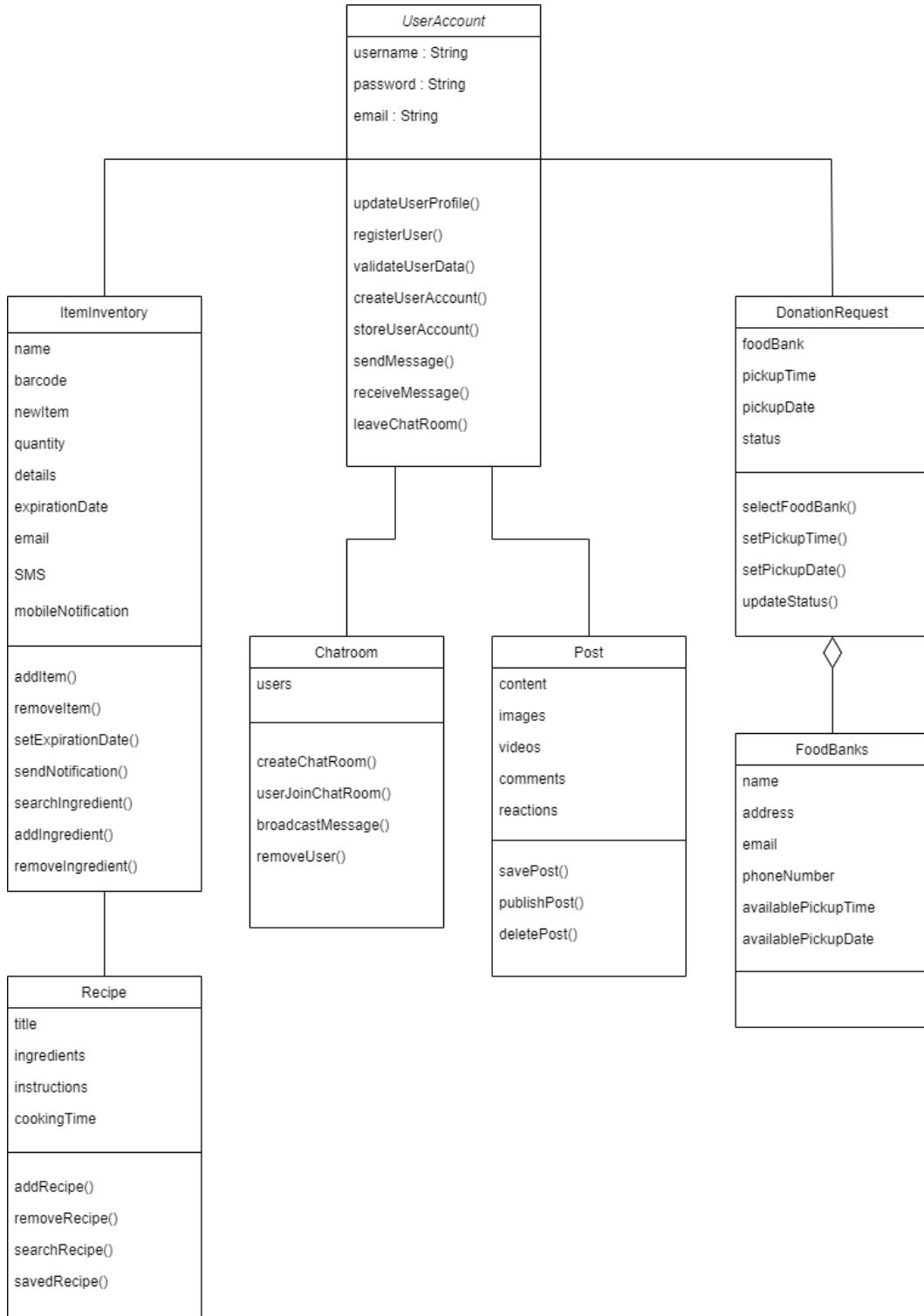


Figure J: Class Diagram of Food Waste Reduction App

Description:

In this class diagram, the UserAccount class represents a description of a user and has attributes such as username, password and email. It provides methods such as register, update and validate. The ItemInventory class represents the food management and has attributes such as name, barcode and expiration date. They also provide methods such as add item, remove item and set expiration date. Next, the Chatroom class represents public chat between users and has attribute users. It provides methods such as creating a chatroom, joining chat rooms and broadcasting messages. The Post class represents writing a post in the app and has attributes such as images, videos and comments. The methods that are provided are save posts, publish posts and delete posts. The DonationRequest class represents food donations and has attributes such as food bank, pickup time, pick up date and status. It also provides methods such as select food banks, set pickup time and set pickup date. The Recipe class represents recipe suggestions where it has attributes such as title, ingredients, instructions and cooking time. It also provides methods such as adding recipes, search recipes and save recipes. There is a class called FoodBanks that is connected with the DonationRequest class where it has an aggregation relationship. It only has attributes such as name, address, email, phone number, and the time availability. All of these classes except for the FoodBanks class are known as standalone classes where they don't depend on the other classes.

Appendix B: Group Log

DATE	DESCRIPTIONS
22 March 2023	We discussed on sections for each member to handle
1 April 2023	<ul style="list-style-type: none"> - We discussed on the use case for the system - Introduction and Overall Description has been updated
11 April 2023	We discussed on the context diagram of the system
21 April 2023	We discussed on the use case of the system
1 May 2023	We edited some parts on the Overall Description
11 May 2023	We had our meeting with stakeholder presenting the specification requirements
30 May 2023	We updated the Use Case details of the system to follow the client's requirements
23 June 2023	<ul style="list-style-type: none"> - The SRS document is completed - All of the members will check the document together to avoid any mistakes. (validation techniques)

Appendix C: Interview Report

Minutes meeting 1 : Food Donations Centres

Introduction :

This interview report summarises the insights gained from interviews conducted with food donation centres to gather information for the development of a Food Waste Reduction App. The interviews aimed to understand the challenges, processes, and needs of food donation centres in relation to reducing food waste.

Interview Details :

- Date: 13 May 2023
- Time: 8.00PM
- Interviewers : Nur Akmal & Muhammad Arij Ulwan
- Interviewee : Heads of Food Aid Foundation, Mr Mujahid & Mr Hazif
- Location: Food Aid Foundation, Kuala Lumpur
- Interview Method: In-person

Interview Questions :

- 1) What types of food items are commonly donated to your organisation?
- 2) How do you currently manage the process of receiving and distributing donated food?
- 3) What are the main challenges you face in handling food donations and minimising waste?

Interview Summary :

During the interviews, Mr Mujahid & Mr Hazif from food donation centres shared insights and experiences related to their food donation processes and challenges:

- 1) Both of them mentioned that their organisations receive various types of food donations, including perishable items, canned goods, and packaged foods.
- 2) Mr Mujahid described their current process of manually tracking and documenting incoming donations, ensuring proper storage and refrigeration, and coordinating distribution to partner organisations and individuals in need.
- 3) Mr Hazif highlighted the challenge of managing inventory effectively, especially when dealing with perishable items that have limited shelf life.

Key Insights:

Based on the interviews with heads of food donation centres, the following key insights were gained:

- 1) The app should provide features that streamline the process of recording and tracking incoming donations, including the ability to scan barcodes or input relevant information for efficient documentation.
- 2) Inventory management functionalities, such as real-time tracking of available food items, expiration date alerts, and suggested distribution or usage based on priority, would greatly benefit food donation centres.

Additional Observations:

One important observation from the interviews was the need for enhanced communication and collaboration between food donation centres and potential food donors, including improved coordination and pick-up scheduling.

Conclusion:

The interviews with food donation centres provided valuable insights into their processes, challenges, and needs in relation to food waste reduction. The findings emphasised the importance of streamlined donation tracking, inventory management, and collaboration features in the Food Waste Reduction App.

Minutes meeting 2 : Sustainability Experts

Introduction :

This interview report summarises the insights gained from interviews conducted with sustainability experts to gather their perspectives on food waste reduction. The purpose was to understand their expertise, insights, and recommendations related to developing a Food Waste Reduction App with a strong focus on sustainability.

Interview Details :

- Date: 14 May 2023
- Time: 7.30PM
- Interviewers : Nurin Adni & Amylia Natasya
- Interviewee : Sustainability scientist, Ms. Azra Danisha
- Location: University Putra Malaysia
- Interview Method: In-person

Interview Questions :

- 1) As a sustainability expert, what are the main challenges you see in reducing food waste on a larger scale?
- 2) What key features or functionalities would you recommend for a Food Waste Reduction App to promote sustainable practices?
- 3) How can technology and data be leveraged to enhance food waste reduction efforts?

Interview Summary :

During the interviews, Ms. Azra Danisha shared her insights and recommendations regarding food waste reduction:

- 1) Ms. Azra Danisha emphasised the need for effective communication and education to raise awareness about the environmental impacts of food waste and inspire behaviour change.
- 2) Ms. Azra Danisha highlighted the importance of collaboration among stakeholders, including individuals, businesses, and policymakers, to address food waste at various stages of the supply chain.

Key Insights:

Based on the interviews with sustainability scientist, Ms. Azra Danisha, the following key insights were gained:

- 1) Education and awareness: The app should provide educational resources, tips, and statistics to inform users about the environmental consequences of food waste and motivate them to take action.
- 2) Collaboration and networking: The app could facilitate connections between individuals, businesses, and organisations to foster collaboration, share best practices, and encourage the redistribution of surplus food.
- 3) Tracking and analytics: Incorporating features that allow users to track their food waste, set goals, and measure progress can enhance accountability and motivate sustainable behaviour change.
- 4) Recipe suggestions and meal planning: Providing users with recipe ideas and meal planning tools can help them make the most of their ingredients, reduce food waste, and encourage mindful consumption.

Additional Observations:

Ms. Azra Danisha highlighted the significance of engaging with local communities and organisations to address regional food waste challenges effectively. She suggested integrating localised information, such as donation centres, composting facilities, and food recovery programs, within the app.

Conclusion:

The insights gained from the interviews with sustainability experts emphasise the importance of education, collaboration, tracking, and community engagement for a Food Waste Reduction App. By incorporating these key features and addressing regional considerations, the app can effectively support users in reducing food waste and promoting sustainable practices.

Appendix D: Questionnaire

We have distributed a questionnaire to a wider audience, including students from UPM, to collect data and gather their responses, as well to determine what the system potentially needs.

Part A

Age
38 responses

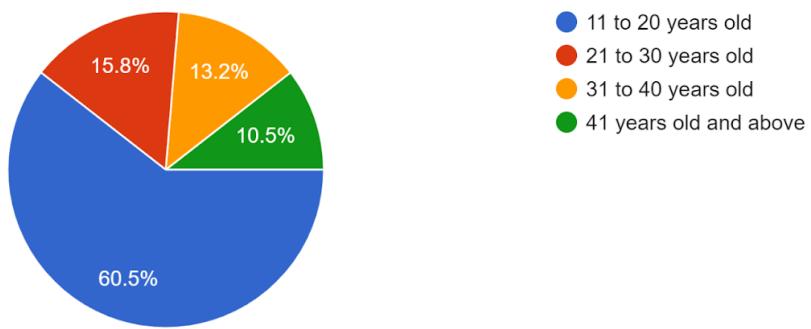


Table 1 : Pie chart of respondent's age

Occupation
38 responses

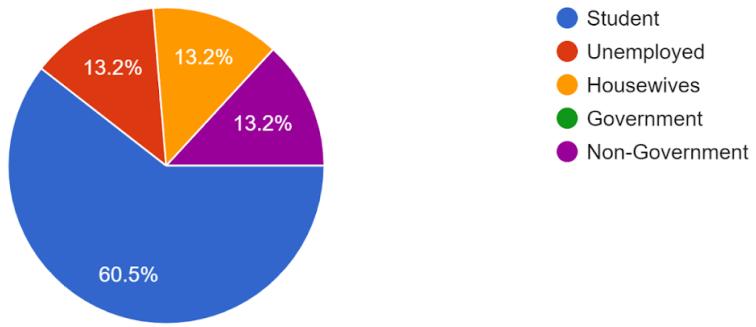


Table 2 : Pie chart of respondent's occupation

Part B

How important is sustainability and environmental responsibility in your daily life?

54 responses

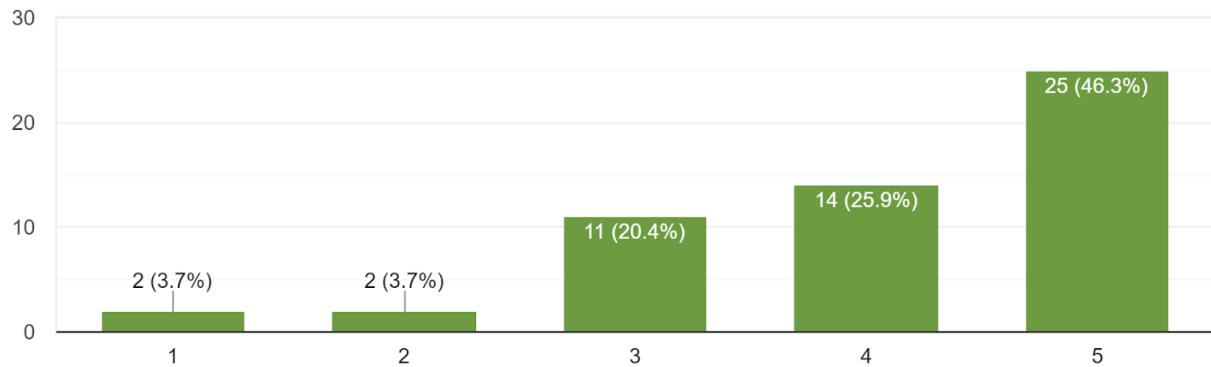


Table 3 : Graph of how important is sustainability and environmental responsibility in respondent's daily life

How interested are you in reducing food waste?

54 responses

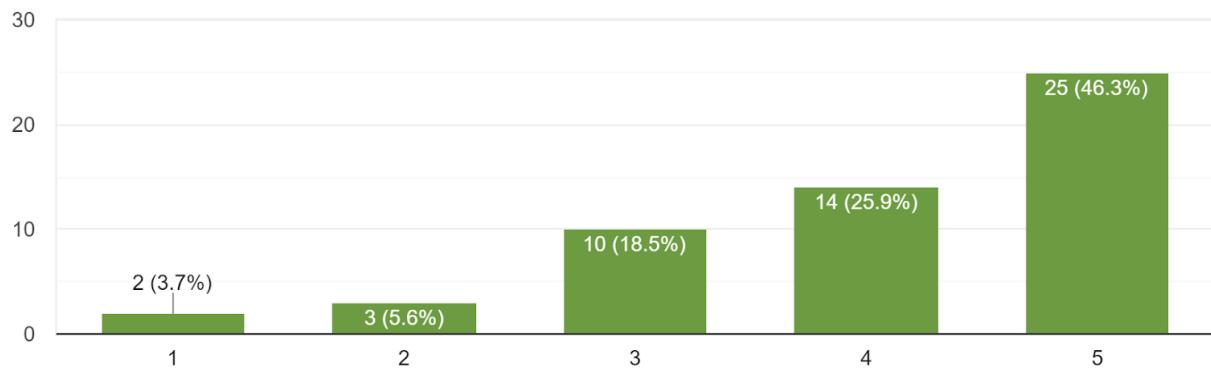


Table 4 : Graph of how interested respondents in reducing food waste

From both of the bar charts, we can conclude that respondents are really aware about their environment and interested in reducing the food waste in our lovely earth.

How often do you find yourself throwing away food that has expired?

54 responses

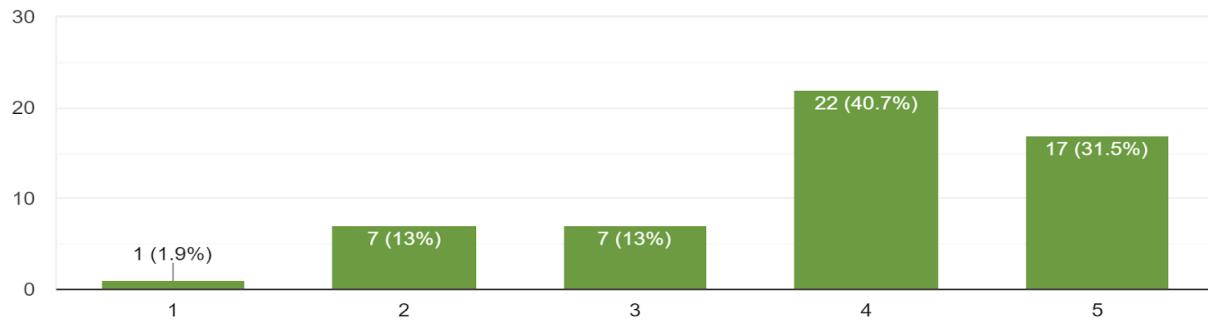


Table 5 : Graph of how often respondents find themselves throwing away food that has expired

How important is it to you to track your food inventory and expiration dates?

54 responses

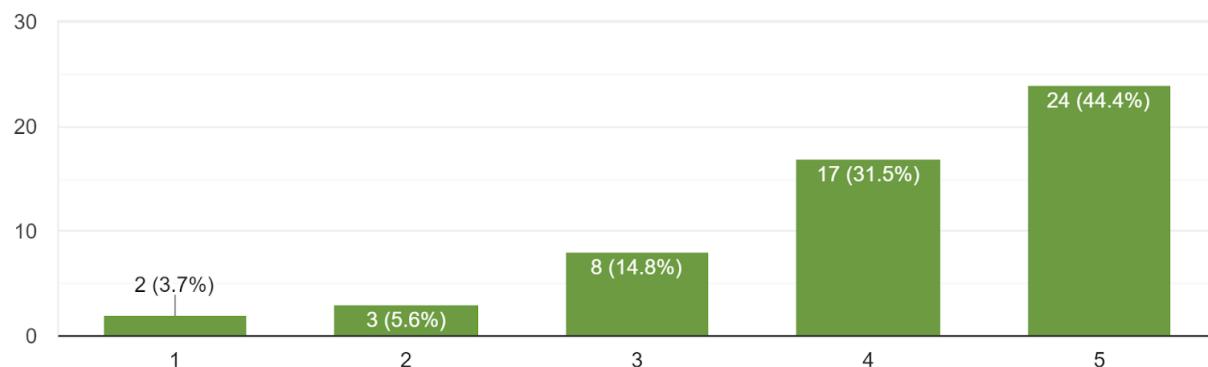


Table 6 : Graph of how important is to respondents to track their food inventory and expiration dates

Based on the bar chart, respondents are likely to throw away food that has expired and most of them like to keep track of their food inventory and expiration date.

Would you be willing to contribute to a community of users by sharing leftover food or excess groceries?

54 responses

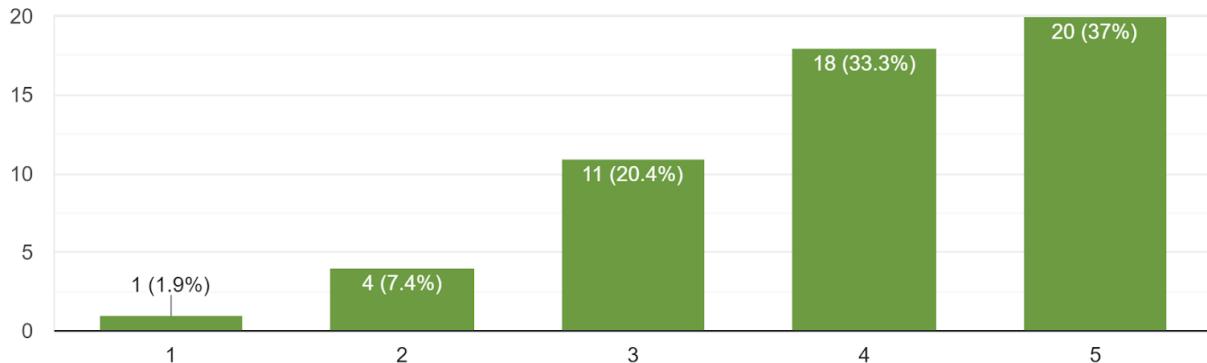


Table 7 : Graph of whether respondents willing to contribute to a community of users by sharing leftover food or excess groceries

Part C

Have you ever used a food waste reduction app before?

54 responses

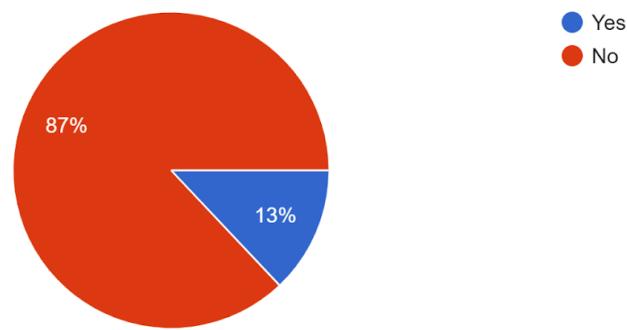


Table 8 : Pie chart of respondents who ever used any food waste reduction before

As the data shows, 87% of the respondents never used a food waste reduction app followed by only a mere 13% who had used it.

What features do you think would be most helpful in a food waste reduction app?
54 responses

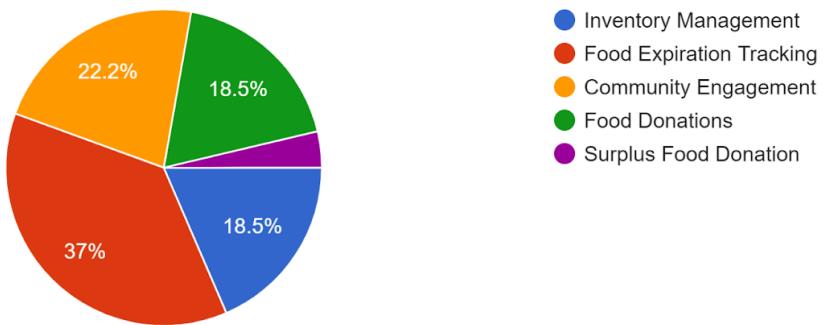


Table 9 : Pie chart of what respondents think would be most helpful features in a food waste reduction app

What are the biggest challenges you face when trying to reduce food waste?
54 responses



Table 10 : Pie chart of respondents' biggest challenges when they trying to reduce food waste

From all the features in our app, the majority of the respondents think that Food Expiration Tracking would be the most helpful in a food waste reduction app.

Most of the respondents also agree insufficient infrastructure for storage and preservation is the biggest challenge they face when trying to reduce food waste.

How likely are you to recommend a food waste reduction app to others?
54 responses

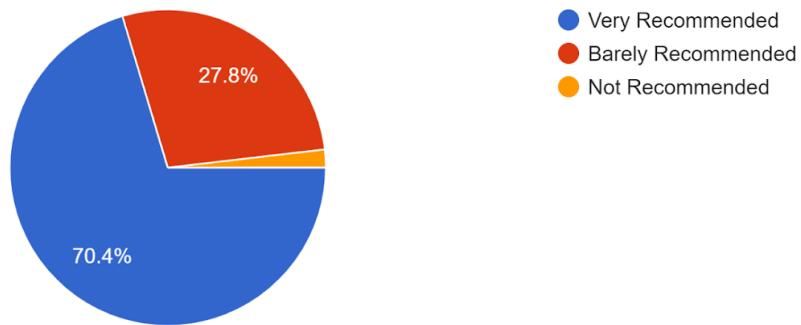


Table 11 : Pie chart of how likely respondents recommend a food waste reduction app to others

Would you be interested in participating in user testing and providing feedback for the app's development?
54 responses

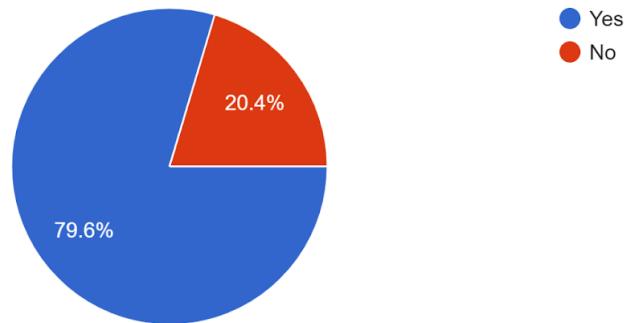


Table 12 : Pie chart of whether respondents interested in participating in user testing and providing feedback for the app's development

Only a really small percentage are not likely to recommend a food waste reduction app to others while the majority of respondents recommended it.

79.6% respondents interested in participating in user testing and providing feedback for the app's development with only 20.4% are not interested.