

EcoBite: Reducing Food Waste Through Intelligent Management

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The Problem

Food waste is a significant global issue with severe environmental, economic, and social implications. In Australia, households, students, and catering businesses frequently experience considerable food wastage due to ineffective inventory management, poor planning, and disregard for food expiry dates. According to Hong, Jaegler, and Gergaud (2024), food waste significantly contributes to greenhouse gas emissions and economic loss, underscoring the urgent need for effective waste reduction strategies.

Research by Mathisen and Johansen (2022) reveals that students and young professionals, driven by hectic lifestyles, often neglect efficient food management, resulting in substantial wastage. Additionally, catering businesses suffer economically from inadequate inventory control, leading to unnecessary expenses and unsustainable practices. Despite growing awareness and efforts to mitigate waste, food waste remains a persistent challenge due to the lack of intuitive, accessible, and incentivized management solutions. Weichbroth (2025) further supports this claim by highlighting common usability issues in mobile applications, emphasizing the need for intuitive and user-friendly interfaces to enhance user engagement and effectiveness in reducing food waste.

The Solution

Value Proposition

EcoBite addresses food waste through a user-friendly mobile application designed to streamline food management, prevent unnecessary waste, and promote sustainable living practices. The platform offers timely expiration reminders, personalized recipe recommendations, and intelligent shopping suggestions, significantly enhancing user convenience and efficiency.

Main Functions

EcoBite integrates essential functionalities including inventory management to easily track and control food usage, expiry notifications that proactively remind users of impending food expiry, smart recipe recommendations tailored to ingredients on hand, and personalized shopping assistance to optimize purchases aligned with current inventory, collectively aiming to significantly reduce food waste.

Business Model

The EcoBite platform utilizes a freemium model where essential services such as inventory tracking and expiry notifications are free to users. Advanced services including personalized recipes and shopping assistance are subscription-based.

Additional revenue streams are generated through strategic partnerships with supermarkets and local businesses, incorporating affiliate marketing and targeted advertising to enhance profitability.

The Market

EcoBite targets a diverse and environmentally aware customer base across Australia, particularly focusing on individuals and groups that experience high levels of food waste due to lifestyle or operational inefficiencies. Key demographics include:

- **Students and Young Professionals:** Aged 18–35, technologically literate, living in urban areas, often too busy to track food inventory effectively, leading to unnecessary waste.
- **Households and Families:** Aged 30–55, typically responsible for managing household groceries. They are highly concerned with budgeting and sustainability and are often overwhelmed by daily routines that cause food to be oversighted.
- **Small to Medium-Sized Catering Businesses:** These organizations require reliable inventory management to reduce overhead costs and improve efficiency. Catering companies, small restaurants, and cafes can greatly benefit from EcoBite's predictive features.

User Personas

To better understand the needs of our target users, EcoBite has developed several representative user personas, expressed in the form of narrative stories.

One persona represents a young professional living in an urban apartment who frequently forgets about perishable items in her fridge due to a fast-paced lifestyle. After adopting EcoBite, she begins receiving timely expiry reminders and tailored recipe suggestions. Within a short period, she notices a substantial decrease in food waste and enjoys using the app's reward system to log and track food saved. Sharing her progress online, she inspires others in her network to try the app.

Another scenario describes a working couple with two children. With busy jobs and irregular meal planning, they often find themselves discarding unused groceries. Using EcoBite, they begin organizing weekly meal plans based on real-time inventory tracking. The children also become engaged in choosing recipes, transforming food management into a family activity. Over time, they reduce their waste, cut grocery costs, and cultivate environmentally friendly habits at home.

A third persona involves a small business café owner who previously relied on manual inventory tracking. Adopting EcoBite allows him to optimize his ingredient orders based on predictive analytics and real-time usage. As a result, food spoilage

decreases, and the café transitions to a low-waste business model. This shift not only improves sustainability but also attracts more environmentally conscious customers.

These stories reflect how EcoBite adapts to diverse user lifestyles, making sustainable food management practical, enjoyable, and deeply integrated into daily routines.

Market Validation

According to Statista (2024), Australia's food waste reduction industry is projected to grow by over 15% in the next five years, indicating strong consumer demand for innovative solutions. The 2024 Population Australia Survey also reports that 35% of Melbourne residents working from home have expressed interest in food management tools to improve sustainability and household efficiency. The growing emphasis on sustainability in schools and corporate settings suggests that EcoBite's reach will continue to expand across both individual and institutional markets.

The Competition

The food waste management market is populated with several notable apps and platforms offering overlapping but not identical services.

Direct Competitors

Toogood Togo: This app connects consumers with surplus food from restaurants and grocery stores at reduced prices. While it effectively redistributes unused food, it focuses more on consumption of surplus rather than prevention.

Food Keeper: Developed by the USDA, Food Keeper offers guidelines on how long foods should be stored. However, it lacks personalization, local relevance, and interactivity. Its generic structure limits long-term user engagement.

Indirect Competitors

Ecocycle Innovations: This company works with corporate clients to improve sustainability practices through supply chain optimization and circular economy strategies. However, it does not serve the individual user or offer real-time mobile solutions.

Ywaste (Australia): A mobile platform that helps supermarkets and cafes reduce food waste by listing discounted surplus food for local customers. Although it promotes reduced wastage, it lacks inventory management features and personalized reminders.

EcoBite's Competitive Advantage

EcoBite differentiates itself through its holistic, user-centered approach that combines inventory tracking, AI-powered recipe suggestions, shopping guidance, and behavioral incentives via a point-based reward system. This full-cycle engagement fosters long-term behavioral change. Unlike Toogood Togo or Ywaste, EcoBite focuses on upstream waste prevention rather than downstream redistribution. Moreover, its focus on smart usability (as recommended by Weichbroth, 2025) ensures a smooth and engaging experience for diverse users.

Solution Design

User Flows and Design Overview

EcoBite's user experience is based on a linear and intuitive flow optimized for mobile users. Upon launching the app, users are welcomed with a personalized greeting and a dashboard summarizing their current food inventory and expiry alerts. The main interface presents clearly labeled buttons: Add Food, My Pantry, Expiring Soon, Reports, and Learn & Earn.

The Add Food page enables manual input of food items, including name, quantity, purchase and expiry dates, storage type, and an optional image. This information feeds into the pantry system, where the food is tracked and managed.

The My Pantry view categorizes items by type and displays quantity and expiry data with supportive icons and images. It also includes a search bar for easy navigation. The Expiring Soon page prioritizes urgent items with user-friendly options to mark them as used, discarded, or retained.

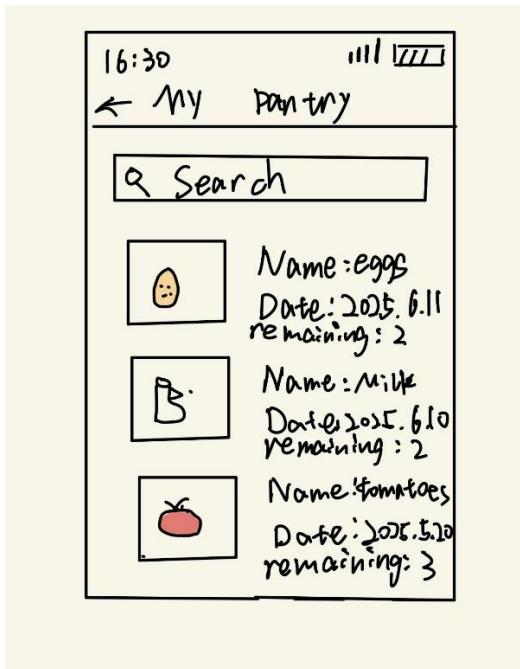
The Reports page uses interactive visualizations—including line graphs and pie charts—to highlight monthly trends, wasted quantities, and category-specific statistics. This empowers users to make informed changes to their habits.

low fidelity:

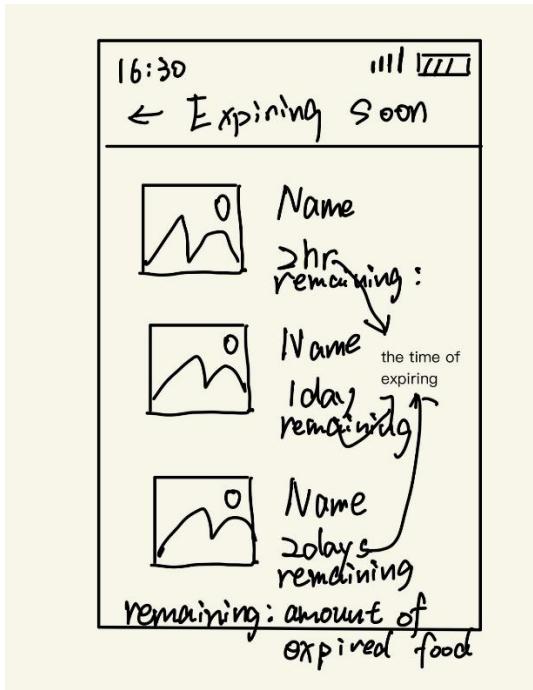
The home page is the first interface users see upon opening the app. It displays a personalized greeting and a summary of the current food inventory, including the total number of stored items and those nearing expiration (e.g., 5 items in fridge, 2 expiring soon). Below this summary, six clearly labeled buttons provide quick access to core features like Add Food, My Pantry, Expiring Soon, Reports, and Learn & Earn. This clean layout helps users understand their food situation and act efficiently.



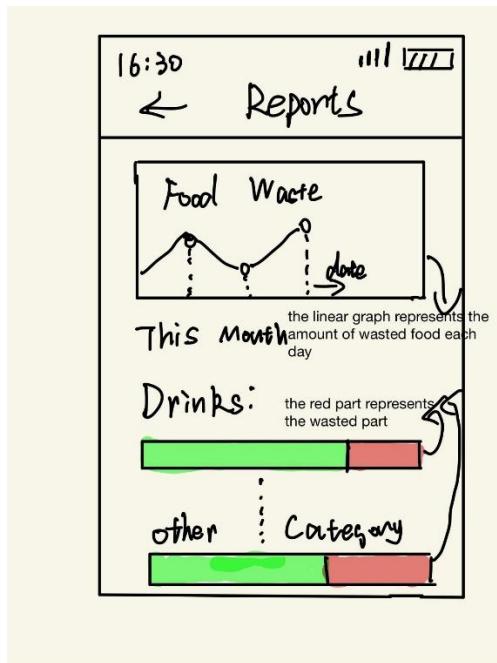
This page allows users to manually add new food items with detailed fields, including name, quantity, purchase date, expiry date, storage type (e.g., fridge/frozen), and optional photo. Once saved, the food item is tracked in the pantry and integrated into reminder and reporting systems. The addition of a quantity field is essential, enabling users to manage multiple units of the same food.



The My Pantry page displays all stored food items in categorized lists. Each item includes a photo, name, expiry date, and quantity (e.g., Tomatoes - 3 items). A search bar at the top helps users locate specific foods quickly. This overview allows users to better manage their inventory and avoid unnecessary purchases or forgotten items.



The Expiring Soon page lists food items that are about to expire, sorted by urgency. Each entry displays the item name, quantity, and remaining time (e.g., Milk – 1 item – expires in 1 day). Users can mark items as "used", "discarded", or "still good", and their actions are recorded for reporting.



The Reports page visualizes food waste data using charts. A line graph shows waste trends over time, while a pie chart illustrates the percentage breakdown by food category. All waste amounts are measured in units (e.g., 7 items wasted this month). At the bottom, bar graphs compare added, consumed, and wasted quantities per category. This data helps users identify waste patterns and adjust accordingly.

Testing Plan

1. User Testing

This user test aims to evaluate whether the core features of the Smart Pantry app meet the expectations and needs of the target users. It focuses on the clarity, usability, and user satisfaction of the current prototype.

Steps:

- Invite Target Users:**

Recruit 5–7 users who match the target demographic—such as environmentally conscious individuals, young professionals, or families interested in reducing food waste.

- Perform Core Tasks:**

Ask users to complete the following key tasks:

- Add a new food item with expiration and storage details
- Check their pantry overview
- Identify food that is about to expire

- Watch an educational video and complete a quiz
- View their monthly food waste report

Observe their actions and note whether they can complete these tasks independently and efficiently.

- **Record Feedback:**

Use screen recording tools or manual notes to capture:

- User thoughts and real-time reactions
- Usability issues or confusion points
- Suggestions for improvement

Conduct short interviews after the session to gather verbal feedback.

- **Analyze Results:**

Organize all recorded data to identify recurring usability problems, unclear instructions, or steps that feel unnecessarily complex.

- **Optimize Design:**

Refine the prototype based on insights gathered. Adjust layout, button placements, navigation flows, and labeling to improve ease of use and user satisfaction.

2. A/B Testing

To further enhance conversion rates and user engagement, we propose running an A/B test on the homepage design.

Steps:

- **Design Two Versions of the Homepage:**

- **Version A:** Features the “Add Food” buttons at the top, with a compact grid layout.
- **Version B:** Emphasizes the user’s food status summary with a more prominent “Expiring Soon” alert in the center.

- **Split Traffic Randomly:**

Simulate or test with two equal-sized user groups. One group interacts with Version A, and the other with Version B. Ensure user behavior for each version is tracked separately.

- **Track Metrics:**

Use tools or manual tracking to monitor:

- Task completion rate
- Click-through rate on core features
- Time spent on homepage
- Registration or profile setup completion

- **Compare Results:**

Analyze behavioral data between the two versions to determine which design yields better user engagement and efficiency.

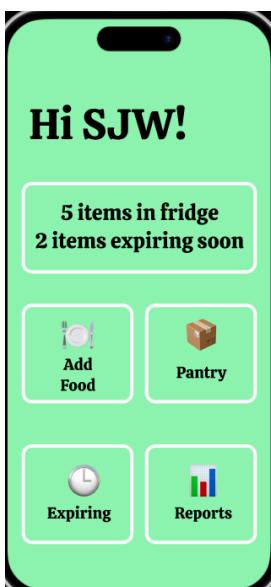
- **Select and Improve:**

Choose the more effective version and apply further refinements based on user feedback. This version will form the basis for future high-fidelity iterations.

high fidelity:

Home Page

- Greetings users by name ("Hi SJW ").
- Shows a summary of current inventory (e.g., "5 items in fridge", "2 items expiring soon").
- Features quick access buttons: Add Food, Pantry, Expiring Soon, and Reports.



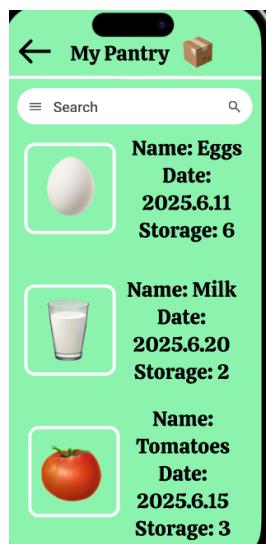
Add Food Page

- Allows users to manually add new items.
- Inputs include food image, name, expiration date, category (e.g., Drinks), and quantity.
- The SAVE button commits the data to the pantry tracking system.



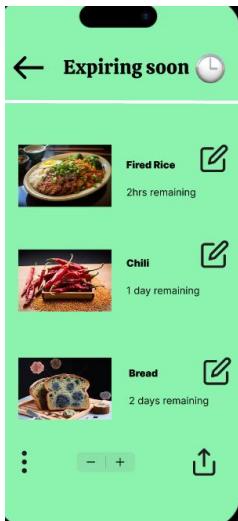
My Pantry Page

- Displays categorized food items in a vertical list with photos, names, expiry dates, and quantities.
- Includes a search bar for fast lookup.
- Icons like 🥚, 🍎, 🍅 visually enhance user recognition.



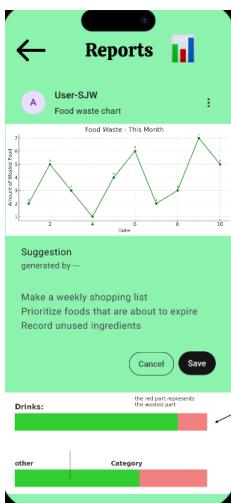
Expiring Soon Page

- Shows a sorted list of foods close to expiration, with time remaining.
- Each item includes a photo and label (e.g., “Fried Rice – 2 hrs remaining”).
- Action icons (edit/delete) allow users to manage these items proactively.



Page Reports

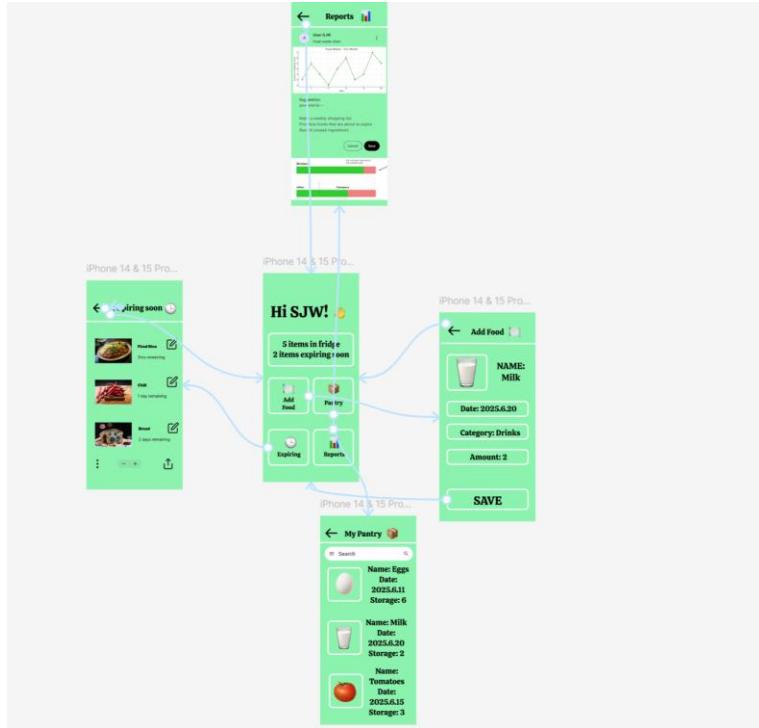
- Provides charts (line and bar graphs) that visualize monthly food waste trends.
- Includes user-specific labels (“User-SJW – Food waste chart”).
- Offers AI-generated suggestions like “Make a shopping list” and “Track unused ingredients”.
- All data is displayed in units to promote better tracking.



Design rationale:

- All components follow a modular layout for easy scalability.
- Icons are sourced via plugins (or emojis), ensuring visual clarity.
- The layout prioritizes readability and single-hand usability.

The logic of the app:



Go-To-Market Plan

EcoBite's marketing strategy incorporates multiple channels. Social media platforms like Facebook, Instagram, and LinkedIn will be leveraged to regularly publish engaging content, promote sustainability, and encourage downloads through incentivization. Additionally, offline advertising in public spaces such as malls and community centers will target diverse demographic groups, particularly appealing to middle-aged users and young professionals. Educational content marketing through informative articles and short videos will further raise awareness about food waste reduction and sustainability.

User interaction will be boosted through a rewards and incentives mechanism, encouraging sustained user engagement by allowing point accumulation for tangible rewards or discounts. Cooperative promotions with supermarkets, businesses, and environmental organizations will amplify outreach and provide exclusive user incentives.

Funding for EcoBite will be secured through angel investments, government sustainability grants, and strategic partnerships. Advertising revenue will provide ongoing income streams, while strategic partnerships with local businesses will mitigate initial marketing expenses and contribute additional commissions.

Growth Opportunities and Expansion Plans

EcoBite plans comprehensive growth through functional, user base, geographical, technological, and sustainability expansions. Functionally, the platform will expand to manage broader food waste categories, integrating AI technology for predictive expiry management and personalized recommendations, as well as IoT-enabled smart fridge sensors for automated inventory tracking. The user base will be expanded by incorporating educational content for younger demographics and enhancing family and community engagement through collective challenges.

Geographically, initial efforts will focus on Melbourne, with gradual expansion to other Australian cities and eventual international markets, particularly regions needing developed food management systems. Revenue streams will diversify through tailored solutions for corporate partners and data monetization strategies providing valuable insights into government and corporate sustainability efforts.

Technologically, ongoing app improvements, including enhanced notifications and user interfaces, alongside blockchain integration for transparency in food waste tracking, will maintain user trust and improve engagement. EcoBite will also position itself as an educational platform for broader sustainability issues and actively engage in government collaborations to integrate with municipal waste management systems.

The growth timeline for EcoBite includes establishing a solid user base within Melbourne in the first year, expanding nationally in the second year, and exploring international markets by the third year.

Conclusion

EcoBite addresses critical food waste issues by providing a comprehensive, engaging, and incentivized digital solution. The project highlights the urgency of sustainable living, the considerable market demand for practical waste management tools, and the feasibility of integrating advanced technologies. Through strategic expansions and innovative features, EcoBite aims not only to substantially reduce food waste but also to significantly influence sustainable habits, empowering users and communities toward an environmentally conscious lifestyle.

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