Student: Tan Eng Tong Chervelle
Student: Soong Jia Kang Daniel
Student: Tan Kim Eng, Andi

Faculty: Computing Science

Student: Khaing Hay Thar
Student: Chin Hongle Ryan

Faculty: Civil Engineering

SMART REUSABLE CONTAINER SYSTEM FOR HAWKER CENTRES

Problem Statement

Hawker centres and food courts in Singapore generate large amounts of single-use plastic waste due to high takeaway demand. Despite nationwide sustainability efforts, most consumers and hawkers find reusable systems inconvenient, and current measures do not effectively reduce plastic usage without harming vendor profitability or food safety standards.
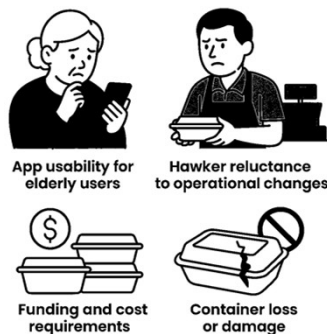
Background Information

Singapore households dispose of thousands of tonnes of single-use plastics each year, much of which originates from hawker centres and food courts. Takeaway meals remain the biggest contributor, and NEA reports show that plastic consumption in F&B is still rising.

Key barriers include:
1. Hygiene and food safety regulations for hot/wet food
2. Hawkers' preference for fast, cheap disposables
3. Consumers finding BYO containers inconvenient
4. Low adoption of reusable or returnable packaging systems

This growing waste stream contributes to incineration loads and carbon emissions, challenging Singapore's Zero Waste Masterplan and Green Plan 2030.

App usability for elderly users

Hawker reluctance to operational changes

Funding and cost requirements

Container loss or damage

Targeted Beneficiaries

This project benefits hawker stall owners who want low-cost, efficient waste-reduction methods without disrupting operations. Hawker customers, including students, working adults, families, and elderly patrons, gain access to a cleaner, more sustainable takeaway option. NEA, Town Councils, and hawker operators benefit through reduced waste volumes and easier achievement of sustainability goals. In the long term, food delivery platforms can also integrate the system to reduce disposable packaging.

2023 Singapore Waste (Based on NEA)

Paper/Cardboard 28.3%
Plastics 27.5%
Food 18.9%
Textile/Leather 6.2%
Others 7.0%
Others (<5%) 14.2%

Waste Types
- Paper/Cardboard
- Plastics
- Food
- Textile/Leather
- Others
- Others (<5%)

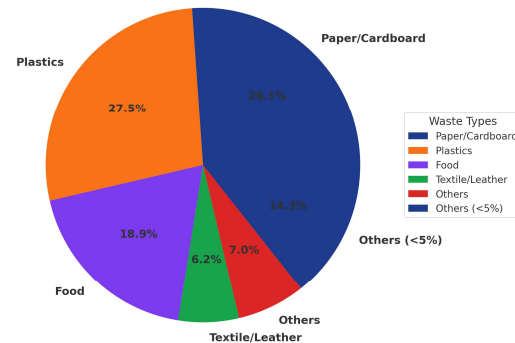| Waste type	Total Generated ('000 tonnes)	Total Recycled ('000 tonnes)	Recycling Rate	Total Disposed ('000 tonnes)
Ferrous metal	1,296	1,289	99%	7
Paper/Cardboard	1,251	387	31%	863
Construction & Demolition	832	828	99%	5
Plastics	957	48	5%	909
Food	755	132	18%	623
Horticultural	256	218	85%	38
Wood	447	299	67%	149
Ash & sludge	231	32	14%	199
Textile/Leather	211	5	2%	206
Used slag	176	173	98%	3
Non-ferrous metal	106	105	99%	1
Glass	75	6	8%	69
Scrap tyres	27	26	95%	1
Others (stones, ceramics, etc.)	238	6	N.A. [1]	232
Total	6,859	3,553	52%	3,306

Limitation and Challenges

Implementing a reusable container system presents several challenges. Some elderly or non-digital users may struggle with the app, requiring simpler guidance and support. Hawkers may be reluctant to change their workflow, especially if it seems slower or more complex. The system also requires upfront funding for containers, washing facilities, and logistics, which can be difficult during early adoption. Finally, container loss or damage can affect stock levels and disrupt operations. These issues highlight the need for clear instructions, strong incentives, and careful planning to ensure smooth implementation.

Supporting Data

Singapore generates 6.86 million tonnes of waste annually, with plastics alone contributing 957,000 tonnes in 2023. Due to low recycling rates of only 5%, most takeaway containers end up being incinerated. An estimated 200,000–250,000 single-use containers are discarded every day, and a typical hawker centre produces 1–2 tonnes of plastic waste per week. Surveys also show that while 80% of patrons prioritise convenience, 70% are willing to adopt reusable systems if they are easy, hygienic, and accessible.

Source: Data obtained from the National Environment Agency (NEA) Waste Statistics and Recycling Rate 2023.

RETURN. REUSE. REWARD.

Student: Tan Eng Tong Chervelle
Student: Soong Jia Kang Daniel
Student: Tan Kim Eng, Andi

Faculty: Computing Science

Student: Khaing Hay Thar
Student: Chin Hongle Ryan

Faculty: Civil Engineering

RETURN. REUSE. REWARD.

SMART REUSABLE CONTAINER SYSTEM FOR HAWKER CENTRES

A smart app-based reusable container system that reduces plastic waste by making rentals easy, returns convenient, and sustainability rewarding.

User Interface

The system offers seamless onboarding and login, allowing users to sign in using email, phone, or a scannable QR code. The home dashboard gives an immediate overview of the user's environmental impact, showing total containers saved, CO_2 reduced, and active rentals. A tiered rewards system (Bronze, Silver, Gold, Platinum) motivates continuous participation through points earned with every rental or return.
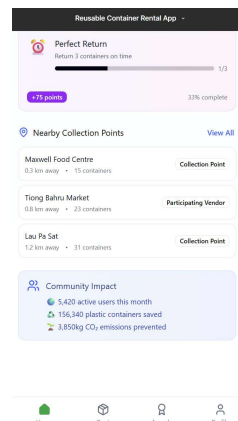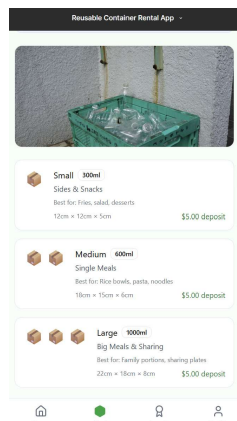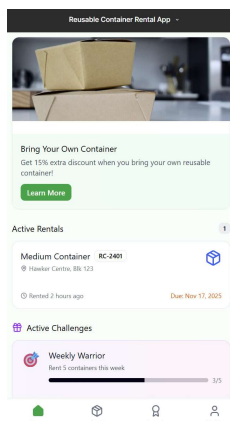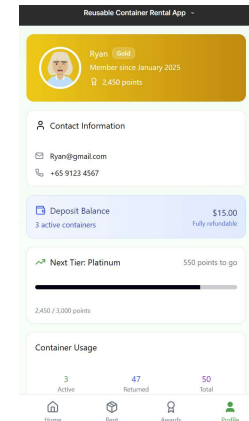
Renting, Returning & Collection Points

The app makes renting and returning containers simple and intuitive. Users can browse container sizes, check deposit requirements, and scan QR codes to start rentals instantly. The "Active Rentals" section tracks due dates to reduce late returns, while the "Nearby Collection Points" map shows real-time container availability at hawker centres. This ensures convenience and increases the likelihood of proper returns.

Gamification, Achievements & Vouchers

To encourage long-term participation, the system incorporates gamification, such as weekly challenges, streaks, and milestone achievements. Users earn points for every rental and return, climb membership tiers, and unlock badges that celebrate sustainability habits. Points can be redeemed for real-world rewards such as Shopee, Grab, FairPrice, and Lazada vouchers creating a strong incentive loop that drives repeated use.

@SingaporeTech