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1.0 Introduction

Imagine a planet where one-third of all food produced never gets eaten. That same food, if saved, could feed every hungry person on Earth and still leave leftovers. This is not fiction; it is today's reality.

Food waste is now one of the most alarming problems in sustainability of the modern world that has devastating environmental, economic, and social impacts. Even though food is produced in large quantities to feed the world population, much of it does not reach the consumers. The United Nations Environment Programme reported in 2022 that the volume of food wasted worldwide was approximately 1.05 billion tonnes of food, which is close to 19% of the total quantity of food supplied to consumers. This loss is added to 8 to 10% of the global greenhouse emissions, mainly through the decomposition of food in landfills as well as the energy, land and water used in its production.(FSSC, 2024)

Outside of environmental harm, food waste is an estimated USD 1 trillion lost in the economy annually with 783 million individuals globally hungry.(UNFCCC, 2024) This is a paradox that shows severe inefficiencies in the global food systems where there is wastage of edible food when millions go undernourished. The solution to this challenge is the priority of the United Nations Sustainable Development Goal 12 (SDG 12): Responsible Consumption and Production, which states the need to cut down the waste production by means of prevention, reduction, reuse and recycling.

In this international context, Replate stands out as one such digital innovation that aims at addressing food waste by matching the excess food to the people who require it most. The platform helps SDG 12 by making consumption and production sustainable and making each meal matter and meaningful.



Figure 1. Replate Logo

1.1 Background

In our fast-paced and consumption-driven society, food businesses such as restaurants, bakeries, supermarkets, and catering often struggle to provide appropriate management and distribution for surplus food. Food businesses typically throw away edible food at the end of business hours because they cannot be stored or resold for the following day.(IIUM, 2024) This amounts to lost revenue for businesses and contributes to global environmental issues associated with food waste that often ends up in landfills and generates greenhouse gas emissions.

Simultaneously, an increasing number of people of all ages and backgrounds, including students, shift workers, and low-income populations, face difficulty in finding affordable meals.(Stone et al., 2024) Although food surplus and food scarcity exist within the same metropolitan context, food businesses, charitable organizations, and individuals do not have access to a centralized, transparent, and user-friendly mechanism to connect and distribute surplus food, which is still healthy or good for consumption, in the real-time marketplace. Although food delivery service applications operate within the delivery mechanism, they prioritize convenience for either consumers or businesses instead of waste reduction or sustainability.

In order to address the existing gap, Replate was conceived as a mobile application for food businesses, consumers, and charitable organizations. On the Replate platform, sellers, such as food businesses, can list surplus food at a discounted price for consumers or they can donate the edible food to registered charities offering help to individuals in need. Replate transforms the way surplus food is managed by turning potential waste into an opportunity for both economic and social value. Its development reflects the belief that reducing food waste is not merely an environmental responsibility but also a way to strengthen community well-being and promote sustainable living.

1.2 Vision

Our vision is to promote a world where no good food goes to waste. We are building a community-driven ecosystem that encourages responsible consumption and achieves long-term environmental sustainability. With Replate, we see a future where businesses and individuals work together to eliminate waste, reduce the impact on our natural resources, and redirect excess food to those who need it most. By making sustainability part of daily consumption, Replate hopes to inspire community-led initiatives for a more equal and sustainable future.

1.3 Mission

Our mission is to develop an intelligent, transparent, and inclusive food redistribution system that can convert excess food into assets to communities. Replate combines Artificial Intelligence (AI) as a demand forecasting system, Internet of Things (IoT) as a food freshness and safety monitoring system, and Blockchain as an alternative that provides secure and traceable transactions.

Replate aims to accomplish four key goals through such innovations:

1. Assist food vendors in cutting waste in their operations and regaining value in excess inventory.
2. Offer quality, safe and affordable food to consumers.
3. Support the charitable organizations by easing the processes of food donation.
4. Promote sustainability which is in line with global citizenship and social responsibility.

Ultimately, Replate is striving to ensure that sustainability is a real, achievable, and rewarding habit among individuals, businesses and communities anywhere in the world. The platform changes the way in which surplus food is managed but contributes directly to the pursuit of SDG 12 and promotes a culture of responsible consumption and production.

2.0 Problem Statement

2.1 Problem Definition

Food waste remains a critical global issue, undermining environmental sustainability, economic efficiency, and food security. The Food Waste Index Report issued by the United Nations Environment Programme estimates the global waste of about 1.05 billion tonnes of food or almost one-fifth of all food offered to consumers in 2022. This is equivalent to over one billion meals a day being wasted even as almost 783 million individuals remain undernourished. There is also wastage of food, which is a significant climate problem, with these emissions amounting to about 8 to 10% of the overall global greenhouse gases, mainly because of the energy, land, and water used in the production of food and because of the methane emitted as food decays. (FSSC, 2024)

In Malaysia, the situation is equally concerning. According to Solid Waste and Public Cleansing Management Corporation (SWCorp), Malaysia is disposing about 17,000 tonnes of food every day, with 24% still suitable for consumption, out of which it is estimated that 4,000 tonnes are edible. Food is almost 45 % of the total domestic waste and 82% of the total waste is dumped, which has led to an increasing strain on the waste management facility in the country.(Chia Chu Hang, 2024) Such statistics are a massive wastage of the food resources and still a large number of people, university students, low-income earners, and non-governmental organizations are facing food insecurity.

One of the main problems is the absence of a coordinated, transparent and digitalized system to manage the excess food. Vendors like restaurants, bakeries, and supermarkets often have to dispose of food that went unsold because of the lack of real-time tools on the forecast of inventory, freshness, and redistribution to customers or donation organizations.(McMahon, 2024) In the meantime, prospective customers who can use free meals at a reduced cost are often unaware of the extra chances. Consequently, there is unnecessary wastage of edible food.

Even though big food delivery services such as GrabFood and Foodpanda have a convenient delivery service, they lack the features of sustainability, namely, the guaranteed information of freshness, automatic pricing of surplus products, or direct donations. They are profit oriented as opposed to being environmental and social responsibility oriented. This gives a huge chance to a solution that will cover the inefficiencies of the food redistributing and respond to Sustainable Development Goal 12: Responsible Consumption and Production, Target 12.3, which is to cut the per-capita food waste in the world by half by the year 2030.(The Global Goals, 2025)

2.2 Relevance of the Project to the Problem

In response to this urgent challenge, Replate advances a technology-enabled platform for the efficient, cost-effective, and safe redistribution of surplus edible food. Instead of potential waste, sellers are able to realize value for various parties who will appreciate the opportunity for a low-cost meal, thus directly supporting SDG 12. Replate enables and empowers all stakeholders to participate in waste reduction without jeopardizing the safety, quality, or convenience of the food supply.

Through a real-time marketplace of surplus food options, Replate reduces the total amount of food entering landfills and creates a more circular economy model. The system provides a digital platform that tackles the root causes of food waste, including insufficient communication between sellers and buyers, poor inventory forecasting, and complications in establishing a donation process. The opportunity for food distribution systems to utilize traceable and transparent transactions will also provide sustainable, accountable, and scalable approaches to surplus food distribution in urban centers where food waste is most significant.

2.3 Alignment with Vision and Mission

Replate supports the team's vision of a world where all good food is valued and not wasted, and aligns strongly with its mission to create a smart, accessible, and transparent food redistribution system. The app's principles of affordability, sustainability, and data-first decision-making underline the team's commitment to both environmental and social responsibility.

Sellers are given the opportunity to turn their surplus into discounted product offerings or donations for community organizations, encouraging ethical business practices and helping to build community resilience. On the other side, for buyers, Replate provides access to safe, affordable meals, which is essential for students, underprivileged communities, and those who work shifts outside normal hours.

Every function of Replate, from the easy food listing process to features that allow live status updates and traceable transactions, helps to normalize responsible consumption practices. In this way, Replate turns our vision and mission into action, directly supporting SDG 12 while fostering a deeper awareness of sustainability, equity, and progressive principles.

3.0 Solution

3.1 Approach to the Problem

The Replate project offers a real-life, innovative solution to the food waste problem by changing the current method of handling, distributing and valuing excess food. Rather than viewing food waste as an unavoidable consequence of the food service industry, Replate redefines it as a chance to redistribute food and contribute back to the community sustainably.

The Replate platform is a digital marketplace that operates on two sides that bring together sellers, consumers, and charitable organizations on one ecosystem. The platform allows sellers, including restaurants, bakeries, supermarkets and catering services, to post their unsold or close to expiry food products before the end of a day. These goods are then displayed to the immediate consumers who can purchase them at reduced prices or donate meals to the local charities using the same platform.

This strategy helps overcome existing issues by offering real-time listings that minimize communication gaps between suppliers and consumers. Automated expiration control is also implemented on the platform to maintain food safety by removing items once they are no longer safe to consume. These mechanisms ensure that Replate is a win-win system where sellers reduce both waste and loss of income, buyers gain access to affordable meals, and communities lessen their impact on the environment. Finally, Replate can transform food redistribution into a joint sustainability initiative that supports SDG 12: Responsible Consumption and Production.

3.2 Innovation of the Solution

Replate introduces a new perspective on food redistribution by integrating convenience, transparency, and community engagement into a single platform. Compared to the traditional delivery applications which are more concerned with the convenience factor, Replate is more concerned with the digital design and its role in fostering sustainable behavior and making responsible consumption a reality, which is accessible to everyone.

The app offers a range of unique features that make it an effective and engaging solution:

- 1. Smart Food Listing System:** Sellers will be able to upload their surplus goods within a few minutes with images, description and discounted price. Then, the system will automatically notify buyers in the surrounding area to enhance visibility and sales depending on location.
- 2. Category-Based Search and Filters:** Consumers can easily search for food by type, such as ready-to-eat meals, bakery items, or fresh produce, and choose between self-pickup or delivery options, enhancing accessibility.

- 3. Verified Freshness and Safety Information:** Before uploading goods, sellers must provide freshness details, for example “Made within 3 hours” or expiry indicators such as “Expired in 12 hours”. This helps provide buyers a sense of confidence and trust in the quality of product.
- 4. Donation Integration:** Any near expiry dates unsold items can be automatically redirected to registered local charities. This helps to reduce the burden on sellers while ensuring food reaches those in need.
- 5. Reward System (GreenPoints):** Both buyers and sellers earn reward points based on all purchases or donations, which can be redeemed for discounts or charitable contributions and to encourage long-term engagement.

All of the characteristics above contribute to Replate to be more than just a food delivery application. It creates an ecosystem that practices sustainability and offers a mix of user convenience and measurable social and environmental benefits. As a result, sustainability becomes not only feasible but also a fulfilling endeavor.

3.3 Alignment with the Vision and Mission

Replate shows the team’s vision of a world where no good food goes to waste and supports the mission to build a fair and open food sharing platform. Each feature, from showing real-time excess food to helping manage donations, is made to promote responsible use of food and to bring the community together.

By helping sellers reduce waste and giving buyers access to cheaper meals, Replate turns sustainability into real actions, not just ideas or policies. The app helps people see food not as something to throw away, but as a shared resource that brings social, economic, and environmental benefits.

With a clear process, simple design, and community effort, Replate demonstrates how technology can provide convenience on one hand and good on the other. Replate also reflects our belief that digital tools can encourage greater user engagement to act responsibly and act upon our vision and mission to create impact towards SDG 12: Responsible Consumption and Production.

4.0 Impact of the Solution

4.1 Social Impact

By providing an innovative approach for communities to manage surplus and excess food, Replate is delivering a positive social, environmental, and economic impact. Replate allows businesses and individuals to take part in responsible consumption and production, thereby making a direct contribution to SDG Goal 12.



Figure 2. Sustainable Development Goal 12 (United Nations, 2025)

By linking sellers with consumers and charities, Replate encourages the redistribution of food rather than letting it go to waste. This not only cuts down on the amount of edible food that ends up in landfills but also provides affordable meal options for students, workers, and those with low incomes. Sellers can recoup some of their costs, while consumers get to enjoy healthy meals at lower prices, fostering a community-driven ecosystem where everyone wins.

In addition to economic benefits, Replate also focuses on increasing awareness and improving behavior. It urges users to make conscious decisions, thus turning sustainability from a specialized topic into a daily routine. In the long run, this will make a significant impact in building a responsible community and creating global citizenship toward a sustainable world.

4.2 Breadth and Depth of Impact

The way Replate is structured allows it to have both a broad and deep impact. On a broad level, it is a highly scalable solution that can reach a large number of users across urban and suburban areas. These users may include restaurants, cafes, supermarkets, and end consumers. By playing a part in nationwide food waste reduction, it can slowly but surely become one of the most important sustainability awareness-raising tools among diverse social groups.

Moreover, Replate is a deeply transformative solution for concentrated communities such as small food vendors, non-governmental organizations, and food-insecure families. For these groups, Replate is a platform that not only saves food but also delivers social value by creating opportunities for them to participate in a circular food economy. Hence, Replate is essentially a two-level system. It broadly increases collective awareness of the problem and, at the same time, makes meaningful changes on a local level.

4.3 Effectiveness in Solving the Problem

Replate offers an effective solution that eliminates food waste by appropriately addressing the issues of communication, coordination, and motivation between suppliers and consumers through a connected digital platform. Replate acts as an online marketplace where excess food can be posted, purchased, or donated before being wasted, allowing edible food to remain within the consumption cycle. It also provides a stable and affordable option for consumers who want ready-to-eat meals, making food more accessible and promoting responsible consumption. In addition, Replate motivates sellers to practice sustainability by demonstrating how losses can be turned into gains, either financially or through social impact when food is donated. The platform also helps reduce the amount of edible food waste that ends up in landfills, decreases greenhouse gas emissions, and conserves water, energy, and land used in food production.

In the process, Replate made a direct contribution to the United Nations Sustainable Development Goal 12 (SDG 12): Responsible Consumption and Production, specifically Target 12.3, which is to have at least reduced global food waste by half by 2030, and Target 12.5, which is to reduce waste generation by means of prevention, reduction, recycling, and reuse. (The Global Goals, 2025)

In a nutshell, Replate converts the conventional "produce-consume-dispose" cycle into a circular system where every meal maintains its worth and purpose. Replate not only eliminates waste but also promotes sustainable habits among both businesses and individuals, showing that SDG 12 can be achieved despite the challenges of daily life through the innovation of digital capabilities.

4.4 Comparison with Competitive Solutions

Most food delivery and discount apps, such as GrabFood and Foodpanda, prioritize convenience and variety over sustainability. While Too Good To Go has addressed surplus food issues in Europe, the same solutions are not yet available or adapted to markets in Malaysia.(Szurovecz, 2025)

Recognizing this gap, Replate was developed to introduce a model that merges efficiency with ethical and sustainable food practices. What really sets Replate apart from other platforms is its strong commitment to social responsibility, which is built into every step of its operation. More than just offering reduced-price food, Replate has developed a thriving community marketplace that fosters economic participation and encourages responsible purchasing choices. Replate's focus goes beyond connecting local businesses and promoting community collaboration. Its support for open commerce transforms it from a simple food platform into a complete and sustainable ecosystem.

5.0 Business Viability Application

5.1 Technical and Economic Viability

Replate shows high technical viability for its main functionality, leveraging well-established technologies including React Native for cross-platform development. It enables 70-85% code sharing across iOS and Android platforms which in turn reduces development costs up to 40-50% in comparison to native development (Blake, 2025). The microservices architecture with API gateway routing provides scalability and flexibility. The application is broken down into individual components which can be developed and deployed independently without requiring changes to the client applications. In return, this largely reduces the overhead of client updates, allowing new features to be deployed quickly (Richardson, 2025).

From an economic perspective, the development of this application requires strategic prioritization on its features. The AI demand forecasting feature, while assuring 30-50% less forecast errors, would require significant amounts of historical data, which therefore should be implemented gradually (Twarogal & Puczyk, 2025). Similarly, computer vision for verifying freshness shows significant challenges due to external factors affecting the appearance of food, in other words, it requires large annotated datasets (Shehzad et al., 2025). The blockchain ledger on the other hand, while offering transparency in audit trails, faces implementation barriers as it involves high costs and technical complexity for most SMEs to adopt (Mbadlisa & Jokonya, 2024). Hence, these advanced features might not be the most suitable when developing the MVP from an economic viability standpoint.

5.2 Sustainable Business Model

Replate's revenue model features multiple streams of a freemium approach that targets the increasing food waste reduction market. Primarily, the revenue streams include transaction commission of 20-25% on food sales, derived from competitive platforms like Too Good To Go (25%) (Too Good To Go, 2023), as other platform's commission rates are undisclosed. Next, a seller subscription tier which includes a tier featuring a free listing service, a premium tier providing analytics and AI forecasting (Ortner, 2025), and enterprise features with IoT integration based on the number of devices, and features required (Tencent Cloud, 2025). Featured listing fees allowing sellers to boost their visibility on the platform where a fee is charged per listing.

The cost structure of this platform emphasizes lean operations to lower expenses whilst still ensuring customer value is maximised. These costs derive from cloud infrastructure, payment processing fees, customer acquisition, and development and maintenance of the platform. The customer acquisition strategy targets a budget-conscious demographic, primarily millennials and Gen Z, by partnering with universities and corporate campuses. We also plan to make use of influencers who heavily promote sustainability to market the positive impact of our platform to the environment.

5.3 Competitive Analysis

SWOT Analysis of Too Good To Go

Strengths	Weaknesses
<ul style="list-style-type: none"> - Active in 19 countries with 100M registered users and 175K business partners (Too Good To Go, n.d.) - Strong partnerships with major retailers (Too Good To Go, n.d.) - Proven sustainability impact with 400M+ meals saved from going to waste (Too Good To Go, n.d.) 	<ul style="list-style-type: none"> - Limited customization for specific diets as they offer surprise bags - No delivery service provided - Contents of surprise bags might vary in quality and quantity from the store
Opportunities	Threats
<ul style="list-style-type: none"> - Expansion into Asia Pacific markets - B2B enterprise solutions for corporate cafeterias 	<ul style="list-style-type: none"> - Increasing competition from the same region - Regulatory changes in food safety laws

SWOT Analysis of Olio

Strengths	Weaknesses
<ul style="list-style-type: none"> - Community driven with 8.9M users (Olio, 2025) - Is free for individuals as it is donation based (Emilyneill, 2025) - Strong social impact and volunteer network (Olio, 2025) 	<ul style="list-style-type: none"> - Limited monetization streams - Inconsistent food quality and potential safety oversight - Slower scalability with community model
Opportunities	Threats
<ul style="list-style-type: none"> - Government grants for social enterprises - Expansion into household food sharing 	<ul style="list-style-type: none"> - Difficult to attract commercial sellers - Competition from commercial platforms

SWOT Analysis of Karma

Strengths	Weaknesses
<ul style="list-style-type: none"> - Partners with premium restaurant (Loritz, 2022) - Onboarded 7K+ retailers and 1M users from Sweden, UK, and France (European Union, 2023) 	<ul style="list-style-type: none"> - Limited market penetration outside Europe - High commission rate involving percentage based fee plus a fixed fee (Karma, 2022)
Opportunities	Threats
<ul style="list-style-type: none"> - Luxury food waste market from high end restaurants - Subscription models for premium users 	<ul style="list-style-type: none"> - Competition from delivery platforms - Restaurants may be reluctant to high commissions

6.0 Architectural Overview

Replate is designed as a cross-platform mobile application to be deployed on both iOS and Android. The application will be developed using React Native, a framework that involves a single codebase with platform-specific modules (Meta Open Source, 2025). *Figure 3* below illustrates the overall architecture of the application, which is organized into several distinct layers, each responsible for specific functions and services.

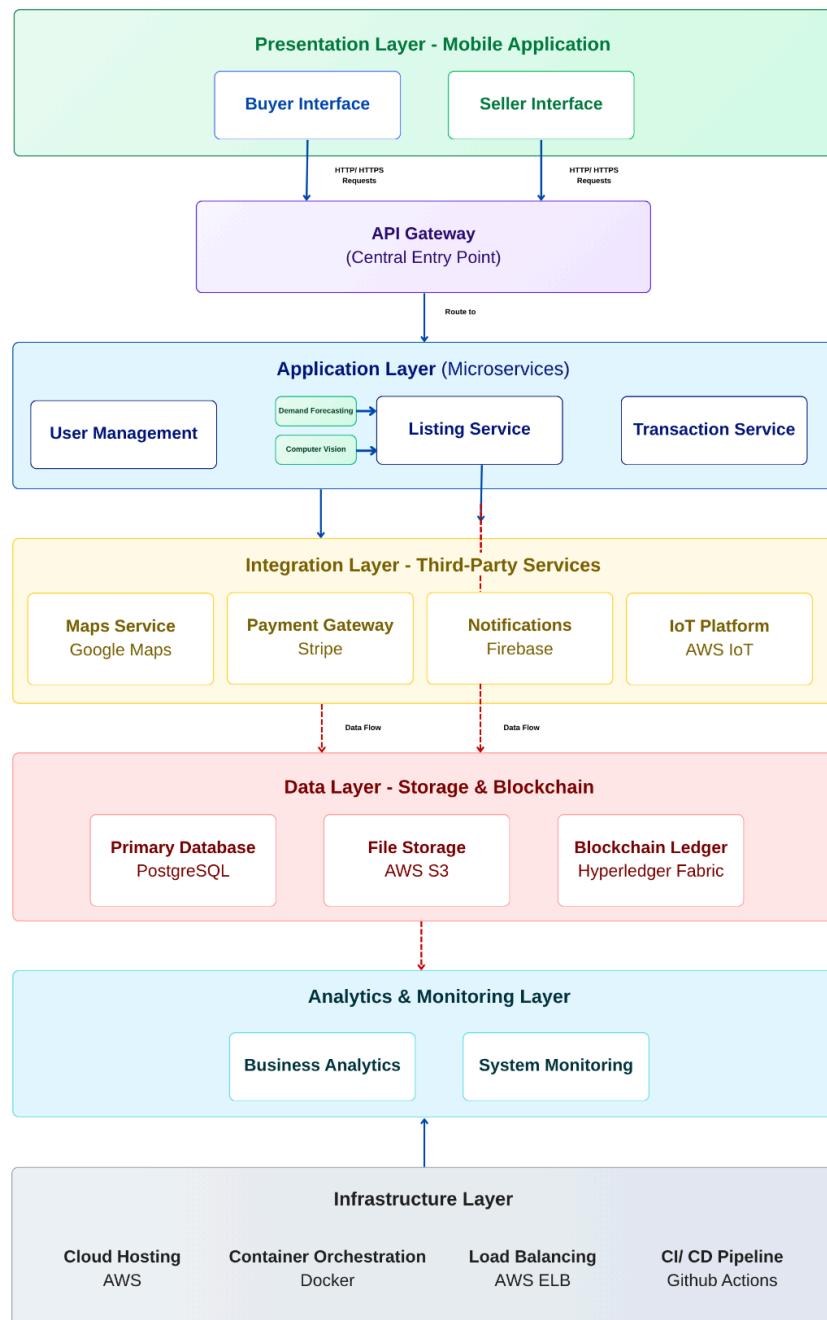


Figure 3. Architecture Diagram of Replate

6.1 Presentation Layer

The presentation layer represents the user-facing interface of the application. It is divided into two main interfaces, each designed to support distinct user needs and use cases. The buyer interface allows users to browse available food postings, view detailed information, and purchase items of their choice. Whereas the seller interface enables users to list near-expiry food items, manage inventory, and track orders efficiently.

This separation ensures that both user groups experience tailored interactions optimized for their respective workflows.

6.2 API Gateway

The API gateway serves as the central entry point for all client requests to backend services, handling requests by routing them to appropriate services (Richardson, 2025). It performs important intermediary functions such as authenticating credentials and authorizing policies, and rate limiting to regulate traffic alongside ensuring resources are distributed fairly (Sinha, 2025).

In the context of Replate, the mobile app will first send a purchase request. The gateway then validates this request and routes it to the transaction service. The client will then receive the relevant responses.

6.3 Application Layer

The application layer contains the core microservices responsible for the system's main functions. Key services include a user management service handling authentication, authorization, and user profiles, a listing service managing food postings and inventory, and a transaction service processing orders and payment transactions securely. The gateway is located at the edge of these microservices, managing requests and responses that flow between client applications and the system's backend. (Richardson, 2025)

This layer also integrates AI and machine learning capabilities to enhance user experience and operational efficiency. One of the features being, an AI-driven demand forecasting, analyzing historical sales data to identify patterns and predict demand. This forecasting tool allows improved inventory management and reduces excessive stock and as a whole, minimizes food wastage (Bhagyashree, 2024). Next, computer vision, which assesses the quality and freshness of food using image recognition models. However, the challenge here lies in the variation of the food's appearance caused by changes in lighting or obstruction and its natural diversity in general. In other words, it will require a large annotated dataset to train the AI models (Shehzad et al., 2025).

6.4 Integration Layer

The integration layer connects Replate with external third-party services that support its functional requirements, including map services (e.g., Google Maps API) for location-based listings and navigation, regional payment gateways for secure financial transactions, notification services (e.g., Firebase Cloud Messaging) for real-time alerts and updates, and IoT platform (e.g., AWS IoT Core) for monitoring environmental conditions such as temperature and storage. These integrations are essential for the application's operation but also introduce development and operational costs. For instance, the fees of API usage scale with user activity not to mention hosting, maintenance, and periodic updates of cloud and third party services. It is also crucial to ensure that these third-party services are compatible with the application's cross-platform environment to ensure consistent performance across all targeted devices. (AppVin Technologies, 2024)

6.5 Data Layer

The data layer manages data storage and retrieval across multiple components. MongoDB is suitable as the primary database for storing user profiles, and inventory data. Its flexible data model allows data structure to change easily with minimal downtime, not to mention its high scalability in distributing data which ensures efficient handling of multiple simultaneous requests. A separate cloud object storage system such as AWS S3 is used to handle and store food images and user-uploaded media. The reason for having two separate storage systems is that databases are optimized for structured data, whereas larger files such as images, therefore, having large files such as images would increase its latency and cost (AWS, n.d.). However, with the help of AWS S3, storing those large files will be a lot more cost-effective and resilient due to the use of flat organization where every file is stored as an object in a main container called a bucket (Abylead, 2023). Ideally, we plan to include a blockchain ledger for maintaining secure transaction records and an immutable audit trail. This combination ensures reliable data management with transparency and traceability. That said, it involves high technical complexity to build and maintain especially when it comes to integration with existing services. Not to mention, it is unlikely that all stakeholders will participate given its complexity and cost (Mbadlisa & Jokonya, 2024).

6.6 Analytics Layer

The analytics and monitoring layer provides tools for business insights and system oversight. It consists of two main sections, one of them being a front-end analytics dashboard that visualizes key metrics such as user behavior, sales performance, revenue, and the GreenPoints reward system. Using BigQuery, a powerful analysis tool, it allows sellers to understand what sells best and track their income by analyzing specific events logged in the application, even if they are nested within the raw data. Additionally, BigQuery can identify the application's peak activity hours by converting timestamps into human-readable local time coupled with categorizing them into meaningful segments (Sher, 2025).

6.7 Infrastructure Layer

At the foundation, the infrastructure layer supports the operational environment of the entire platform. It includes, firsthand, a cloud hosting model for application deployment and scalability. It eliminates the need for upfront expenses on physical hardware, in addition to providing the ability to scale resources automatically to meet increasing user demand (GoSolve, 2023). In this case, Google Cloud Platform is suitable as it is cost-effective for large-scale data processing and analytics workload, in addition to having native integration with the previously mentioned BigQuery data warehouse (Kuzmenko, 2025). Then there is a CI/ CD pipeline that automates building the code, testing, and deploying it to ensure continuous delivery and reliability. This automation not only enables quicker delivery of new features and fixing of bugs, but also eliminates human error when deploying new code manually (Vakkalanka, 2025).

7.0 System Requirements and Scope

7.1 Questionnaire

To gather the important insights from potential insights regarding our Replate App which align with SDG 12: Responsible Consumption and Reproduction, we conducted a questionnaire and received 56 responses.

Section 1: Demographic Information of Responses

Role Selection

What is your role?

56 responses

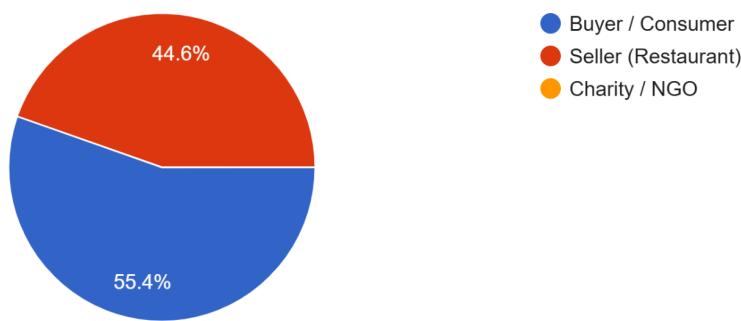


Figure 4. Role Selection

The response shows a nearly balanced distribution between buyer (55.4%) and seller (44.6%) respondents, with no responses from charity organizations. These findings can be concluded that the main stakeholders in the food waste ecosystem are buyers and sellers. In response, the Replate App will design a role selection at registration, allowing users to choose between a buyer and a seller based on their needs. Although no charity organizations join in the survey, Replate App will still introduce a community platform for donation activities.

Two sets of questionnaires were prepared for different roles (buyers and sellers) to get more accurate and relevant results. Section 2 and 3 focused on buyers (31 respondents) to understand their awareness of food waste and buying behaviour, while section 4 targeted sellers (25 respondents). Finally, Section 5 and 6 were for both users (56 respondents) to assess their trust in technology and willingness to use the Replate App.

Section 2: Awareness and Experience with Food Waste of Responses

Consumption Patterns

How often do you buy prepared food items in a week?

31 responses

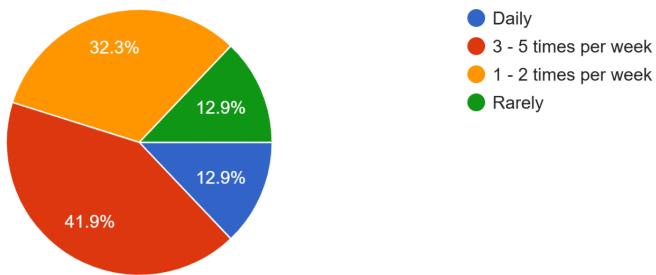


Figure 5. Consumption Pattern

Based on the responses indicating that buying prepared food is a common lifestyle behavior for most of the respondents. Around 41.9% of the buyers purchase prepared food items 3-5 times per week and another 32.3% purchase 1-2 times per week, showing that frequent food purchasing is part of their regular lifestyle. It proposed that users are likely to use the Replate App since it fits naturally into existing lifestyles by providing frequent buyers with a more affordable and sustainable way to access prepared food.

Experience in Purchasing Discounted or Near-Expiry Food

Have you ever purchased discounted or near-expiry food before?

31 responses

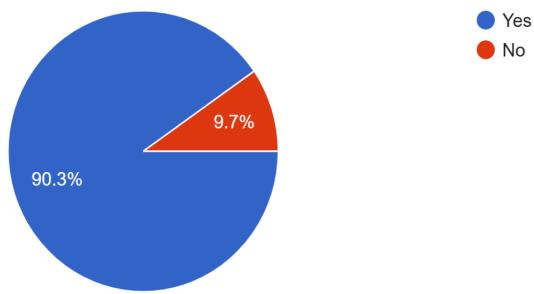


Figure 6. Experience in Purchasing Discounted or Near-Expiry Food

The response from the questionnaire reports that 90.3% of the respondents have purchased discounted or near-expiry food at least once, showing that it has become an accepted behaviour and existing demand among buyers. Hence, the Replate App is built upon an existing habit instead of persuading them to accept a new behaviour. It can focus on improving convenience, variety and reliability, ensuring that buyers can easily discover surplus food and make purchases with confidence.

Motivation to Purchase

If yes, what motivated your purchase? (Select all that apply)

31 responses

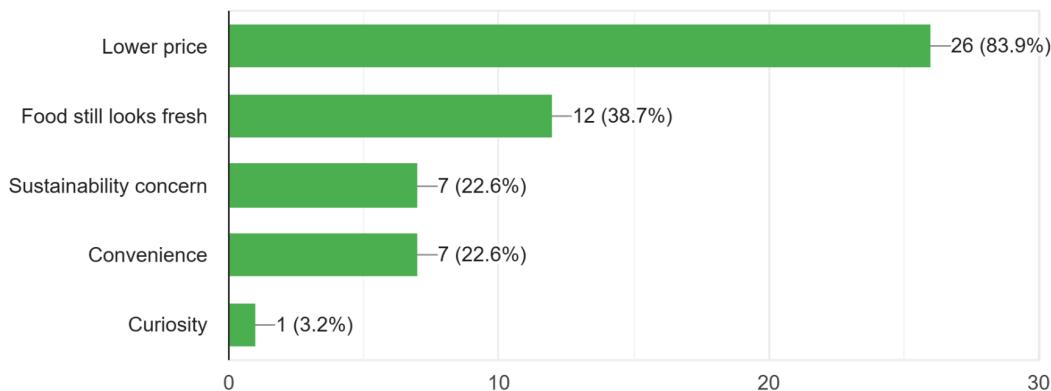


Figure 7. Motivation to Purchase

The findings show that 83.9% of the buyers are mainly encouraged by affordability, while around 38.7% of them still prioritize the safety, freshness and quality of the food they consume. To meet these motivations, the Replate App will be designed by combining dynamic pricing features and AI-powered freshness verification. With these features, each listed item can be verified for quality and reasonable price based on its condition.

Awareness of Food Waste

How concerned are you about food waste in your community?

31 responses

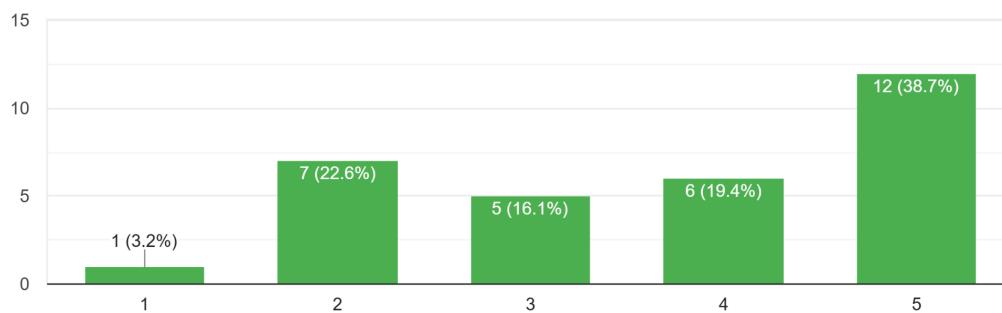


Figure 8. Awareness of Food Waste

The responses show that around 38.7% of the respondents have strong awareness of food waste issues, meaning that the public already recognize the importance of responsible food consumption. This understanding provides a strong foundation for the Replate App, which aims to convert awareness into practical action by enabling buyers to purchase surplus food or donation conveniently. Additionally, the Replate App also plays an educational role for those 22.6% of respondents who still have low awareness of food waste problems. With features such as impact dashboard can help these users to gradually understand their actions contribute to reducing waste.

Methods of Discovering Discounted Food

How do you currently discover deals or discounted food?

31 responses

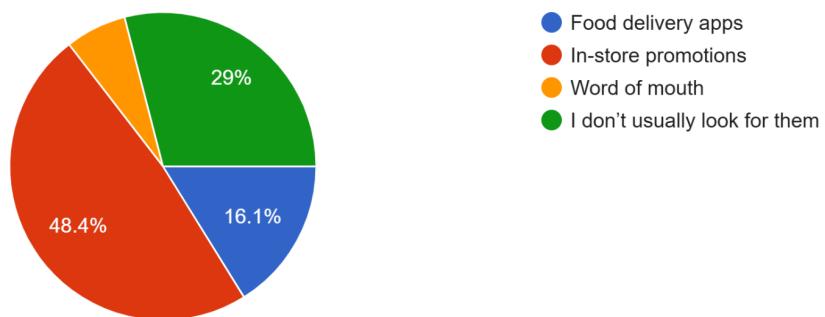


Figure 9. Methods of Discovering Discounted Food

The findings show that 48.4% of the respondents usually found discounted or near-expiry food through in-store promotions, while 29% do not actively look for deals. These patterns show that many potential buyers are not informed on time and cause the awareness of surplus food remains limited. Hence, the Replate App can take this opportunity to bridge the gap by providing features such as real-time notifications, location based search and filtering options by category or prices. These functions allow buyers to conveniently discover nearby food without visiting the store. This approach not only increases accessibility for consumers but also helps sellers to improve inventory turnover.

Section 3: Buying Behaviour and Preferences of Responses

Factors for Choosing Discounted Meals

When choosing discounted / leftover meals, what matters most? (Select all that apply)

31 responses

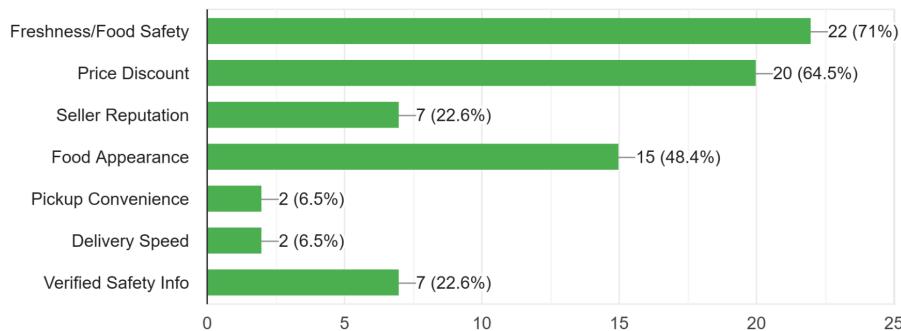


Figure 10. Factors for Choosing Discounted Meals

Based on the respondents' responses, around 71% of them prioritize freshness and food safety when choosing discounted food. This high percentage shows that buyers will not compromise on quality and safety even purchasing discounted food. Accordingly, the Replate App should include freshness verification features such as clear photo uploads to increase buyer confidence and encourage frequent purchases. Besides, 64.5% of the respondents highlighted price as another factor that influenced their decision, showing that affordability strongly motivates users to buy surplus food over regular-priced options. In response to these findings, the Replate App will implement a dynamic pricing feature with AI-powered forecasting to attract more users.

Preferred Mode for Rescued Meals

Which mode do you prefer for rescued meals?

31 responses

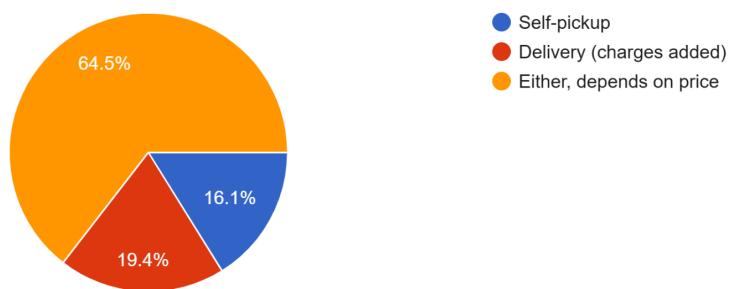


Figure 11. Preferred Mode for Rescued Meals

The responses show that 64.5% of the respondents are comfortable with both self-pickup and delivery modes when buying rescued meals. At the same time, a nearly equal proportion of respondents are only willing to self-pickup (16.1%) or deliver with charges (19.4%) based on their convenience. The results proposed that the app should have multiple options instead of being limited to a single mode of access. Therefore, the Replate App will introduce both food options to accommodate different user needs.

Searching Behaviour

Scenario: It's 9PM, you want a cheap, quick meal. What's the first thing you would do in a food rescue app?
31 responses

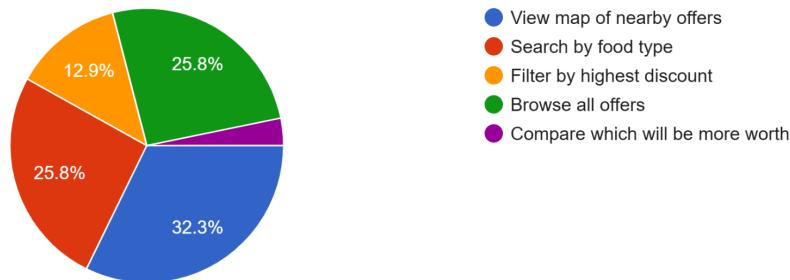


Figure 12. Searching Behaviour

The questionnaire results reveal that 32.3% of them prefer to find nearby offers. This means that location plays a key role in buyers' food purchasing decisions. Additionally, both "Browse all offers" and "Search by food type" received the same percentage of responses (25.8%). These results suggest the Replate App to develop a smart search engine for users to filter food listings by location, food type and discount level based on their convenience.

Main Concerns When Purchasing Discounted Food

What's your biggest concern when buying discounted/surplus food? (Select all that apply)
31 responses

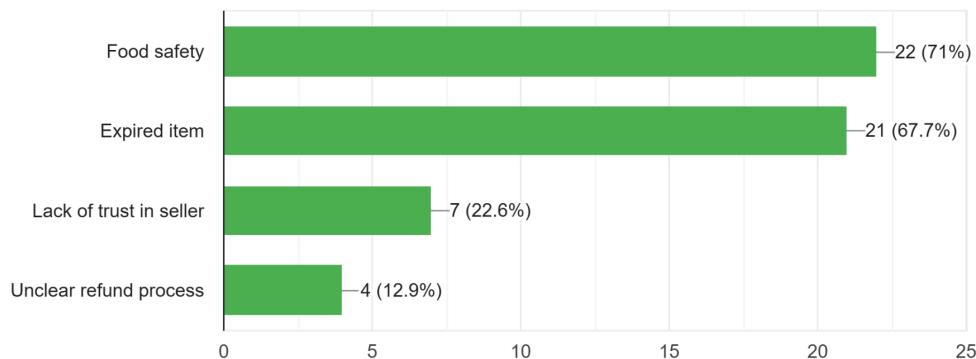


Figure 13. Main Concerns When Purchasing Discounted Food

When purchasing near-expiry food, 71% of buyers prioritize food safety. The results show that users are still concerned with the food handling process even when buying discounted food. To address this, the Replate App will implement features like freshness verification tools, sellers' profile to strengthen buyers confidence to encourage them to purchase frequently. Furthermore, 67.7% of the buyers highlighted that another major concern is the expiry dates of the item. Hence, the Replate App will require sellers to clearly state the expiry and preparation information for each listing item. By doing so, buyers can easily view the recommended consumption period and decide whether to purchase based on the freshness and time remaining.

Consumer Trust in Food Listings

What makes you feel a food listing is "safe to buy"? (Select all that apply)

31 responses

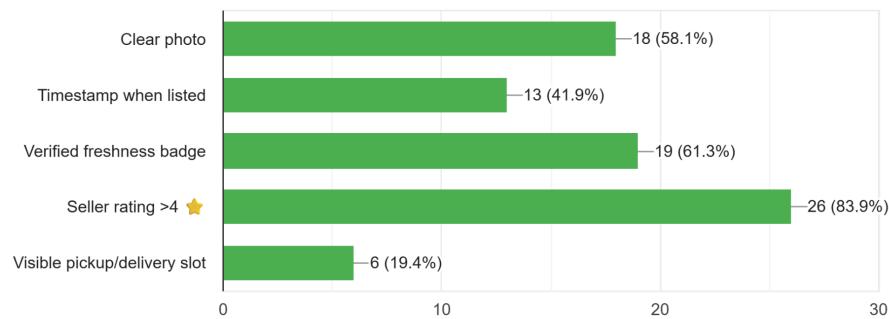


Figure 14. Consumer Trust in Food Listings

The results demonstrate that 83.9% of buyers consider that seller rating as the most important factor that makes consumers be confident to buy the discounted food. According to the results, the Replate App should implement a rating and review system, allowing buyers to share their experiences and display seller ratings on their profiles as a reference for new users. In addition, around 61.3% of respondents emphasized the need for a verified freshness badge, while 58.1% emphasized the importance of clear food photos. The results reveal the importance of transparency and visual clarity to build trust between buyers and sellers. Thus, to help buyers purchase with confidence, the Replate App will ensure that each listing includes verified freshness details and high-quality photos.

Preferred Impact Statistics on Dashboard

Beyond saving money, which "impact" statistic would you like to see on your dashboard? (Select all that apply)

31 responses

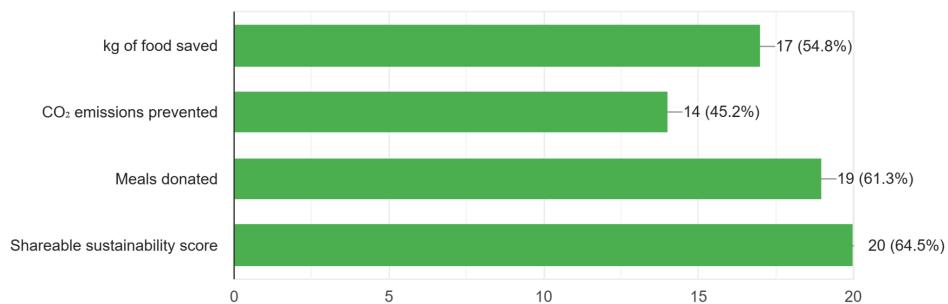


Figure 15. Preferred Impact Statistics on Dashboard

There are 64.5% of the respondents preferred to have a shareable sustainability score on the dashboard that allows them to share their environmental contribution with others. Meanwhile, 64.3% of them want to track the number of meals donated. In addition, 54.8% of them wanted to track kilograms of food saved, while 45.2% preferred to view CO₂ emission prevented. Since all listed statistics receive high responses, the Replate App will include all in the dashboard for users to review their overall impact.

Section 4: Seller Perspective of Responses

Seller Response to Unsold Food

If you were a seller, what would you do with unsold food at day-end? (Select all that apply)
25 responses

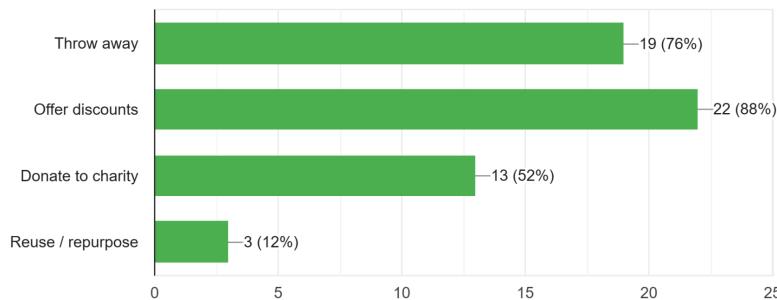


Figure 16. Seller Response to Unsold Food

The questionnaire results show that 88% of sellers prefer to offer discounts on food on unsold food which means that they are already trying to reduce waste through price reductions. However, 76% of sellers will consider throwing away leftover food at the end of the day. This finding highlights the importance of the Replate App in offering better waste management practices. With this app, sellers can instantly list their surplus food and notify nearby buyers in real time. Through this way, the app is able to bridge the gap between sellers who aim to minimize waste and buyers who are seeking affordable meals.

Biggest Challenge with Surplus Food

As a seller, what is your biggest challenge with surplus food? (Select all that apply)
25 responses

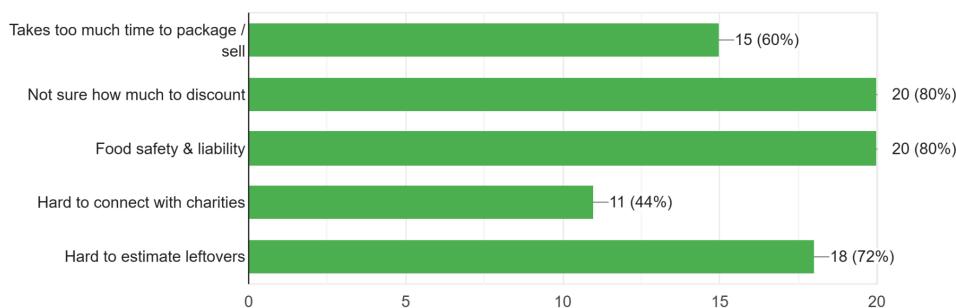


Figure 17. Biggest Challenge with Surplus Food

To understand the sellers' challenge so that the app can address their specific needs, this question was asked. The results show that both uncertainty for the discount and the food safety and liability problems are the biggest challenge with 80% of the respondents having. At the same time 72% of them have problems on estimating the leftovers. The Replate App integrates features with AI that can solve these problems directly. To address pricing uncertainty, the app will provide dynamic pricing suggestions which can help sellers. For food safety and liability concerns, the app builds trust by displaying freshness scores for buyers. Additionally, the app utilizes AI technology to predict daily surplus quantities for making better inventory decisions.

Factors Affecting Immediate Posting of Leftover Food

When listing leftover food, what stops you from posting immediately? (Select all that apply)
25 responses

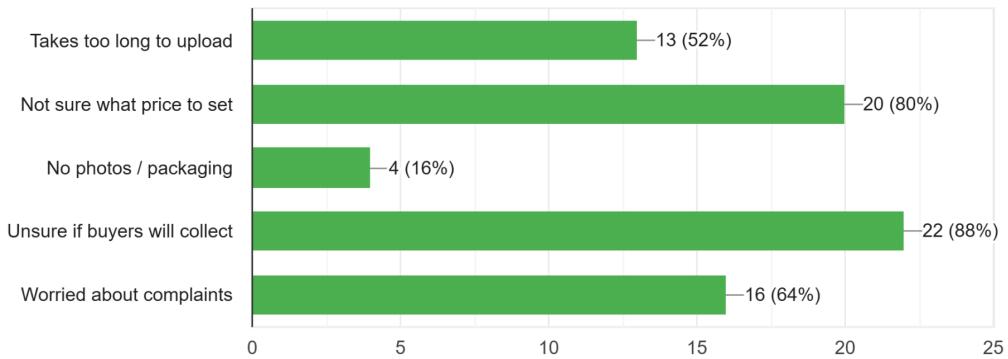


Figure 18. Listing Barriers

The majority of respondents (88%) are concerned about whether the buyers will collect their orders, which is a significant challenge for sellers. This uncertainty often causes the respondents to hesitate to post their leftover food. For this problem, the Replate App has users' profiles that allow sellers to view the buyer's profile and the order management features to decide before accepting an order. Besides, the app integrates an online payment system as a protection for the sellers which ensures that buyers complete payment upon placing an order to reduce the risk of failing to collect.

Another common challenge that was raised by respondents (80%) is the difficulty in determining suitable pricing when uploading surplus food. To address this specific challenge, the Replate App will include an AI-Powered Demand Forecasting that analyzes data and gives sellers a suggested price for their items. Sellers can either use the recommended price or adjust it based on their own decision.

Willingness to Donate Food Automatically After a Cut-Off Time

Would you be willing to donate unsold food automatically after a cutoff time (e.g., 11 PM)?
25 responses

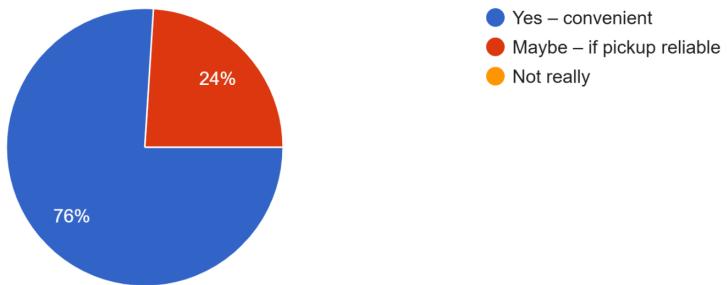


Figure 19. Willingness to Donate Food Automatically After a Cut-Off Time

A high number of respondents (76%) are willing to donate unsold food automatically after cut-off time if it is convenient, while 24% of them will consider donating under certain conditions if pickup is reliable. This finding shows that the auto-donation idea is realistic and well-accepted among users, hence the Replate App will integrate the donation activity and make the process simple and accessible. Sellers can easily post available food for donation under the community section, then the nearby charities can view and arrange for collection.

Refund Model

If a buyer complains about food safety, which refund model do you prefer?
25 responses

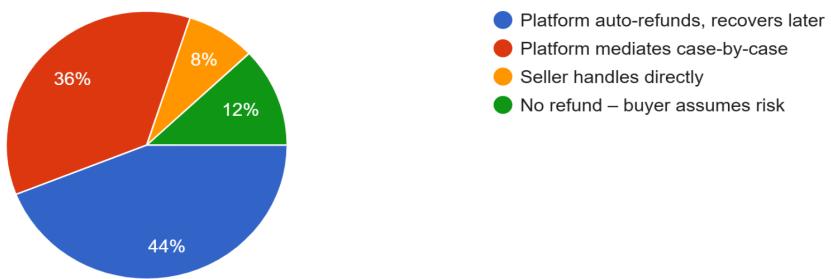


Figure 20. Refund Model

From the results, 44% of the sellers prefer the platform to auto-refund the buyer first and recover the payment from the seller later when buyers raise food safety complaints. At the same time, 36% of sellers support handling refund requests through case-by-case mediation. To address the problem fairly and protect both parties, the Replate App will implement a transparent refund model. Buyers are required to submit photo evidence once they receive their order. The system will review the images when buyers request a refund. Once both parties reach an agreement, the payment will either be released to the seller or refunded to the buyer.

Handling of Late or Uncollected Orders

If a buyer doesn't pick up by 10 PM, what should the app do?

25 responses

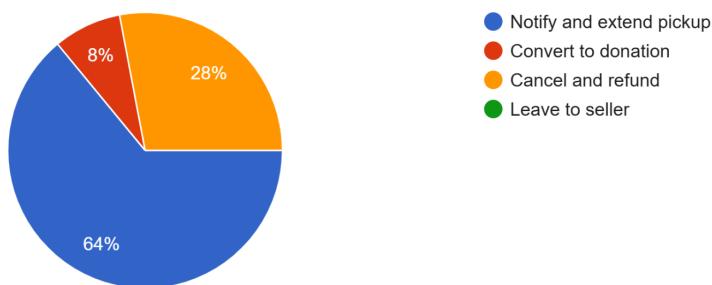


Figure 21. Handling of Late or Uncollected Orders

Based on the sellers' responses, around 64% of them prefer to send a notification and extend the pick up time for the buyers who fail to collect their orders on time. However, 26% of sellers prefer to cancel and refund the order. To balance both preferences and protect sellers from losses caused by buyers, the Replate App will integrate a two response mode. Sellers can choose to either extend the pickup time for 15 minutes with a small late charge or cancel the order and refund to them with deduction to ensure fairness to both parties.

User Preference for Receiving AI Forecast Insights

How would you prefer to receive AI forecast insights (for surplus prediction)?

25 responses

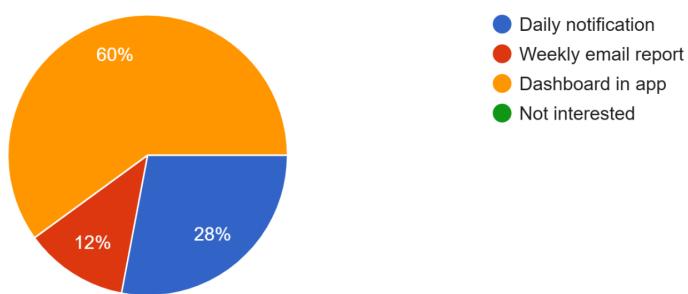


Figure 22. User Preference for Receiving AI Forecast Insights

The Replate App provides AI forecast insights for the sellers to help them predict the surplus and make better inventory decisions. For their convenience, the survey included a question regarding the sellers' preferred location for this feature. The findings reveal that around 60% of respondents prefer to have the feature integrated within the dashboard, so they can access important data quickly and easily. To align with these expectations, the Replate App will position the AI Forecast Insights on sellers' dashboard in a clear and simple visual format. The dashboard will update daily to provide real-time forecasting data so sellers are able to make timely decisions and inventory management.

Section 5: Trust and Technology Perception of Responses

Blockchain

Would you trust a system that uses blockchain to record food handling & donations?
56 responses

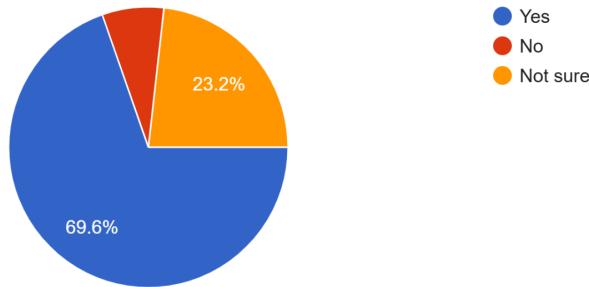


Figure 23. Blockchain

The questionnaire results show that a large number of respondents (69.6%) trust blockchain-based systems to record food handling and donation activities. This finding reveals that the majority of users are confident in blockchain as a secure and transparent method for managing data and ensuring record accuracy. However, the current version of the Replate App has not yet implemented blockchain integration, it will be a promising direction for future development which would strengthen user trust to safety and data integrity.

Users' Comfort Level with Technology Use in Food Purchasing

How comfortable are you using technology (AI apps, digital payment) for food purchases?
56 responses

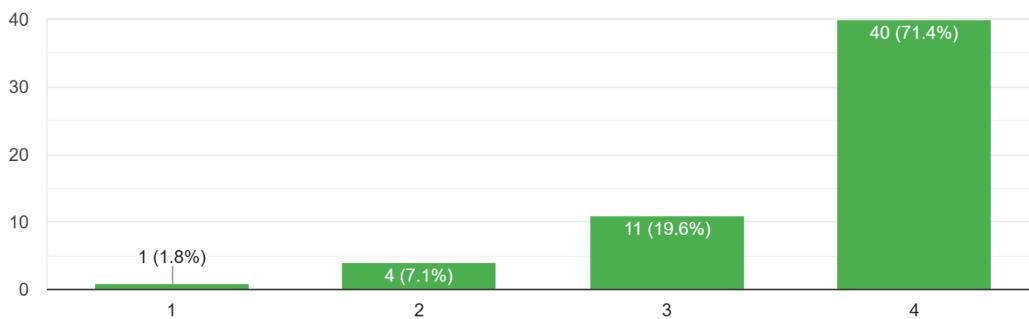


Figure 24. Users' Comfort Level

According to a majority of 71.4% of the respondents rated 4, showing that they are very comfortable purchasing food through technology. Since most of the users are familiar with the integration of digital platforms in their daily routines, it is a good opportunity for the Replate App to integrate advanced technologies. For example, the app can introduce an AI-powered freshness verification to enhance the user experience and make the process more convenient and reliable.

Section 6: Willingness to Use Replate

Intention to Use the Replate App

How likely are you to use an app like Replate that offers discounted surplus food?

56 responses

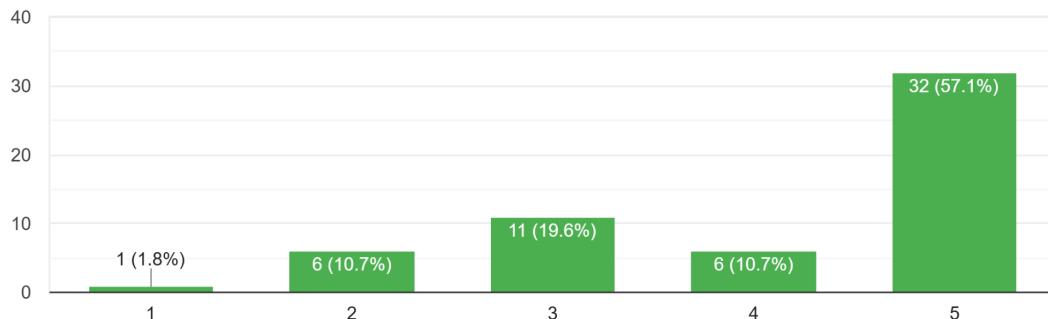


Figure 25. Intention to Use the Replate App

This questionnaire question was included to measure respondents' willingness to use the Replate App. From the findings, around 57.1% of respondents rated 5 which means that they have strong interest toward using the app. Meanwhile, 19.6% of respondents rated 3, indicating a neutral opinion but an openness to explore the platform. To attract these users, the Replate App should not only focus on selling surplus food but also emphasize unique features that set it apart from other platforms.

Factors Encouraging the Use of Replate

What would encourage you to download and use Replate?

56 responses

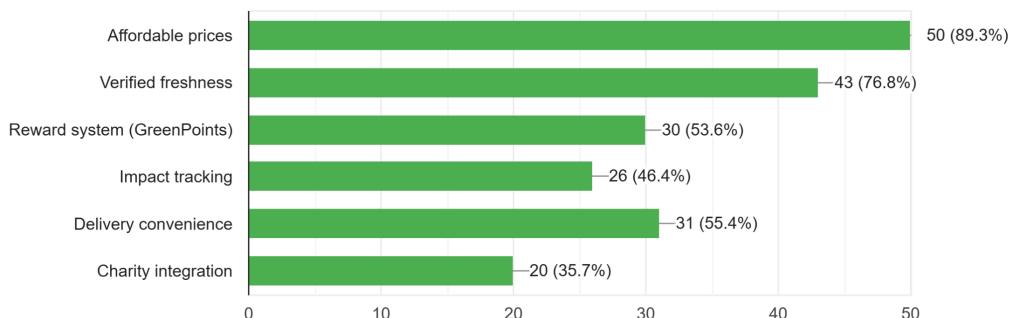


Figure 26. Factors Encouraging the Use of Replate

The questionnaire identifies key factors that would encourage users to download and use Replate App. The results reveal that all listed factors are considered important by users. Around 89.3% of the users consider the affordable prices as their primary motivation to use the app. Followed by verified freshness with 76.8%, indicating the food quality and safety is virtual in users' purchasing decisions. Meanwhile, 55.4% deliver convenience and 53.6% motivated by a reward system. These findings show that Replate App attracts users by offering affordable meals but also ensuring reliability, freshness and convenience throughout the buying process.

Factors Encouraging Users to Stay Long-Term

Which feature would make you stay loyal long-term?
56 responses

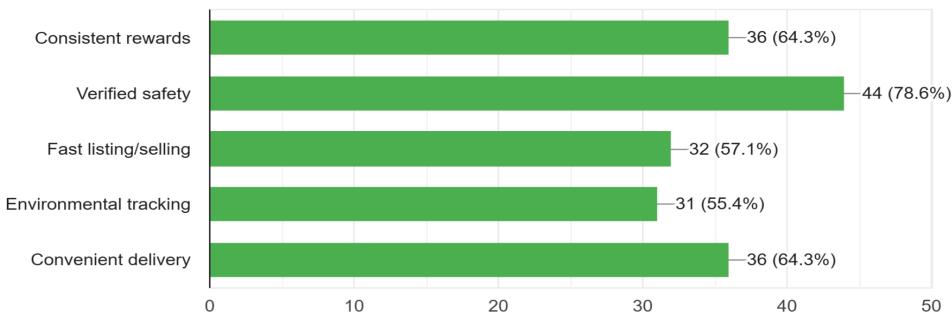


Figure 27. Factors Encouraging Users to Stay Long-Term

This questionnaire explores the features that keep users for long term loyalty to the Replate App. Around 78.6% of respondents identify that verified food safety is crucial to maintain trust and consistent quality to retain users over time. Other factors like consistent rewards and convenient delivery were both chosen by 64.3% of respondents. Fast listing (57.1%) and environmental tracking (55.4%) also receive high response, reflecting that users. Thus, the Replate App will be designed with verified food safety, while supported by consistent rewards, delivery convenience, fast listing and impact tracking. By integrating these features, to encourage users to remain active over the long term.

7.2 Functional Requirements

ID	FR01
Title	Login and Registration
Description	<p>The system allows users to register and log in to the Replate app based on their selected roles to access different features.</p> <ul style="list-style-type: none"> a. Buyer: To purchase surplus food b. Seller: To list surplus food for sale or a donation

ID	FR02
Title	Food Browsing and Search
Description	<p>Users are able to browse available food listings in real time. Food can be filtered by discount, location and food type. Users can also search by the name or keyword to find their desired food.</p>

ID	FR03
Title	Transactions
Description	<p>Users can choose various payment methods when purchasing and each method will be secure by SSL encryption. The system will notify the user whether the payment is success or failure. For each transaction will be recorded for the users to review later on. GreenPoint can be earned for each transaction.</p>

ID	FR04
Title	Real-Time Tracking
Description	<p>The system will provide a real-time tracking to allow the users to check the status of their order. This feature applies to all types of orders, including delivery and self pick-up. With this tracking, the system will notify users at each stage of the process and display an estimated arrival or pick up time that can help users plan conveniently.</p>

ID	FR05
Title	Dashboard
Description	The system will display analytics and sustainability reports that include: shareable sustainability score, meals donated, kg of food saved and CO2 emissions prevented. For sellers, they will receive AI-driven demand forecasts to predict surplus.

ID	FR06
Title	User Profile
Description	Each user has a personal profile page that stores and displays their information. Users can manage their account settings like language based on their preference. The profile also includes a rating system to build trust within the community.

ID	FR07
Title	Notifications and Alerts
Description	This function allows all users to keep them updated on important activities in the Replate App. With this feature, every user will stay informed about relevant updates. For the late pickup order, the system will also send a notification to users as a reminder.

ID	FR08
Title	AI Freshness Verification
Description	An AI freshness verification can build buyer confidence by displaying freshness scores for each food. When sellers upload food photos, the AI model will analyze colors, texture and packaging to estimate the freshness.

ID	FR09
Title	Community For Discussions
Description	The system will provide a platform for all users to communicate through posts and discussions. They can share experiences or feedback by creating and replying to posts. For donation activities, sellers are able to post surplus food under the community so that the nearby charities can view and arrange collection.

ID	FR10
Title	Reward and Loyalty Program
Description	This feature is used to encourage the users to participate actively in the Replate App. Users will earn GreenPoints once they complete a purchase, sale or donation. These points can be redeemed for discounts or vouchers, ensuring continuous engagement and contribution to food waste reduction.

ID	FR11
Title	Menu Management
Description	This feature allows sellers to manage their food listings efficiently. Sellers can upload, edit or delete anytime based on their requirements.

ID	FR12
Title	AI-Powered Demand Forecasting
Description	This AI-model analyzes sales data to predict potential surplus and suggest appropriate pricing for sellers as a reference. Hence, the system can assist sellers in managing surplus food and setting optimal prices by implementing this feature.

ID	FR13
Title	Order Management
Description	Once sellers receive an order, the system allows them to choose either accept or reject based on their business decision.

ID	FR14
Title	Real-Time Chat
Description	The system allows buyers and sellers to communicate directly in real-time to clarify order details or request for adjustments. This feature enhances overall user experience by reducing misunderstandings.

7.3 Non-Functional Requirements

ID	NFR01
Title	Security and Privacy
Description	The application will secure the transaction through SSL encryption. Role-based access control (RBAC) will be implemented, ensuring that different user types have appropriate access levels based on their roles. All users' sensitive data such as passwords must be encrypted before storage.

ID	NFR02
Title	Availability
Description	For core services like food listing, the system needs to maintain 99.5% uptime to ensure that users can access at all times. Besides, the system should backup all data to protect from system failure.

ID	NFR03
Title	Performance
Description	To provide a smooth user experience, the system must load within 3 seconds under normal network conditions. The system must handle at least 500 users at the same time without performance degradation.

ID	NFR04
Title	Usability
Description	The interface of this application will be simplified and user-friendly. Pop-ups should be provided for users to understand features easily. The app has to use clear, recognizable icons that are related to their functions to reduce misunderstanding.

ID	NFR05
Title	Accuracy
Description	The AI freshness detection model should achieve at least 85% accuracy in evaluating food quality to build users' trust. In addition, to have reliable delivery and pick up, location services must maintain high precision.

7.4 Data Requirements

Category	Data	Source	Data Type	Quality Rule
User Data	User Type	User	String	Must be either 'Buyer' or 'Seller'.
	Full Name	User	String	Must not be empty and contain only alphabetic characters and spaces. Maximum 100 characters.
	Password	User	String	Must have a minimum 8 characters with at least 1 uppercase letter and 1 special character.
	Email Address	User	String	Must be a valid email address.
	User ID	App	String	Must be unique for each user. Format depends on User Type: 'B' for Buyer (Exp: B001), 'S' for seller (Exp: S001), followed by a four-digit number.

				by 3 digits.
	Location	User	String	Must be a valid address format.
	Phone Number	User	String	Must be a valid phone number format.
Food Listing Data	Listing ID	App	String	Must be unique and start with 'L', followed by 3 digits (Exp: L001)
	Food Name	User (Seller)	String	Must not be empty. Maximum 100 characters.
	Food Photo	User (Seller)	Image	Must upload minimum 1 photo in JPG format
	Price	User (Seller)	Numeric	Must be a positive numerical value
	Expiry Date	User (Seller)	DateTime	Must be a valid DateTime format
Transaction Data	Order ID	App	String	Must be unique and start with 'O', followed by 3 digits (Exp: O001).
	Transaction ID	App	String	Must be unique and start with 'T', followed by 3 digits (Exp: T001).
	Payment Amount	App	Numeric	Must be a positive numerical value.
	Payment Method	User (Buyer)	String	Each user must select a valid payment method such as 'Paid Online' or 'Paid by cash'
	Delivery Method	User (Buyer)	String	Must be either 'Delivery' or 'Self-Pickup'
Image Assets and CV Outputs	Image ID	App	String	Must be unique for each image and start with 'I', followed by 3 digits (Exp: I001).
	Freshness Score	AI	Numeric	Must be integer between 0-100

		system		and generated by CV model.
AI and Analytics Data	Food Saved (kg)	App	Numeric	Must be a positive value with 2 decimal places
	CO2 Estimate (kg)	App	Numeric	Must be a positive integer.
	Meals Donated	App	Numeric	Must be a positive integer.
	GreenPoints Earned	App	Numeric	Must be a positive integer.
	GreenPoints Redeemed	App	Numeric	Must be a positive integer.
	Sustainability Score	App	Numeric	Overall score must be integer between 0-100.

8.0 Prototype and User Interface Design (UID)

8.1 Overview of Prototype

Replate's application has been thoughtfully designed, with Jacob Neilson's 10 Usability Design Principles as its foundation. *Figure 28* displays the overview of the low-fidelity alpha prototype for Replate's mobile application.

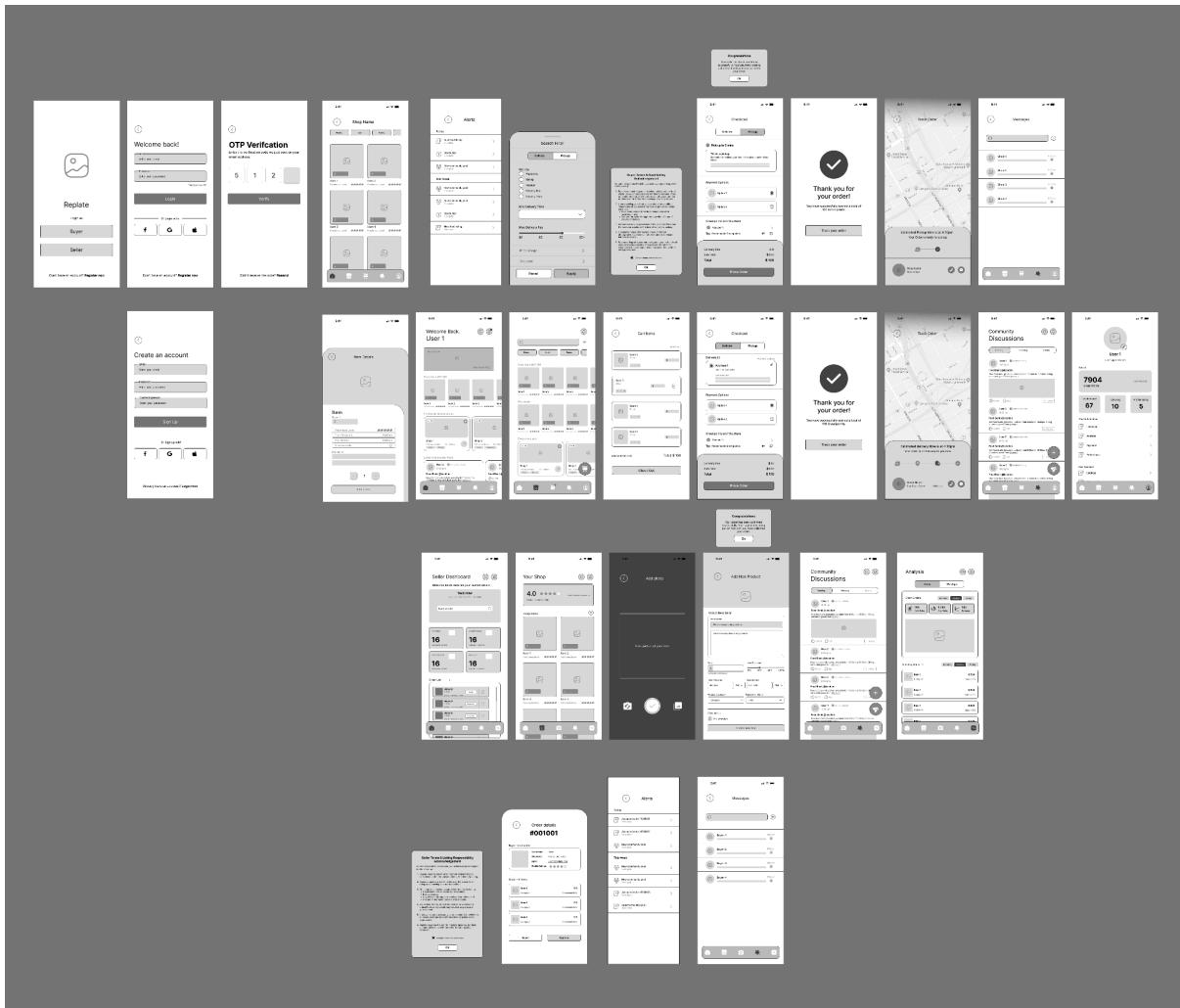


Figure 28. Overview Prototype of Replate

8.2 Jacob's Nielson's Heuristics

Jacob Nielson's Usability Design Principles, also known as heuristics, help interface designers improve and evaluate the usability of their digital products. Following these heuristics makes Replate's interface easy to navigate and explore while maintaining its aesthetic and functionality. (Nielsen, 2024) This section analyses the 5 heuristics chosen and its corresponding functionality within Replate.

8.2.1 Visibility of System Status

One of the first design principles Jacob mentioned was the visibility of system status, which essentially means that when you click a button there should be some sort of indicator or feedback that you have clicked on that button (Nielsen, 2024). As a result, in Replate's interface, specifically in our add to cart function and notification system, the number of items and unread alerts that the user may have are updated in real time, allowing users to plan their next course of action almost instantly. The figure below displays the real time cart and notification updating interface Replate implements.

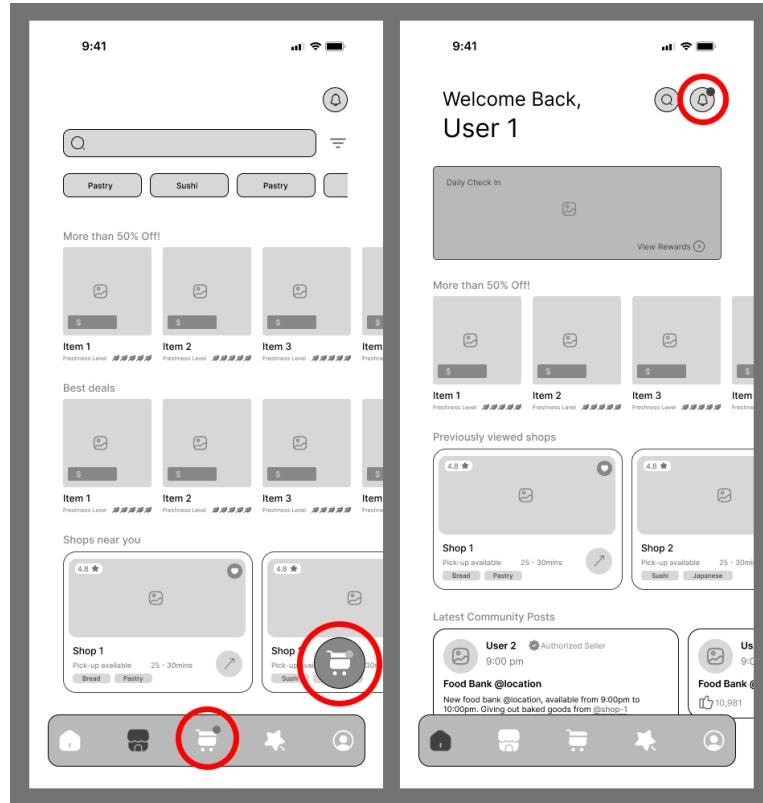


Figure 29. Real Time Cart and Notification Interface

8.2.2 Match Between the System and the Real World

The second heuristic, *Match Between the System and the Real World*, encourages designers to use familiar terminology, concepts and symbols that users already understand and are familiar with (Nielsen, 2024). Therefore, Replate's interface incorporates icons that users are already familiar with, as shown in *Figure 30*, our buyer's footer: a house, shop, cart, community and profile.



Figure 30. Buyer's Footer Interface

8.2.3 User Control and Freedom

This heuristic focuses on the ability for users to undo or correct their actions, so that they never feel constrained or trapped by the system. (Nielsen, 2024) Replate includes numerous previous buttons so that users are never stuck on one screen.

8.2.4 Aesthetic and Minimalist Design

This fourth heuristic emphasises minimalist design, which discourages clutter and excessive information or controls because they overwhelm users. (Nielsen, 2024) Therefore, Replate's login, signup, and checkout pages contain only the most important information for users, as shown in the figures below.

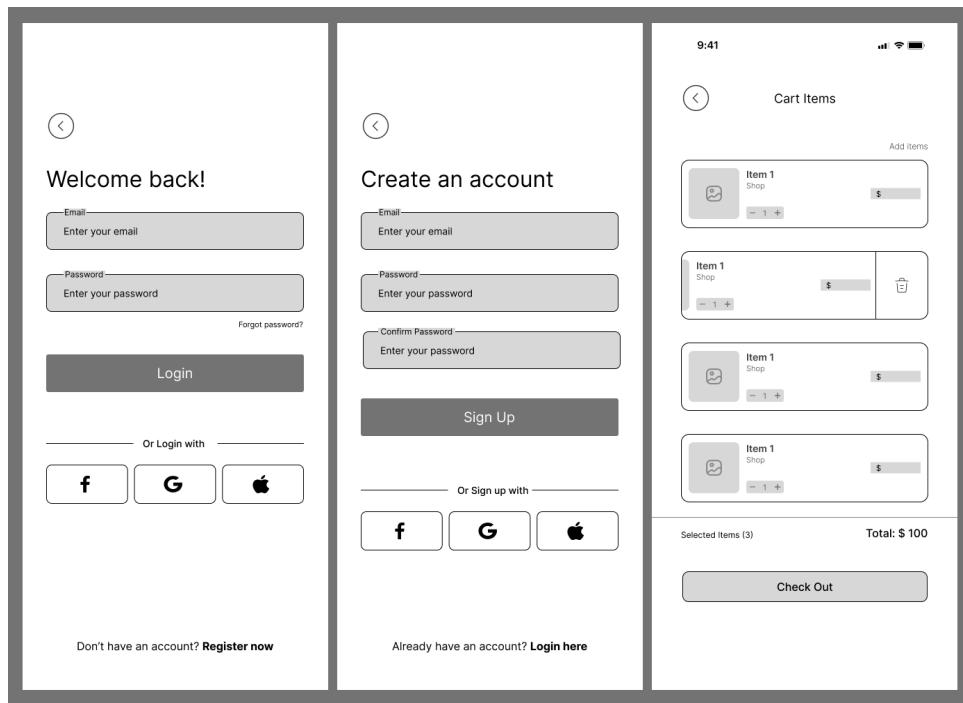


Figure 31. Login, Sign up and Cart Interface

8.2.5 Help Users Recognize, Diagnose, and Recover from Errors

Lastly, this principle enables users to quickly resolve errors by providing clear and helpful guidance. (Nielsen, 2024) Replate demonstrates this through its login system which includes a “forgot password” feature that allows users to change their password to one they can remember.

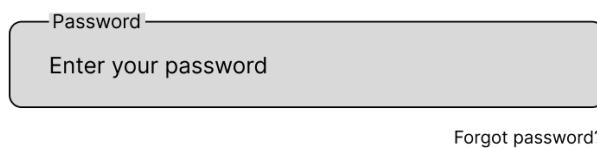


Figure 32. Forgot Password Feature

8.3 Application Explanation

This section introduces Replate's low-fidelity interfaces and key features and each interface will be demonstrated with a screenshot and a description of its purpose and functionality.

8.3.1 User Login Interface

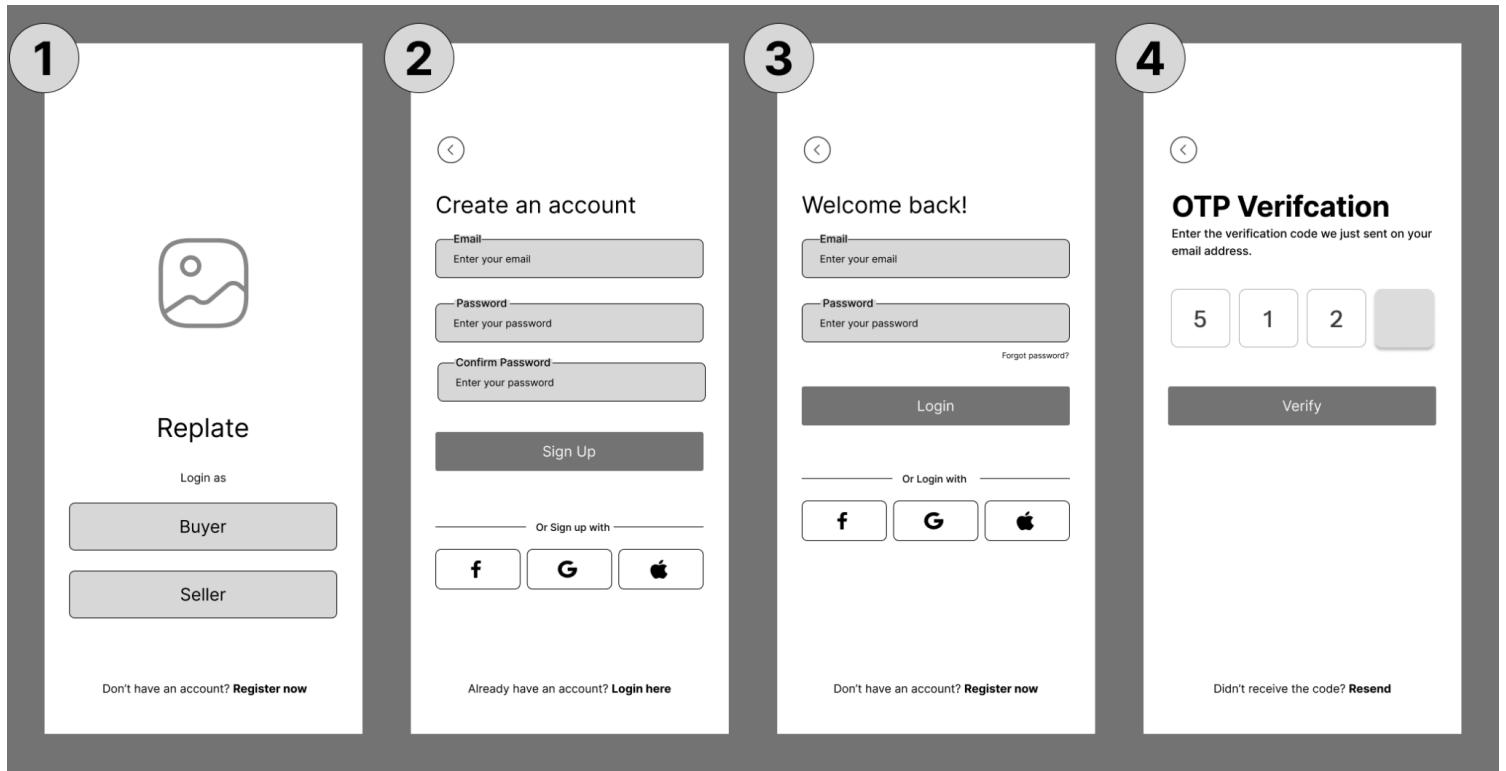


Figure 33. User Login Interface

Users can choose their role by selecting a buyer or seller option. Upon selection, the users will be directed to the registration page to fill in their email and password, or choose to register using a third-party sign-up option. However, if the user already has an account, they can click the “Login Here” button on the bottom of the page. Upon entering their credentials, if the user forgets their password, they can reset it using the “Forgot Password” button. Finally, after clicking the “Login” button users are required to complete an OTP verification by entering a four-digit code sent to their email or phone to confirm their identity before accessing the app.

8.3.2 Buyer Terms & Food Safety Acknowledgement

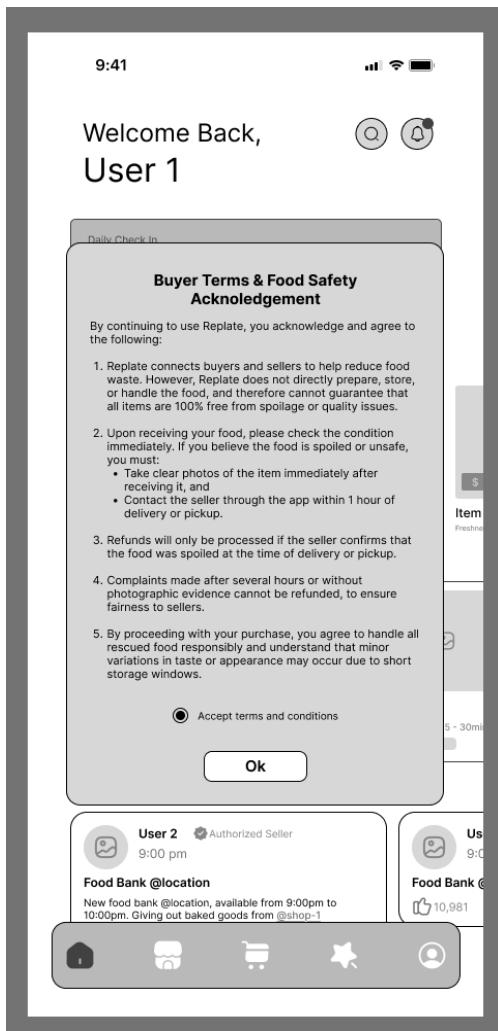


Figure 34. Buyer Notice Interface

Before exploring the app, buyers will have to accept the terms and conditions regarding food safety and responsible consumption. Once they have agreed, they can proceed by clicking the “OK” button.

8.3.3 Buyer Home Page

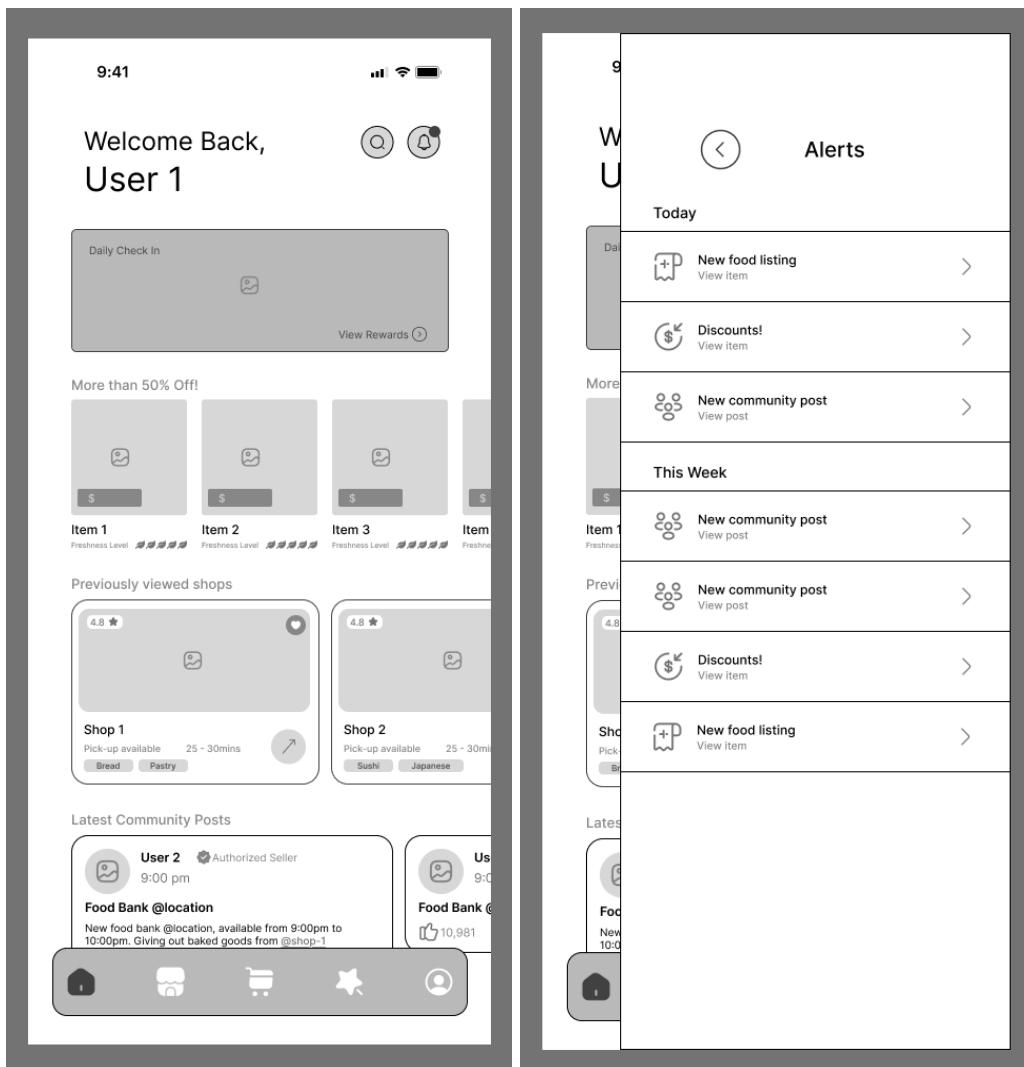


Figure 35. Buyer Homepage and Notifications Interface

The *Buyer Homepage Interface* displays the main overview of the Replate app. In this page, buyers can view their:

- Daily check-in rewards.
- Explore the best deals of the day.
- Revisit previously visited shops.
- View the latest community posts.

The notification icon located at the top right corner notifies users of new food listings from following shops, new discounts, and recent community updates.

8.3.4 Item Details Page

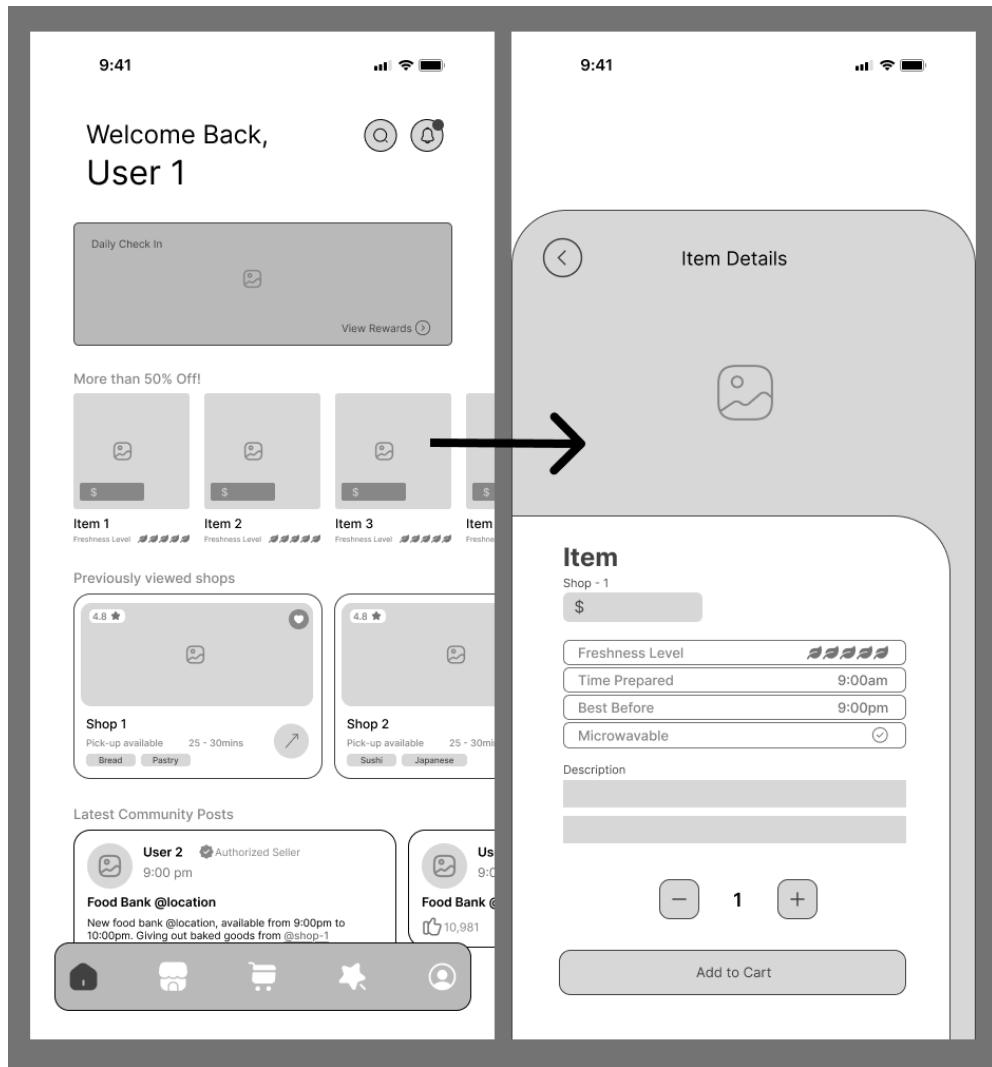


Figure 36. Item Description Interface

Whenever the buyer clicks on an item, they get directed to the *Item Details Page* which they can view the item's:

- Shop name.
- Price.
- Freshness level.
- Time prepared.
- Best before date.
- Microwavable status.
- A short description.

On the bottom of the screen, users can adjust the quantity of the item using the plus or minus buttons and add the items into their cart by clicking the “Add to Cart” button.

8.3.5 Shop Details Page

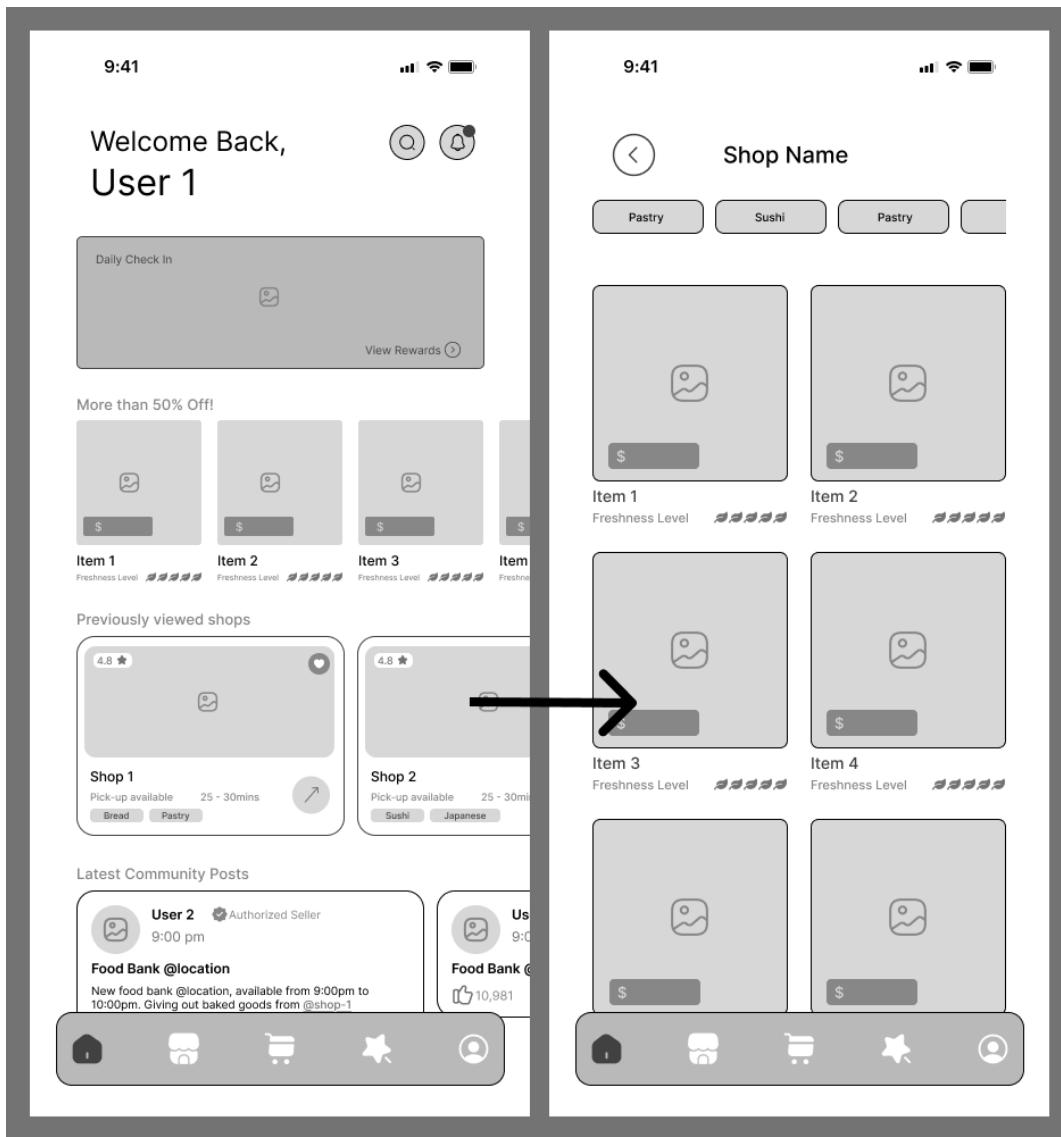


Figure 37. Shop Details Interface

If a buyer clicks on a shop item, they will be taken to the shop's details page, where they can browse the menu using category filters.

8.3.6 Shop Page

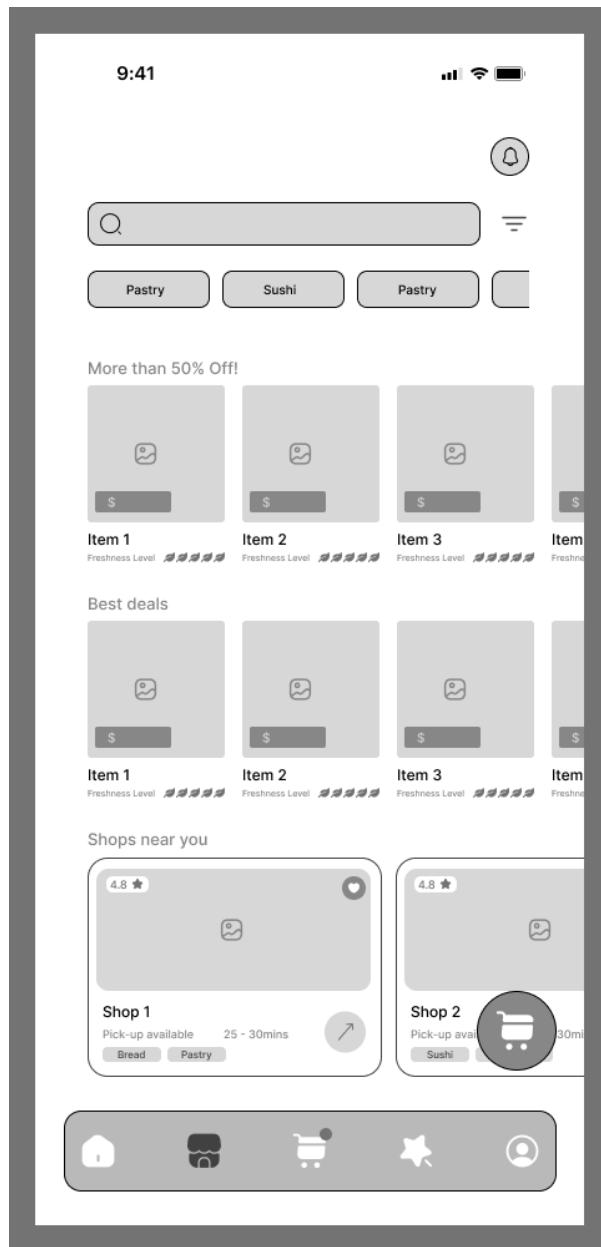


Figure 38. Shop Interface

The Shop Page allows users to browse the various stores and items available on Replate. A search bar at the top allows users to easily find specific shops or food items.

8.3.7 Search Filter Page

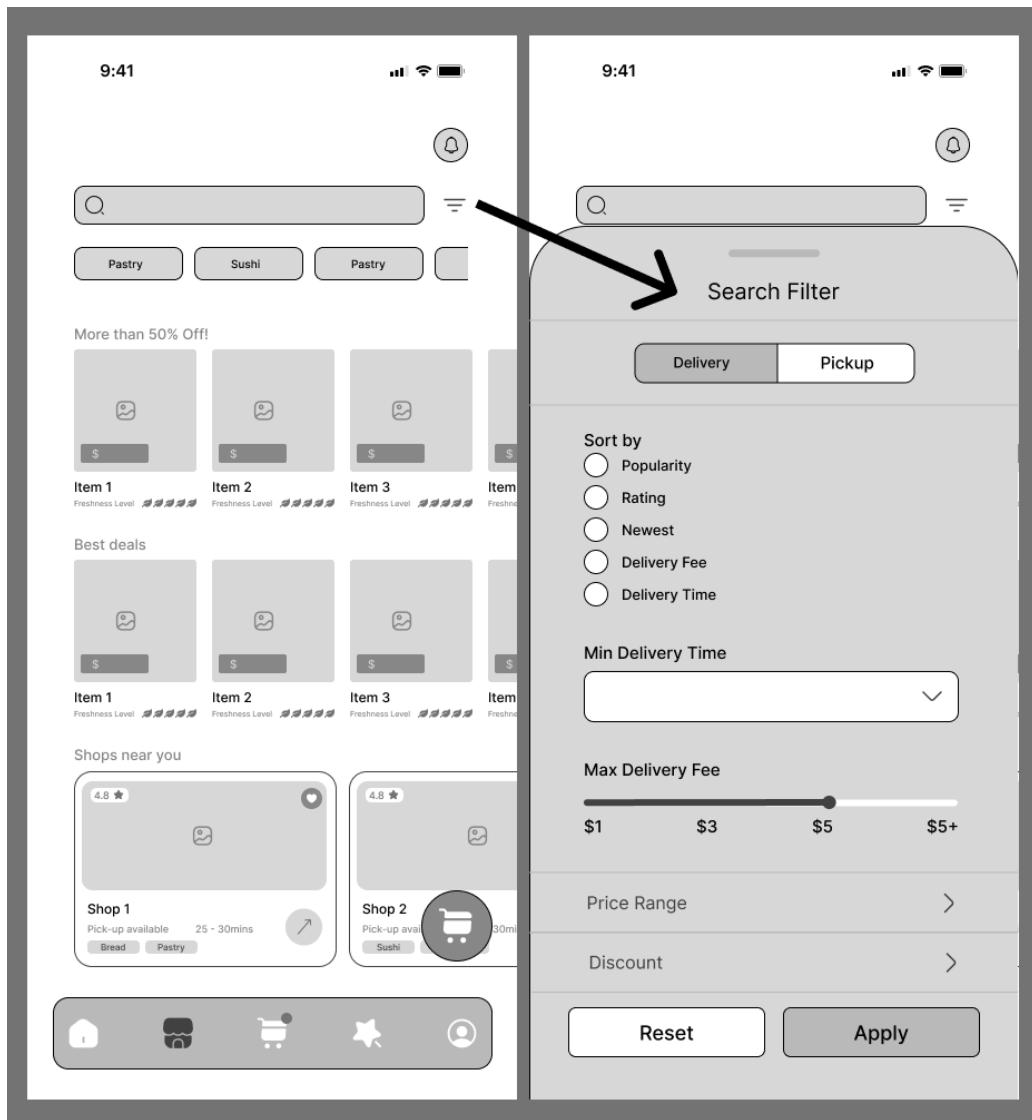


Figure 39. Shop Filter Interface

The *Search Filter* provides users with multiple options to narrow down their search. Buyers can sort by:

- Delivery or pickup.
- Popularity.
- Rating.
- Newest.
- Delivery fee.
- Delivery time.

Buyers can set their preferred minimum delivery time, maximum delivery fee, price range, and discount percentage to find shops that meet their needs more efficiently.

8.3.8 Add to Cart Page

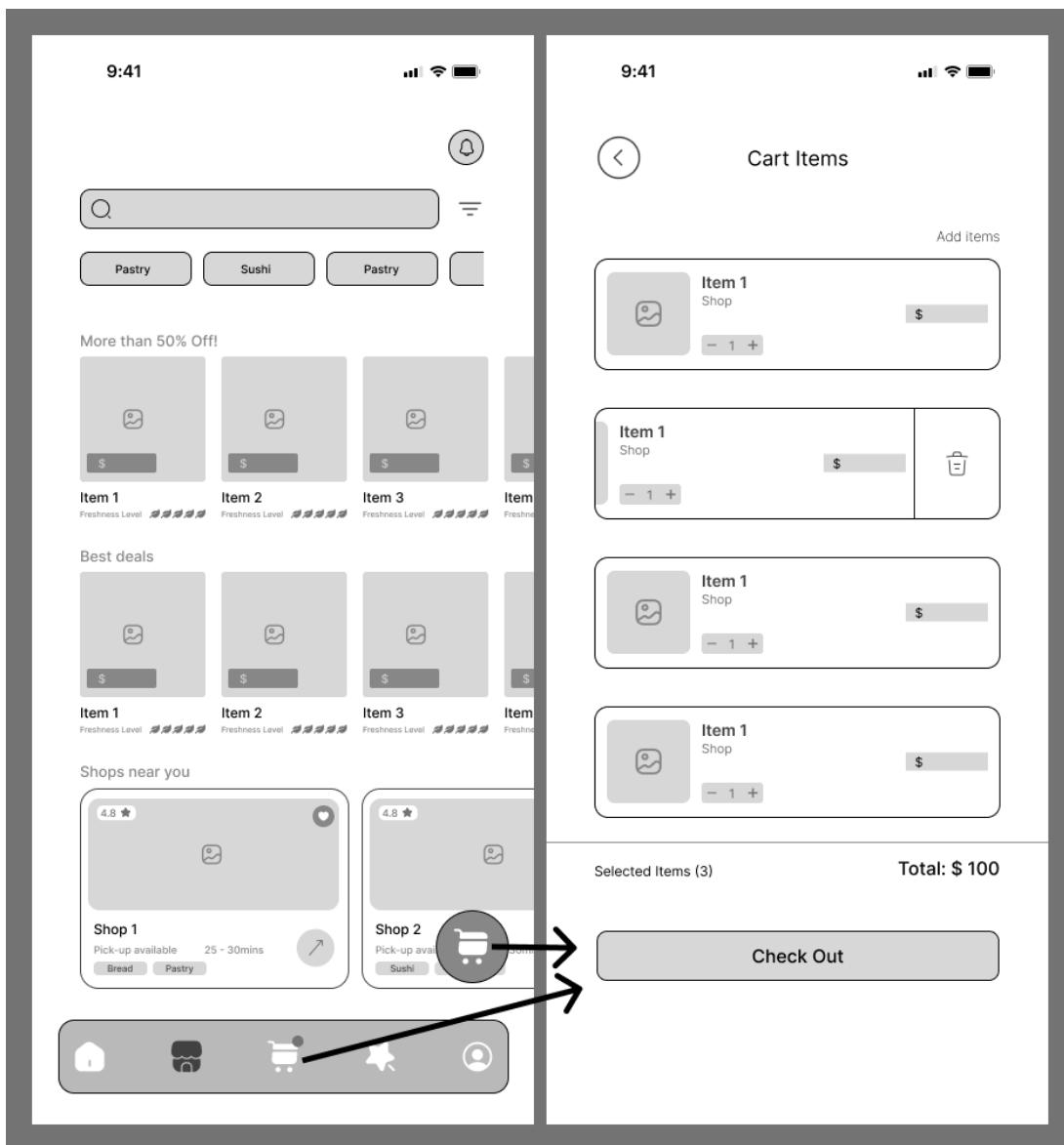


Figure 40. Add to Cart Interface

To view their cart, users can click the cart icon on the shop page or the navigation bar on the bottom. In their cart, users can manage their items by swiping left to delete them or adding more. Users can also confirm the total price of items, and once buyers are done reviewing their cart, they can click the “Check Out” button to check out their items.

8.3.9 Checkout Page

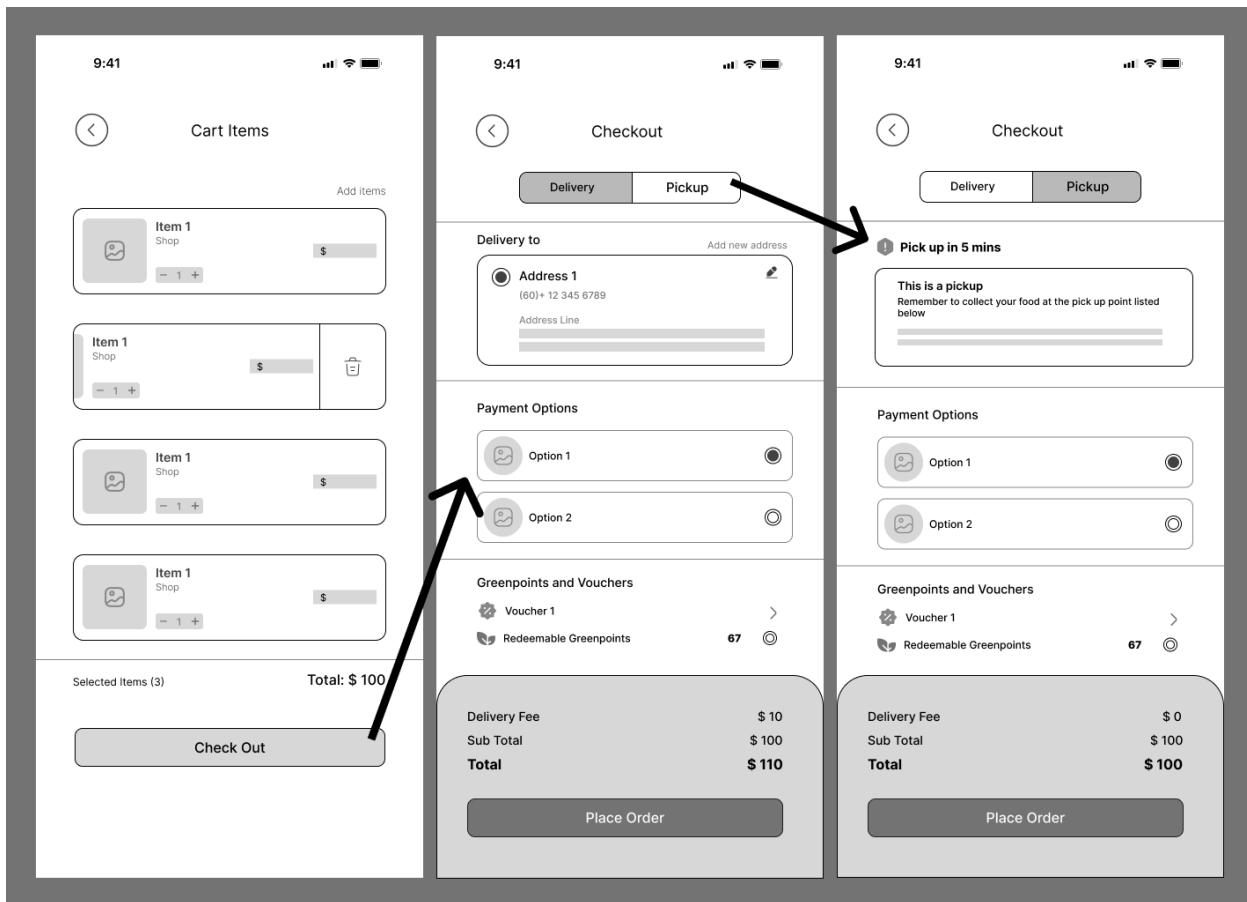


Figure 41. Checkout Interface

When users click checkout, they will be given the option of ordering delivery or pickup. If they select delivery, users can manage their address (add or edit address), whereas if they select pickup, a notification will appear informing the user of the pickup time and address.

This page also allows users to manage their:

- Payment Options.
- Greenpoints and Vouchers.

8.3.10 Checkout Notice Page

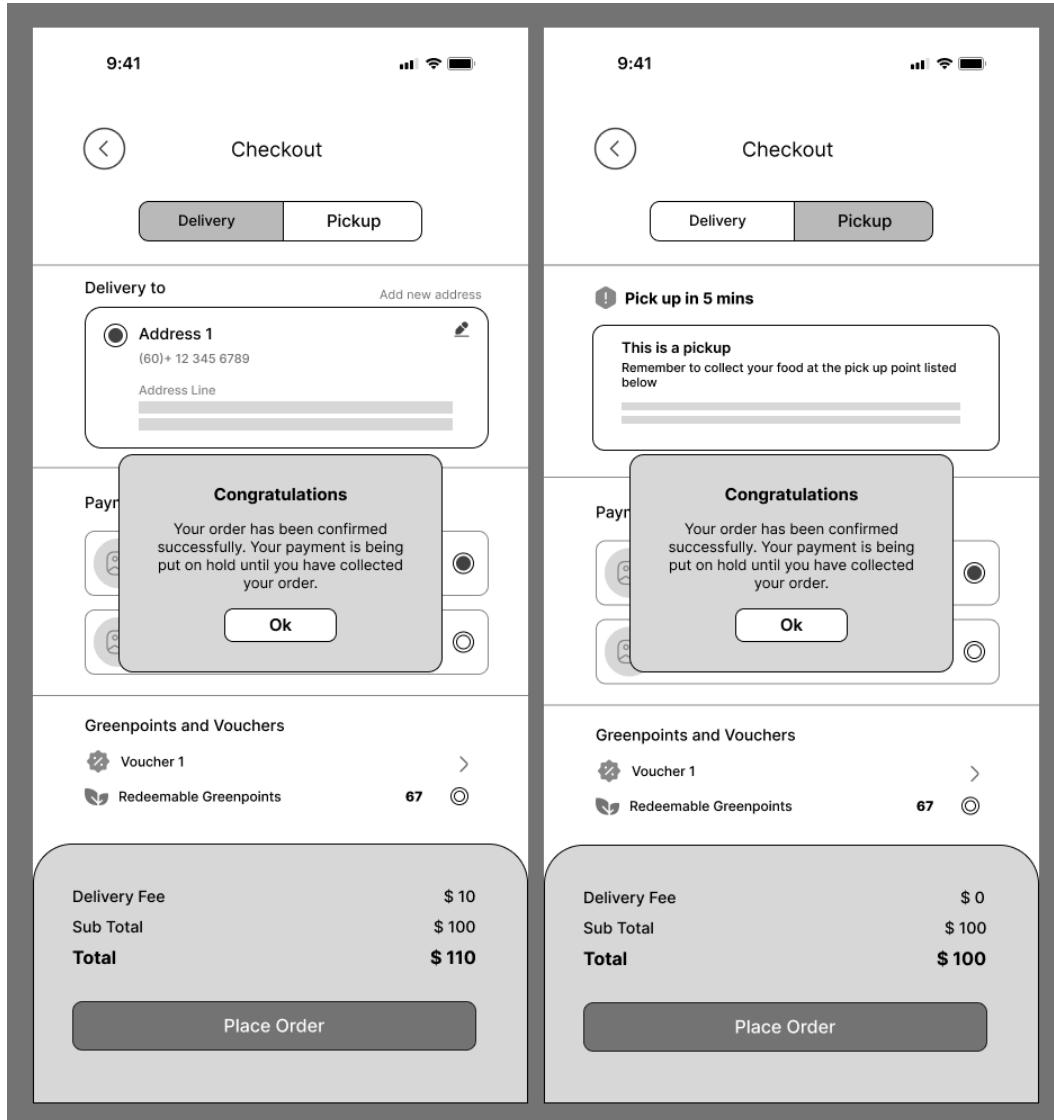


Figure 42. Checkout Notice Interface

When buyers click “Place Order”, an alert will appear to notify users that their order has been confirmed and their payment will be put on hold until they have collected their order.

8.3.11 Order Confirmation and Tracking Page (For Delivery)

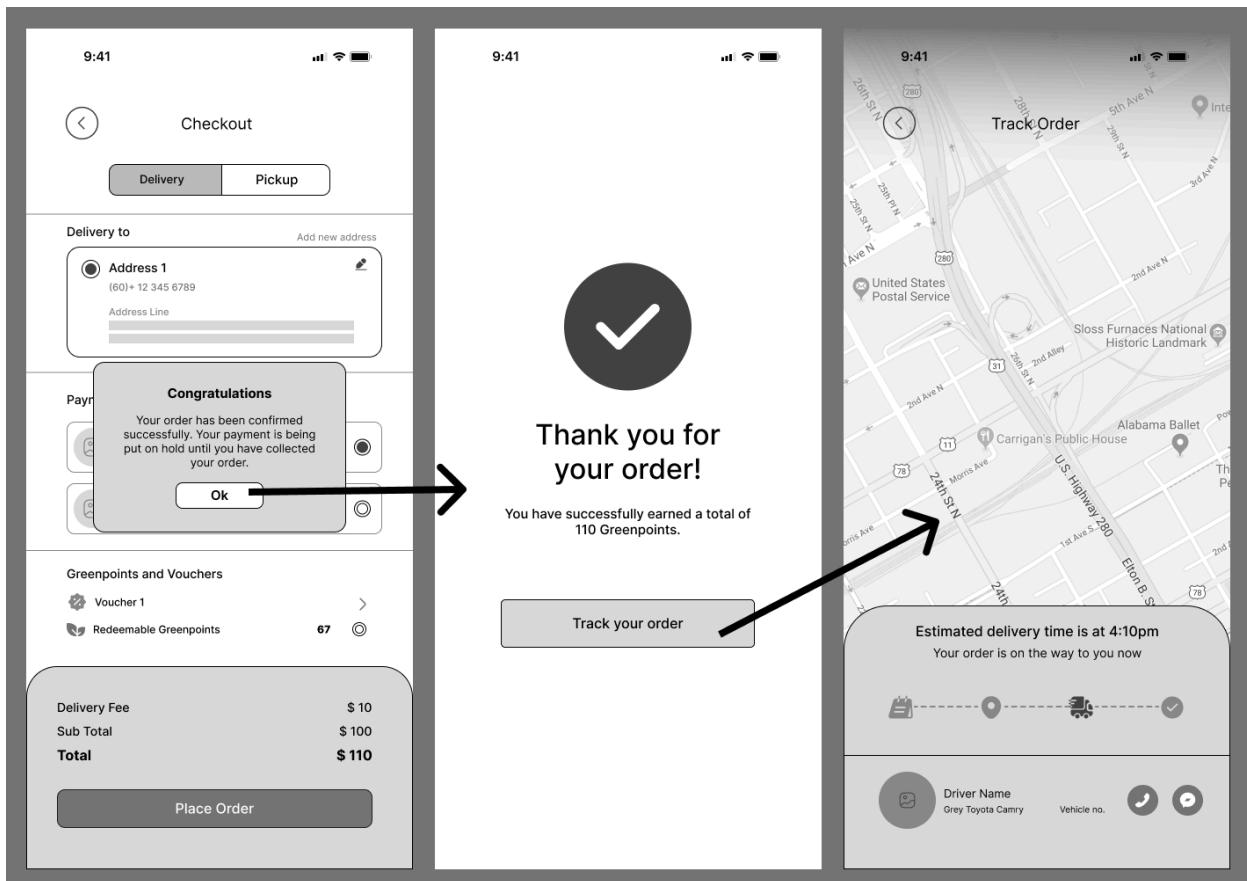


Figure 43. Order Confirmation & Tracking Interface for Delivery

Once the user clicks “OK”, they will be informed how many Greenpoints they earned from the order and they can track their order by clicking on the “Track your order” button. The user will be led to to a Track Order interface which displays:

- A live map that shows the delivery driver location.
- Estimated time of arrival.
- Driver contact information.

8.3.12 Order Confirmation and Tracking Page (For Pickup)

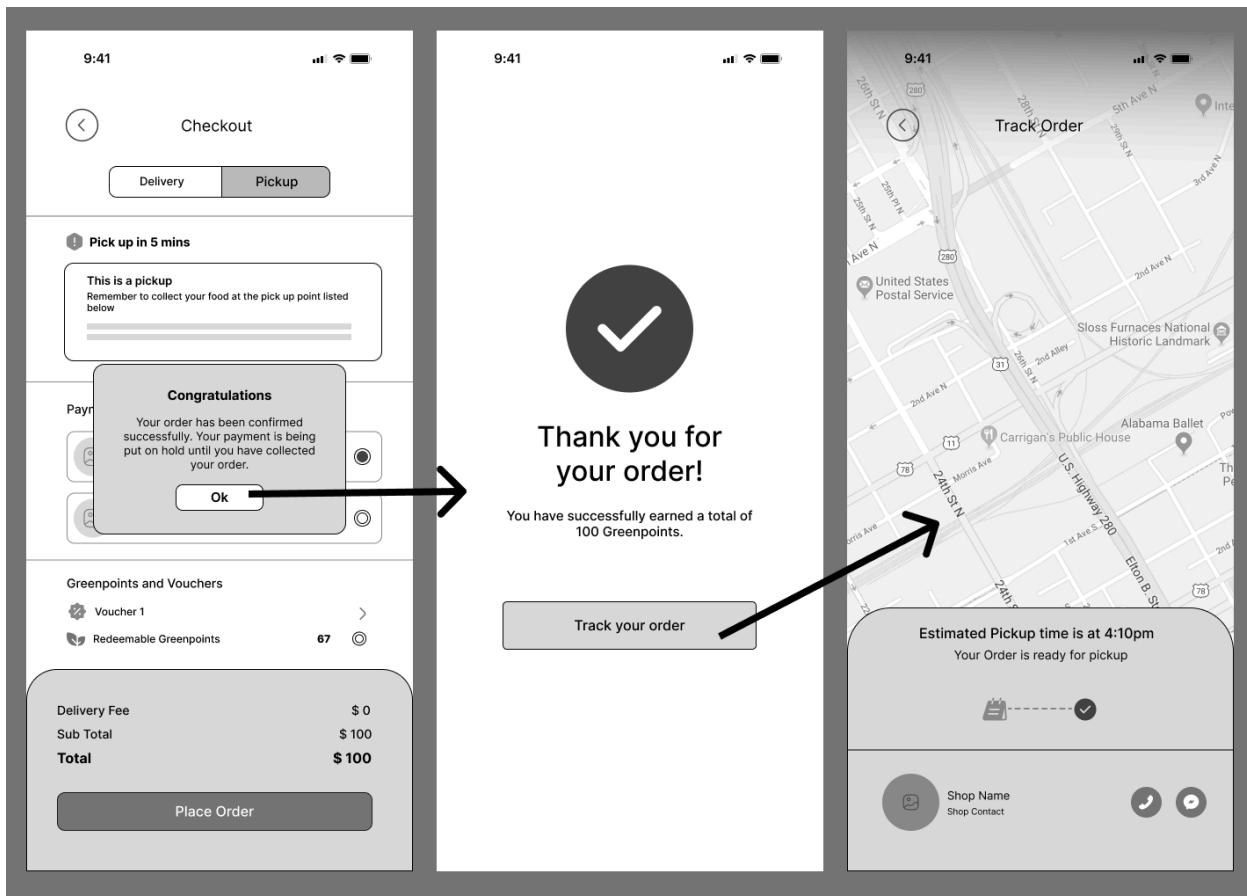


Figure 44. Order Confirmation & Tracking Interface for Pickup

Once the user clicks “OK”, they will be informed how many Greenpoints they earned from the order and they can track their order by clicking on the “Track your order” button. The user will be led to a Track Order interface which displays:

- A live map that shows the pickup location.
- Estimated time of pickup.
- Shop contact information.

8.3.13 Buyer Community

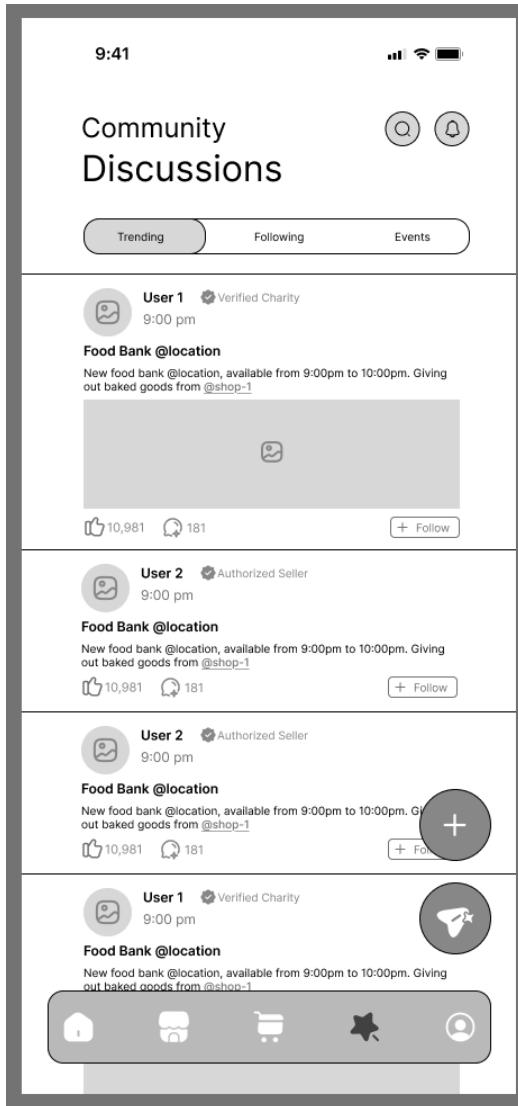


Figure 45. Buyer Community Interface

Through the *Buyer Community Page*, buyers can view

- Recent trending posts.
- Latest user updates from other users they are following.
- Upcoming community events.

At the bottom right of the screen, there are two buttons that allow users to either create a post or send a message, which encourages engagement in the community and interaction between buyers and sellers.

8.3.14 Buyer Messages Page

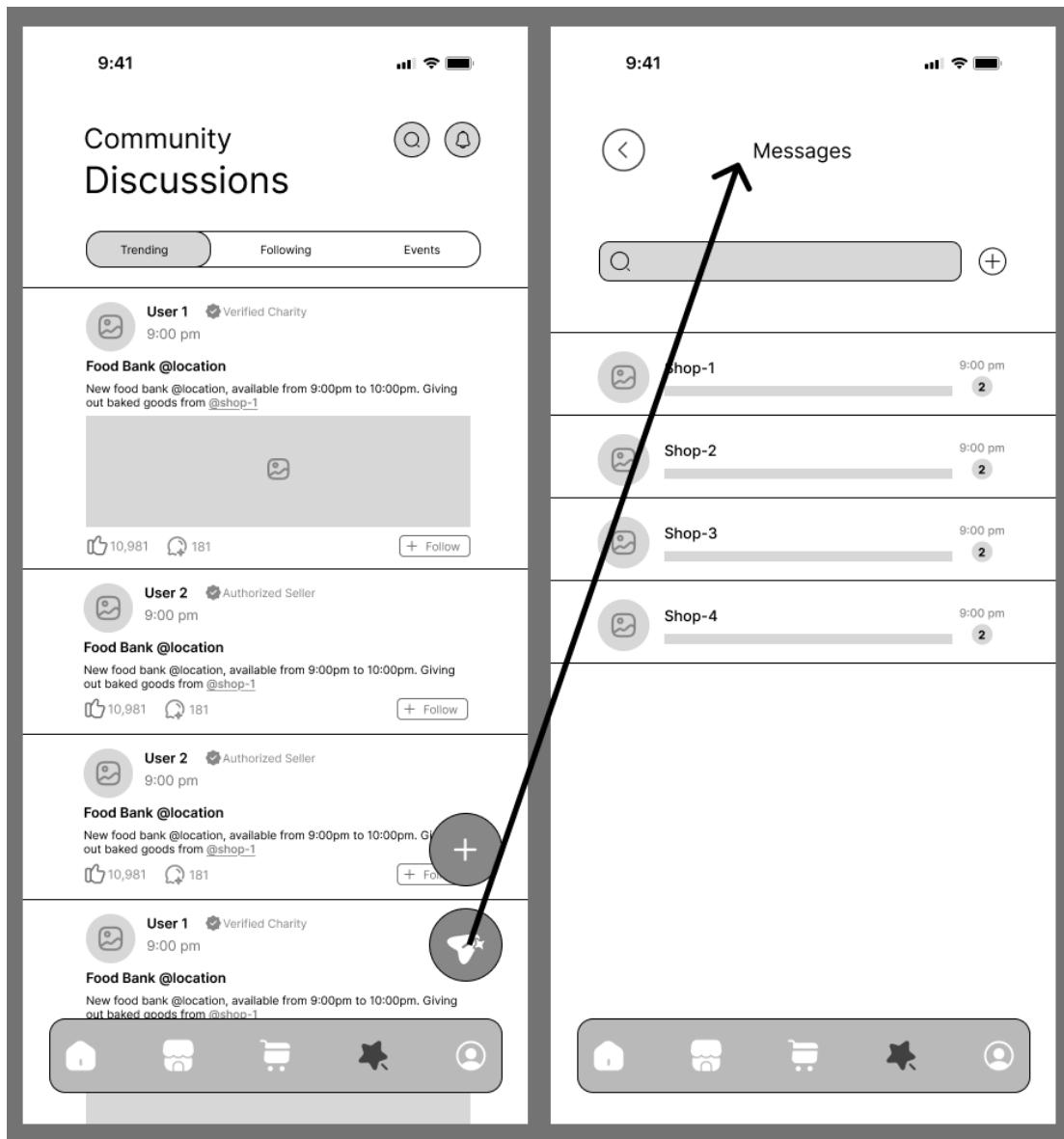


Figure 46. Buyer Messages Interface

From the community page, or via the message icon, buyers can access the *Buyer Messages Page* where the buyer can:

- Search for a shop.
- Create a new message.
- Continue a previous chat.

8.3.15 Buyer Profile Page

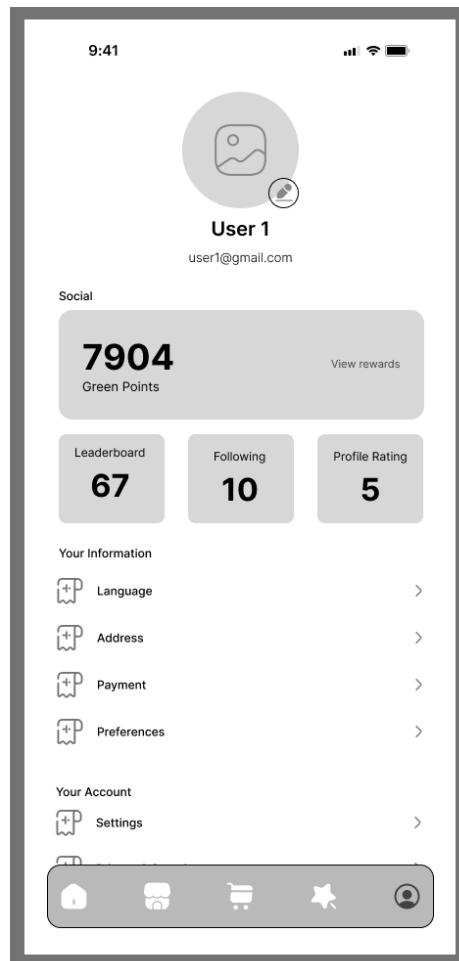


Figure 47. Buyer Profile Interface

Buyers can view their profile in the *Buyer Profile page* which displays user's:

- Total GreenPoints.
- Rewards.
- Leaderboard status.
- Accounts followed.
- Profile rating.

In this page buyers are able to manage their:

- Language settings.
- Addresses.
- Payment methods.
- Food preferences.
- Types of discounts.

In order to customize what they see in their shop page.

8.3.16 Seller Notice and Homepage

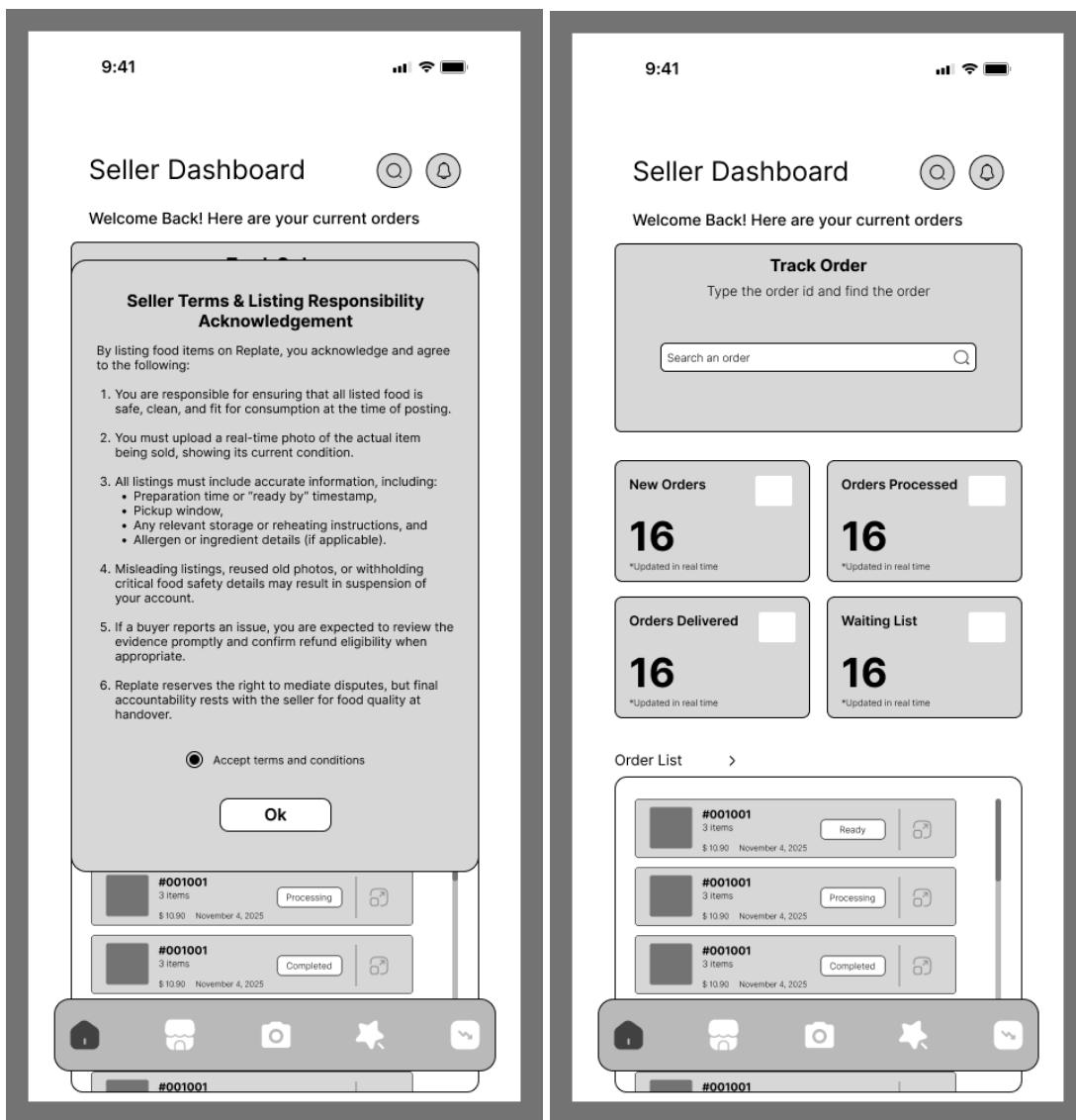


Figure 48. Seller Notice & Homepage Interface

Sellers must review and accept the terms and conditions prior to accessing the *Seller Homepage*. Once in the *Seller Homepage*, sellers will be able to see and manage all orders, through an order management system that categorizes all orders into new, upcoming, and processed sections. This page is designed to help sellers manage and monitor their business activities accurately and efficiently in real time.

8.3.17 Seller Notifications Page

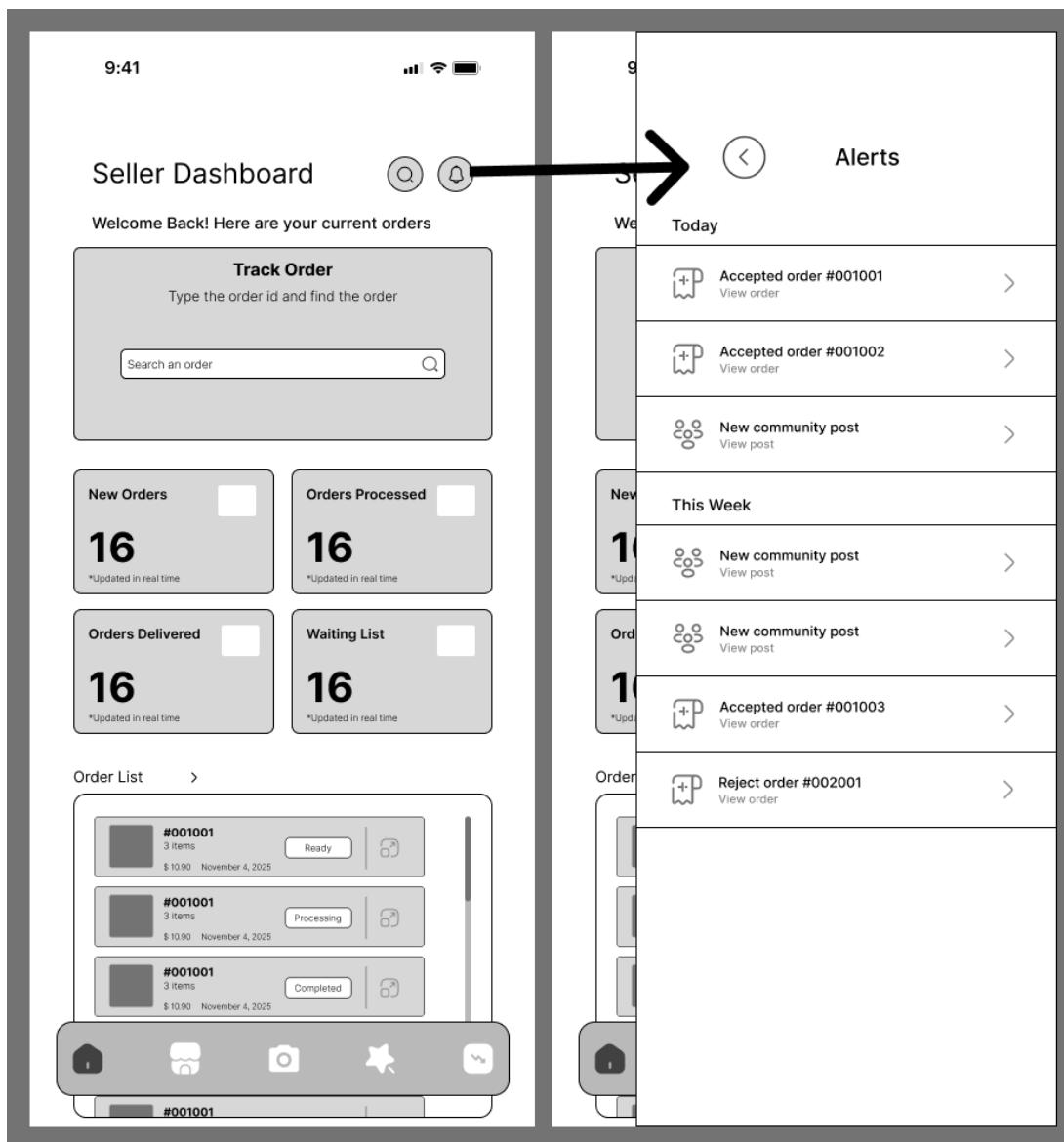


Figure 49. Seller Notifications Interface

Sellers can see their notifications and alerts by clicking on the bell icon on the upper right hand corner of the screen. This contains the order acceptances or rejections, purchasing requests, and the emergence of new posts within the community. This feature will keep the sellers updated and alert to the actions of the customers.

8.3.18 Seller Order Management (Approve/Reject Orders)

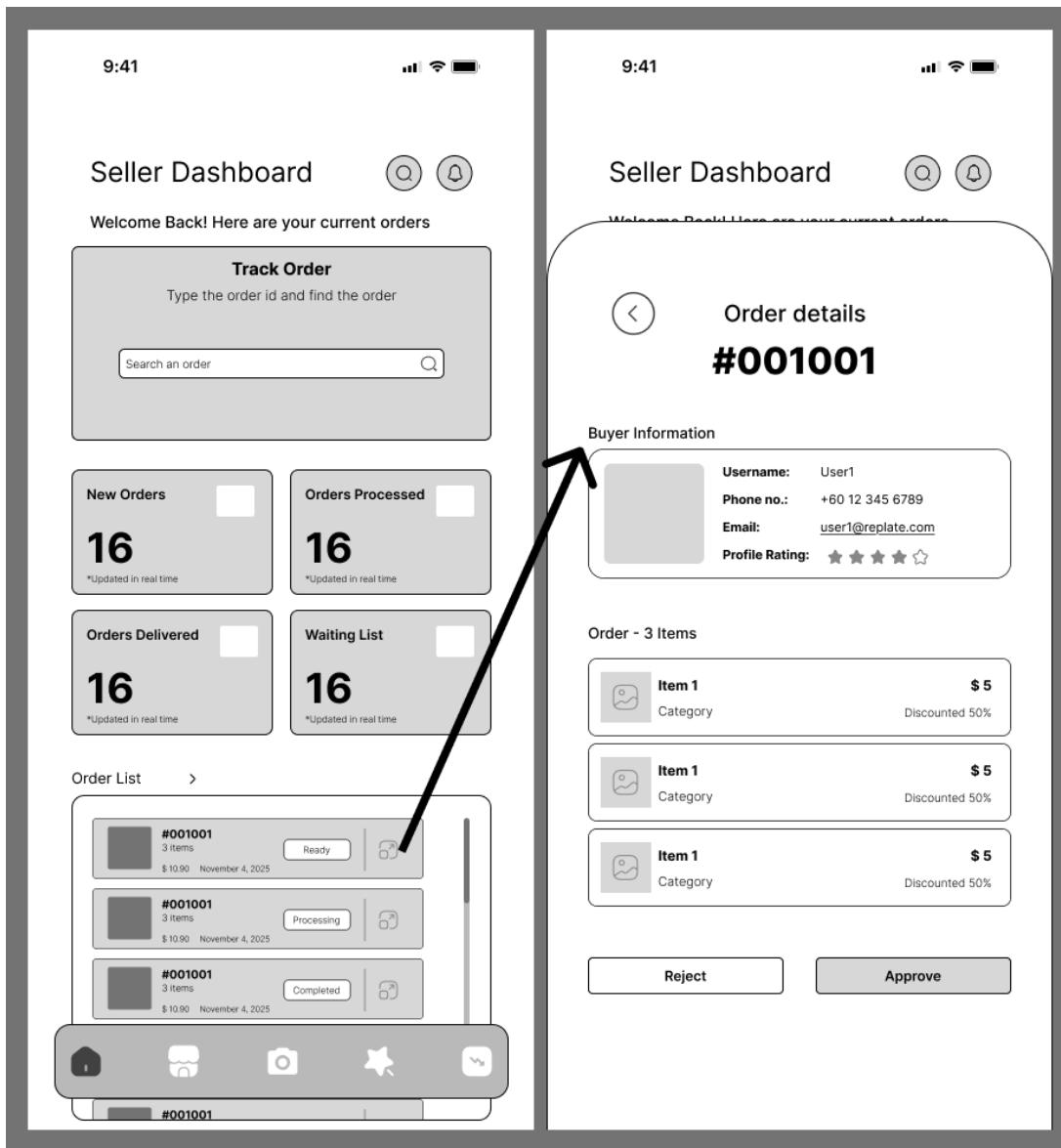


Figure 50. Seller Order Management Interface

When a seller clicks an order from the *Order List*, an *Order Detail Popup* appears displaying:

- Buyer information.
- Order information.
- Buyer profile rating.

This allows the seller to approve or reject the order and sustains order integrity and helps sellers maintain quality of service.

8.3.19 Seller Shop Page

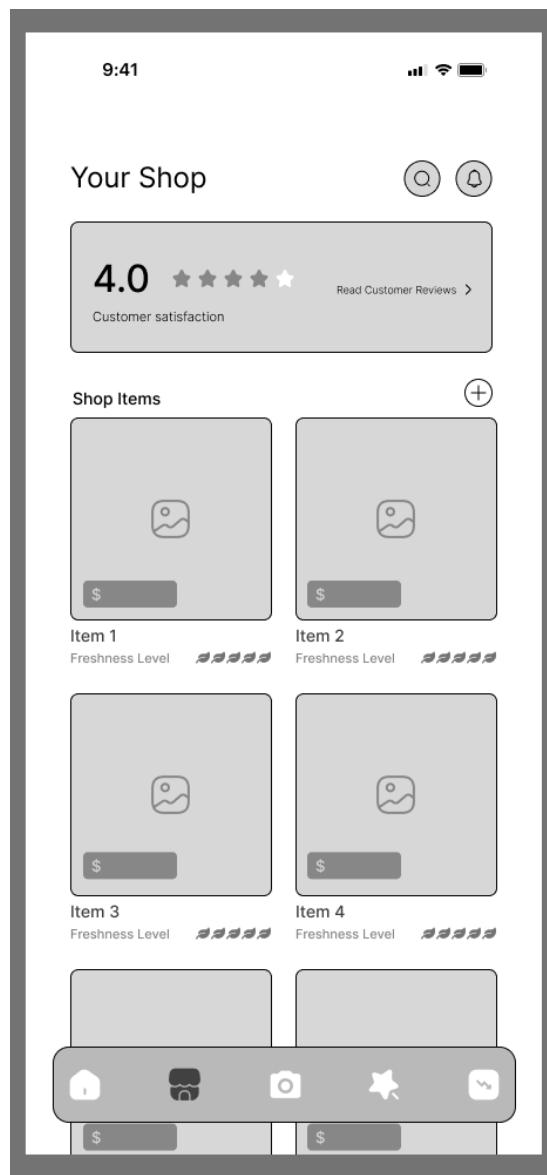


Figure 51. Seller Shop Interface

Seller Shop Page gives the sellers the ability to control their shop and food listings. Sellers will be able to see:

- The overall rating.
- Customer feedback.
- Menu of their shop.

This page will serve as the main point where the sellers keep track of the performance and reputation of their shop.

8.3.20 Seller Menu Management – Adding an Item

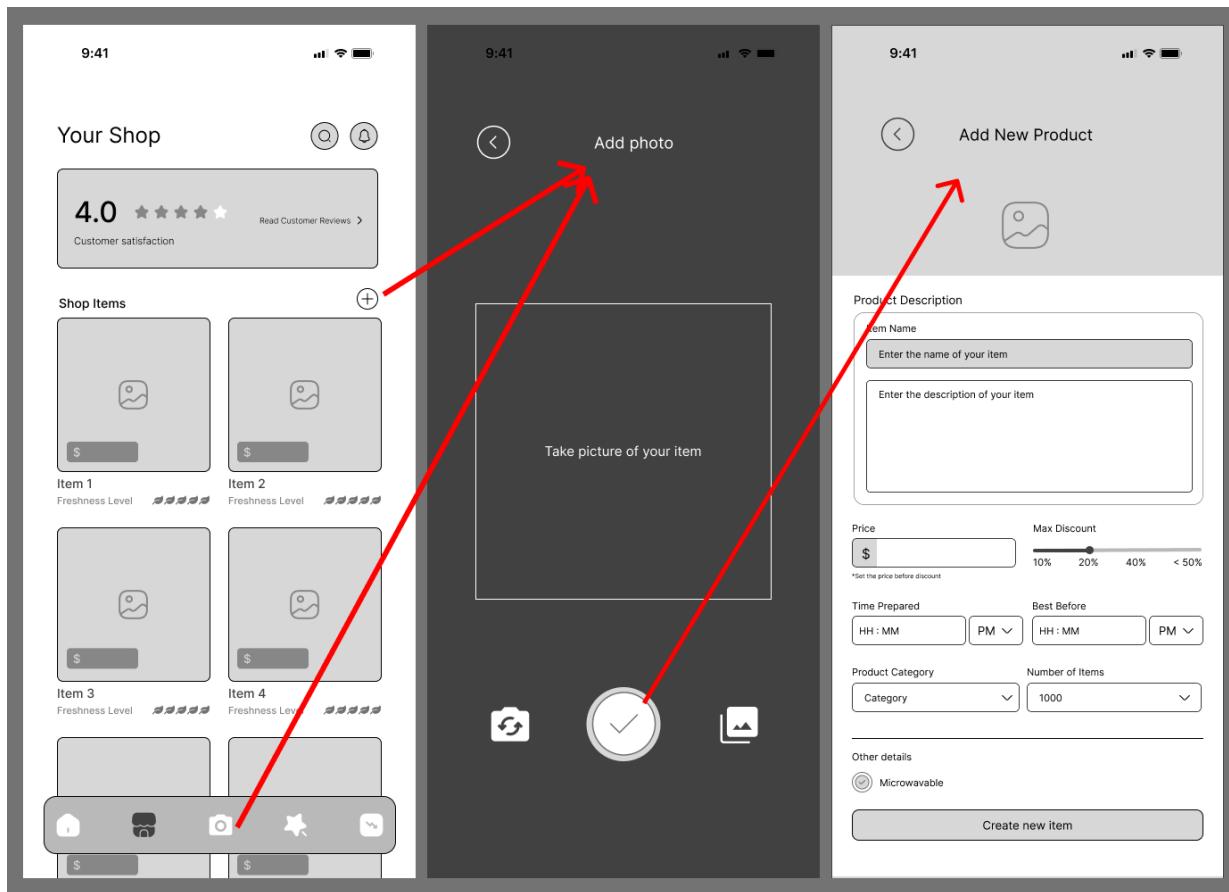


Figure 52. Seller Menu Management Interface

In order to add a menu item, sellers can either click the photo icon on the footer menu or the plus to add (+) sign on the shop page. This will open a camera feature where sellers have to take a picture of their selling food. After taking the food photo, the Artificial Intelligent (AI) system of Replate automatically determines the level of freshness of the food based on the photo taken.

Then, Sellers have to fill in item name, description, price (before discount), maximum discount allowed, time prepared, best before time, product category, quantity available, and whether the item is microwavable. This information is very important and this process simplifies item management while ensuring accuracy and consistency.

8.3.21 Seller Community and Messages Page

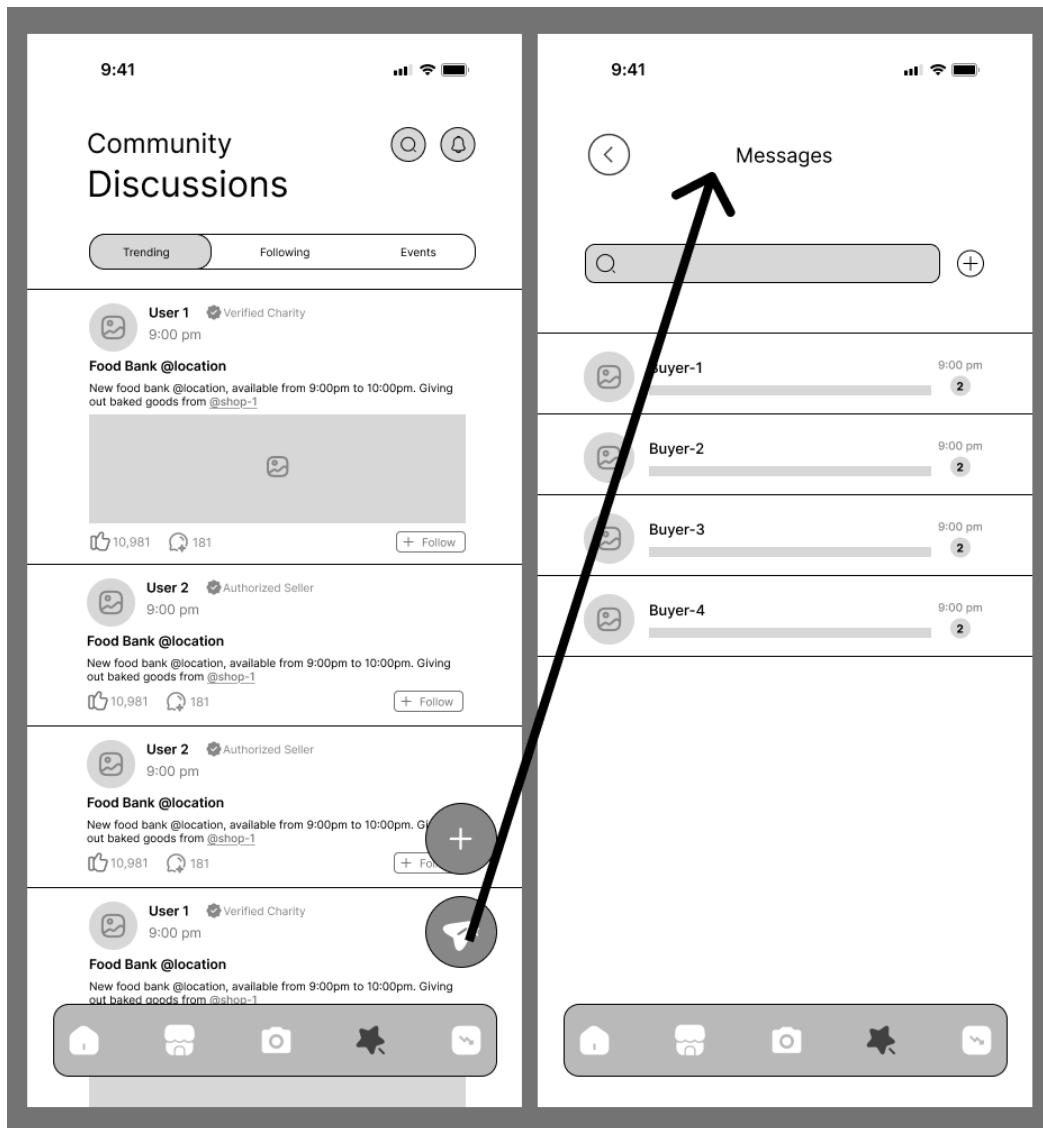


Figure 53. Seller Community & Messages Interface

The *Seller Community Page* functions similarly to the buyer's community but focuses on seller interactions with buyers. Sellers can view posts, share updates, and access the message section to contact buyers directly. However, sellers are not able to message other shops. This maintains professionalism and promotes buyer–seller communication.

8.3.22 Seller Analysis Page

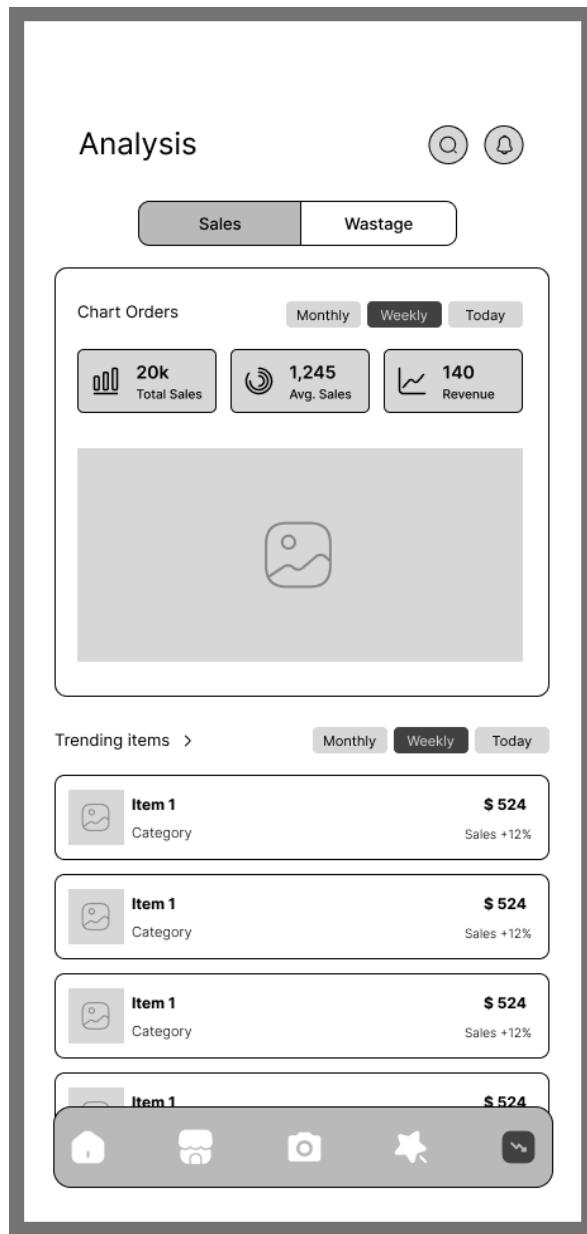


Figure 54. Seller Analysis Interface

The *Seller Analysis Page* provides valuable insights into the seller's business performance through two key dashboards:

- Sales Analysis
- Food Wastage Analysis.

Using Replate's AI-powered analytics, sellers can view data trends, monitor their performance, and identify areas for improvement. This feature supports better decision-making and helps sellers enhance sustainability practices.

9.0 Conclusion and Future Enhancement

9.1 Conclusion

In conclusion, Replate is a very practical and eco-friendly solution to one of the greatest issues the world is facing today, which is food waste. The initiative combines corporate social responsibility with technology to solve problems in the food redistribution sector and support the Sustainable Development Goal 12 (SDG 12) of Responsible Consumption and Production. Through its online platform, Replate successfully brings together the sellers, consumers, and charities into a unified ecosystem where the excess food is either sold or donated safely instead of being thrown away.

The platform has the dual advantage of not only cutting down food waste but also creating financial and social value by providing reasonably priced meals and strengthening the community networks. By promoting the partnerships of all parties involved in food production and consumption, Replate is able to shift the focus from sustainability being a mere theoretical goal to it being a realistic and significant everyday practice. In addition, the company has proved that the advanced technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain can be used responsibly in food redistribution, resulting in greater transparency, safety, and trust throughout the system.

In a nutshell, Replate is the living proof that technology can be a win-win for both the environment and humanity. It allows communities to adopt responsible practices, reduces the food industry's carbon footprint, and at the same time treats edible food as a valuable shared resource instead of letting it go to waste.

9.2 Future Enhancement

In the future, Replate is well-positioned for scalability and further technological enhancement in order to maximize its impact and scope. The team intends on developing the platform in a number of strategic areas in order to make it more intelligent, efficient, and accessible to a broader audience.

A key direction of the future developments involves enhancing the Artificial Intelligence aspect to include advanced predictive analytics functionality that can forecast the surplus quantities on a daily basis and provide real-time pricing optimization for item surplus goods. This new capability would assist sellers in not having to rely solely on history, giving sellers a more accurate picture of demand and reducing waste before it happens. Machine Learning algorithms can also be developed to analyze user behavior and make personalized suggestions to users about food choices and giving opportunities in order to increase user engagement.

Another key enhancement will involve scaling the Internet of Things sensors to continuously monitor and assess the temperature, freshness, and handling of food products while they are in storage and transit. This feature will not only provide another layer of assurance for food safety but will also allow the system to verify and record confirmed temperature and freshness for purchasing and charitable partners.

Replate also explores partnerships with local governments, educational institutions, and non-profits organizations to improve the giving network to enhance nationwide adoption. Working with these organizations will also provide additional support for sustainability goals in Malaysia while amplifying the social impact of this project.

In addition, utilizing Cloud Computing would facilitate storage of large data sets and analytics that will enable real-time feedback on food waste reduction and carbon savings. Introducing gamification and reward programs based on community participation would also build continuous user engagement and contribution to a shared cause.

In the future, Replate aims to not just be a mobile app but also a comprehensive smart food sustainability ecosystem connecting producers, distributors, retailers, and consumers on a single platform. In this respect, Replate will continue fostering ongoing innovation while collaborating on its central mission to make sustainable consumption and production a global norm that benefits people, businesses, and the planet.