IELM 2150 Product Design (Fall 2017)

Project Report

ReBox

A lunchbox that office workers and students actually use

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Background

Food containers and packaging are among the major sources of wastes reaching the landfills. While governments and environmental organizations are trying hard to encourage people to use reusable lunchbox, most citizens, especially students and office workers, are still reluctant to switch away from disposable lunchbox.

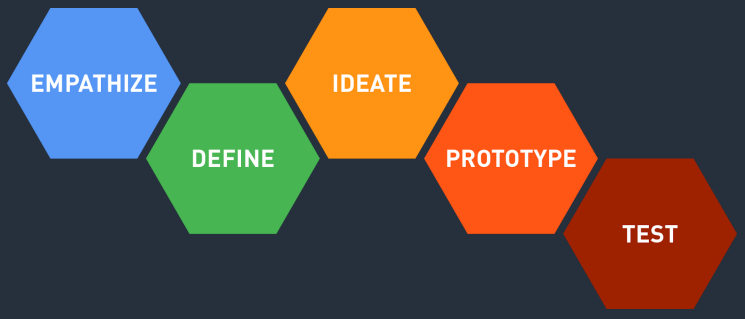
In fact, there is always a struggle between reusable lunchbox and disposable lunchbox. Reusable lunch box is green but full of troubles; disposable lunch box is convenient but harmful to the earth. This could lead to serious problems because it introduces a dilemma between environmental protection and product usability.

Key Statistics

% of solid wastes that are food containers and packaging	23%
Adoption rate of reusable lunch box in Hong Kong	<1%

Methodology

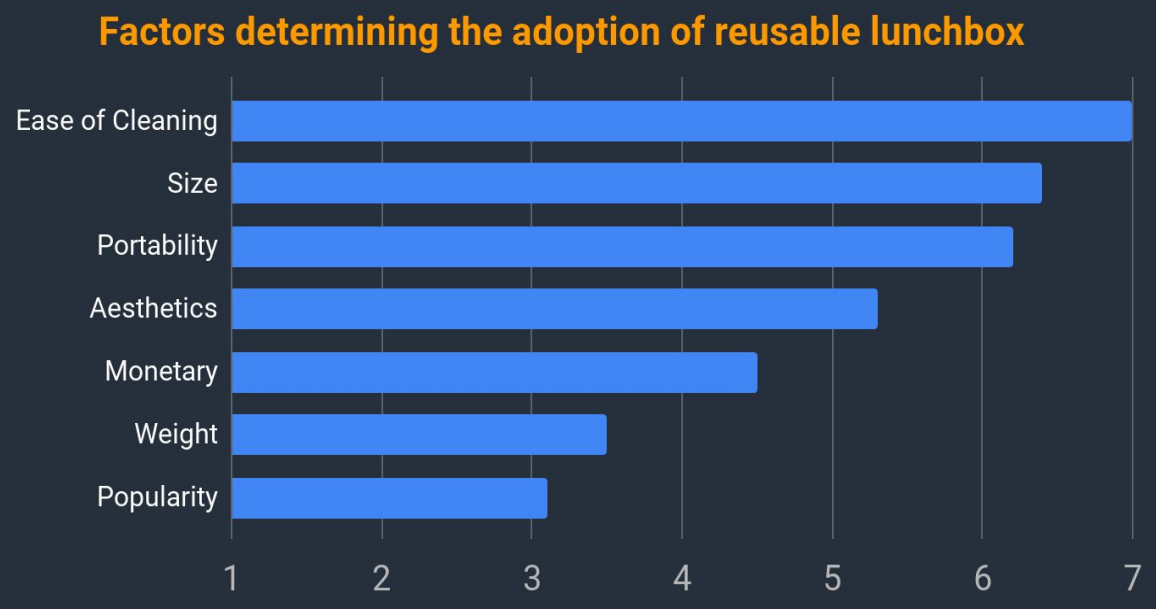
To analyze and solve the problem systematically, the concept of design thinking has been extensively adopted throughout product development process.



In the **empathize** stage, focus group, interview and online survey are conducted to understand the needs and current behaviors of target customers. In the **define** stage, the needs of customers are ranked, prioritized, and compiled into a problem statement that is precise yet without assumption on the solution. In the **ideate** stage, concept generation and selection is conducted through a series of participative brainstorming with target users and feature comparison. In the **prototype** stage, low-fidelity prototypes and full functioning prototypes have been developed for test and design iteration in the later stage. In the **test** stage, target users are invited to test out and comment on the functioning prototype. Based on the feedback, the entire process iterates from an appropriate previous stage and goes on again.

Problem Analysis and Definition

Based on the data collected in the empathize stage, the following factors that make people reluctant to bring their own lunch box are rated and ranked below. It is shown that **ease of cleaning**, **size** and **portability** are the three most important considerations of office workers and students. These factors are all related to the perceived **convenience** of reusable lunch box so it is not difficult to see that convenience is the most determining factor among all.



Further questions in the focus group interview reveal that with enough convenience, users are indeed willing to bring their own lunch box to save the earth. For example, some participants think that they will bring the lunch box if the size and portability of lunch box are comparable to that of a portable charger. Furthermore, if the cleaning procedure of the lunch box can be reduced to less than 1 minute and do not grease their hand, they are willing to bring and wash the lunchbox.

Based on the above analysis, it is discovered that there is a conflict between being environmentally friendly and having takeout conveniently. As a result, the following "How might we" question is defined.

> **"How might we" question**
>
> How might we provide a **takeout experience** that is both **environmentally friendly** and **convenient** for **office workers** and **students**?

The question is intentionally designed to be vague to remove any assumption that limits the possibilities of final product. However, this question clearly represents the underlying problem and provides an optimization goal for the design decisions in later stages.

Potential

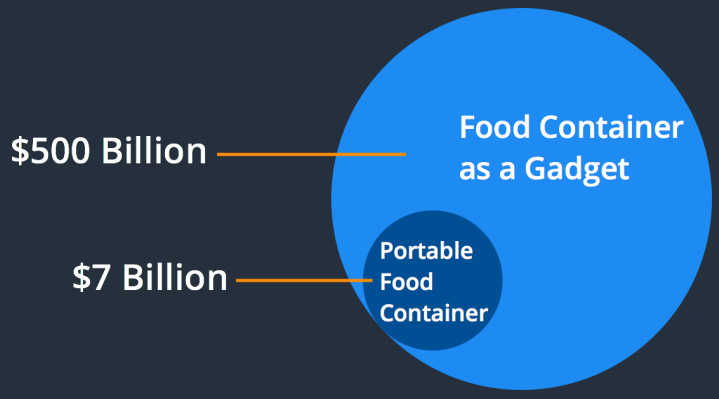
Problems without enough demand and customers are extremely difficult to solve. Fortunately, designing a convenient reusable lunch box is not one of them.

In terms of market potential, the portable food container market is a market that is not small. But when a lunch box becomes portable and wash-free, it is closer to a gadget more than a daily necessity. More customer needs can be exploited such as

- Meal logging and suggestion,
- Intelligent temperature control, and
- Nutrition analytics.

If these need are taken into consideration, the target market is actually a $500 billion new market with no significant players.

Estimated market size

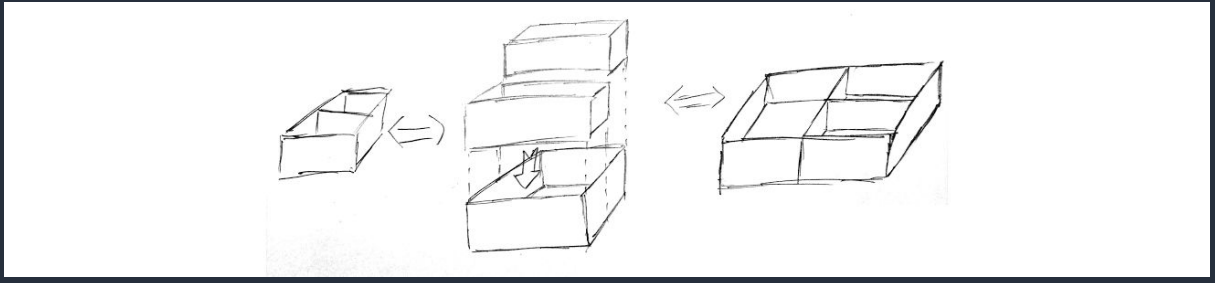


There is also no active patent with the same design as the later proposed solution. It is expected that there will be no significant barrier of entering the market.

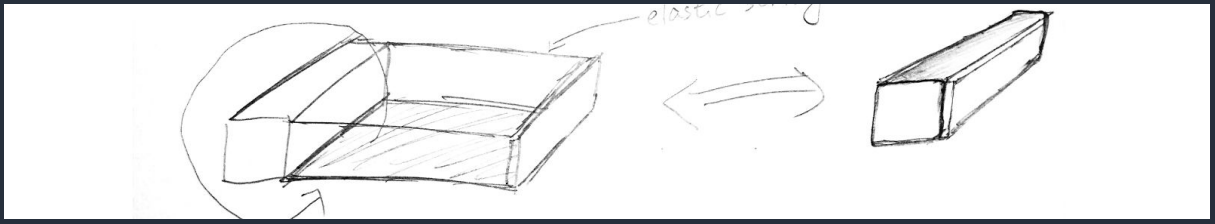
Concept Generation and Selection

A series of concepts have been generated in the brainstorming process. They include a stackable design, rollable design, foldable design and recyclable design. For illustration, please refer to the submitted sketchbook.

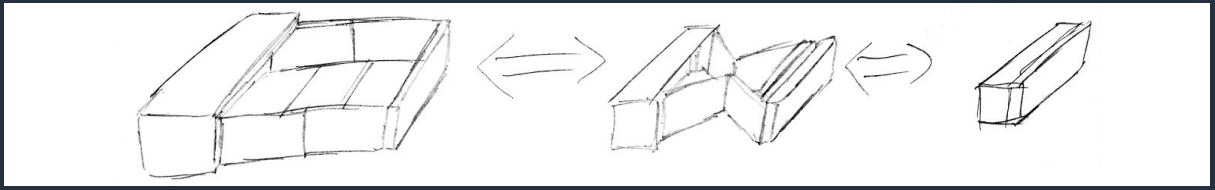
The stackable design divides the lunch box into three parts. Each part can be stacked together to reduce its size.



The rollable design is inspired by the scroll used by ancient king in China. It saves space by making the lunch box body soft and rollable.



The foldable design is a box that can be folded into a smaller compact block. Its body is rigid while keeping the single compartment.



The recyclable design is a box that can be easily stacked with each other and washed by machine. It is supposed to be returned by the diners after finishing their meal and washed by restaurants.

The detailed comparison among all concepts are listed below.

Comparison of different concepts

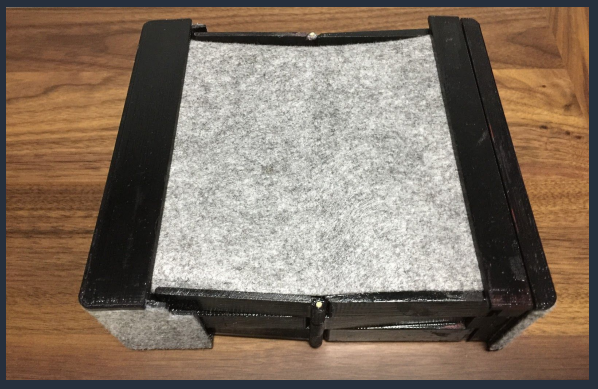
	Stackable	Foldable	Rollable	Recycle
Size Reduction	2x	**5x**	5x	N/A
Wash-free	No	**Require inner layer**	Require inner layer	Yes
Portability	High	**High**	High	Low
Ease of collapse	Low	**High**	High	N/A
Reliability	Average	**High**	Average	High
Asethetics	Average	**Good**	Good	Average

The foldable design was selected to be the final concept due to its convenience, usability and expected durability. It was then prototyped in the next stage.

Prototyping, Testing and Final Design

A few low-fidelity prototypes were made to test out the ideas. They are all made by cardboards and papers. Unfortunately, most of them have been discarded and no photo records are left. However, there is one remaining low-fidelity prototype which can be submitted if needed.

All these low-fidelity prototypes are then tested for its usability and feasibility, which are evaluated based on factors like user interaction, affordance, usage flow, overall product mechanics, etc. After confirming that the product design is usable and feasible, a high-fidelity functioning prototype was made to showcase the design of final product.



The final product is named ReBox because it is a complete redesign of any existing lunch box. It includes the following features.

Key features

1. ReBox can be reduced into one fifth of the original size

In fact, after folding, ReBox is just as long as an iPhone 8 Plus.

Even when put into a small woman handbag, there is still room left for thick wallet, phone and cosmetic box.

2. ReBox is completely wash-free

   A piece of **biodegradable greaseproof paper** is used as the inner layer that actually contacts the food. As a result, when the user finished their meal, they just have to throw the paper away.

   There are three advantages of using biodegradable greaseproof paper:

   - Disposable
   - Ten times less waste and extremely compressible
   - Stay in the landfills for only weeks

   The above advantages allow ReBox to create minimal environmental impact in terms of transportation and storage. The overall environmental friendliness is comparable to traditional lunchbox but does not sacrifices convenience.

As shown below, the paper can be easily fitted into the lunch box.

3. ReBox is aesthetically appealing

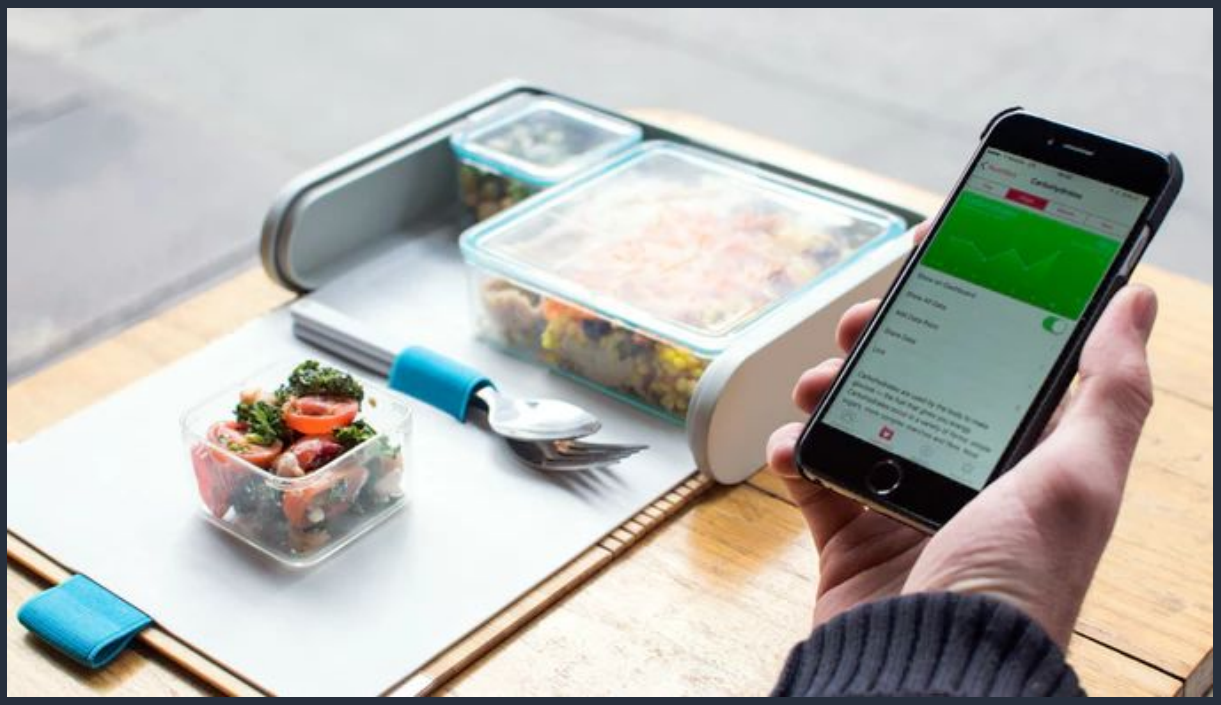
   The design language of ReBox is recently popular Italian design widely used by Google and Amazon. It maintains a good balance between playfulness and maturity, matching the style of young office workers and students.

Comparable Product Analysis

There are a few comparable products in the market. Apart from traditional lunch box made by Lock & Lock, Pyrex, etc. There are two new lunch box innovations.

Collapsible Silicone Box is a type of lunch box made by silicone and its height can be reduced into half. However, it is still quite bulky and hard to be put in most bags.

Prepd Pack is branded as a smart lunch box that allows users to prepare exactly right portion of food and its app monitors the nutrition intake of its users.



The following table compares the features of different alternatives to ReBox. It can seen that none of them provides the same balance between environmental friendliness and convenience, which is the uniqueness of it.

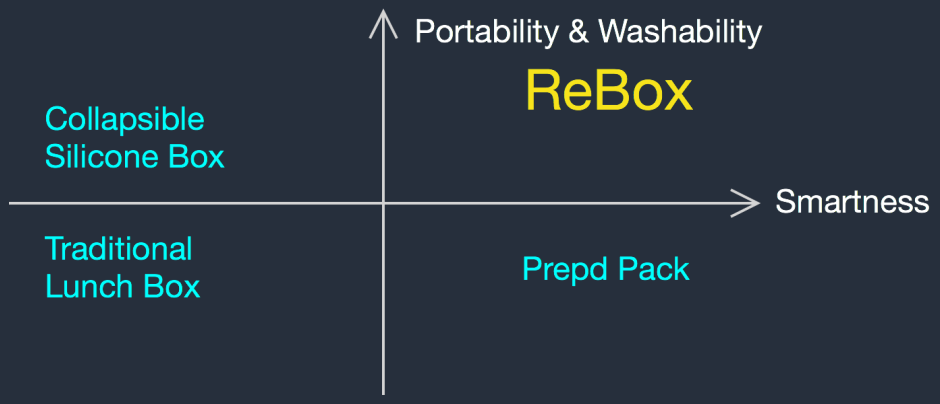
Comparison Table

	Traditional Lunch Box	ReBox	Prepd Pack	Collapsible Silicone Box
Cost	Low	**Medium**	High	Low
Wash-free	No	**Yes**	No	No
Smartness	No	**Yes**	Yes	No
Portability	Low	**High**	Low	High
Asethetics	Average	**Good**	Good	Average

* Traditional lunch box refers to brands like Lock & Lock, Pyrex, etc.

With the most important factors as the axes of the perceptual map, it is found that ReBox indeed has an unique value proposition.

Perceptual Map



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