

# **Sustainability Innovation**

## **Second-hand Books Recycling And Reusing Platform**

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# Summary

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Students need extra reference books except for officially distributed books. The reference book is only used in a certain period. It will be set aside after its corresponding stage of studying finished. In Shenzhen, we have more than 700,000 students from grades 1 to 12. If one student needs 5 books a year, which we know is much less than the actual number, it is 3,500,000 books in total a year. It is a huge number and it has great impacts on the environment.

It will contribute to environmental protection if we can reuse these reference books and textbooks. Meanwhile, it is a big challenge to encourage students to cultivate the habit of reusing second-hand books. After a close study on students' habits, we developed the platform consisted of a rewarding system, a WeChat mini program, and smart cabinets to support students reusing the second-hand books to contribute to environmental. We think our platform workable and interesting that students would join this plan.

# Identify the Challenges

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## 1. Environmental Awareness

Commonly, people lack the consciousness of environmental protection. After years of promotion of garbage classification, many people still cannot do it right which implies that it was difficult to convey the idea of environmental protection. Some of them think that they have paid the bill so that they deem it is not their responsibility to recycle or dispose of rubbish. In addition, prize and convenience are the only factors they care about. And the rest of them are aware of the importance of environmental protection but have no idea of how to contribute to society.

## 2. Huge Volume

Today students need more and more extra reference books except for officially distributed textbooks. These reference books are only used in a certain period. It will be set aside after it's corresponding stage of studying finished. It is not negligible. In Shenzhen, we have more than 700,000 students from grades 1 to 12. If one student needs 5, much less than the actual number, reference books, a year. It is 3,500,000 books a year. It has a big possibility and a big challenge reusing these books to reduce the impact on the environment.

## 3. Lack of Suitable Platform

There are some e-commerce platforms in China now. Theoretically, students can buy and sell the used books through them. As a commercial platform needed to make a profit, most of these platforms have less interest in used reference books. They are more interesting in collectible books. Secondly, as a business, those platforms have some requirements for books and operate in a certain business model, which includes complicated rules and works. This is not easy for students and it will be a big obstacle to reuse the used book.

## 4. Online Shopping

Online shopping is well-developed in China now. Because of the competition between e-shops provides good prices, high standard services which attract the potential customer. People have already cultivated a habit of search and buy goods on e-shops when he needs something.

## 5. The difficulty of Reusing Workbooks

According to our observation, western textbooks mostly consist of examples and explanations while our textbooks are most practicing and answer, more like some workbooks, which make those un-reusable.

# Identify a Root Cause

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## 1. Lack of Environmental Awareness

Most people care about the environment but the problem is that they are seldom informed how their ordinary life affects the environment. People would change their lifestyles to protect the environment if they are well educated. If we can bring them enough information about how he will contribute to environmental protection. When he chooses to use a book instead of buying a new one, he would be satisfied with the used book.

## 2. The Great Convenience of Online Shopping

Today e-commerce is well developed. In the meantime, the competition between e-shops is very intense. To attract customers, e-shops try their best to supply low prices, high standard service, and good quality commodities. Their efforts encourage people to buy more unnecessary items. With small expenditure, waiting for 2-3days to buy a new book from an e-shop, it is not a burden to most people.

## 3. Lack of Suitable Platform

There are several second-hand book platforms in the market already. They are focus on collectible books and whole country markets. They have less interest in textbook and reference for students. Secondly, the reference books recommended by different teachers have their own characteristics. They may not suitable for students from other schools. When students list his used books on existing platforms, they may stay on there for a long time.

# Generate Solutions

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## 1. Hold Campaign in School

We collect information like how many carbon emissions will be produced by making a textbook; how many textbooks we need totally in a school, a city, and the whole country every year; how many trees need to be planted to compensate for the carbon emission. Tell students clearly and directly how much we can contribute the environmental protection if we reuse a book. Hold campaign in school, introduce the idea of “let used book to be reused” to students and call on students to do what they can do to protect our environment.

## 2. Students and Used Book Company

We build a connection between students and used book company, on-line or off-line. We explain the situation to the companies and lobby them to organize special activities for local schools such as coming to collect used books regularly and list books in a specific area. With this, it is easier for students to exchange the used books.

## 3. Build Up Used Book Wechat Group in School

Now, almost every class in school, teachers, and parents build up the WeChat group to communicate with each other. Imitating, we build up WeChat groups focus on reusing books. Students/parents can list their on-sell books and wanted books in these groups.

## 4. Put Up Used Book Shop in School

We would cooperate with school authorities and borrow a classroom as a used book shop. When a student goes to a higher grade, he can send his used books to this shop and also find the wanted book here.

## 5. Build Up a Welfare Platform to Encourage Students to Reuse Book

We would build up a platform that contains a managed system, a WeChat mini program, and smart cabinets. The platform is C2C like the other existed used book platforms. The difference is that we consider a school as a dealing unit and students can only interact in their unit. Once a student creates an account in his unit, he can list his on-sell books and wanted books on the platform. When donation and demand matched, the donor is required to send a book to the smart cabinet and the demander can go to take the book. Once the deal is done, students can see how much carbon emission they reduced in his account.

## 6. Carbon Currency

This is a welfare plan that involves no money. We define the concept of carbon currency. We know that produce 1kg paper product, 3.5kg carbon emission would bring about. Therefore, we calculate the 1kg textbook as 3.5 carbon coin.

([https://www.carbonstop.net/carbon\\_calculator/school/](https://www.carbonstop.net/carbon_calculator/school/))

It is easy to calculate roughly how much coin a book worth if we know its size and pages. Instead of pay or receive money when you buy and sell a book, the donor and the demander both get carbon coins due to their contribution to environmental protection, the donor will get 2/3 of the aggregate and the demander gets 1/3.

## 7. Cooperate with Other Welfare Organization

An active platform can arouse students' enthusiasm and urge them to join our plan. Some used books on the list might be less attractive. To accelerate the trading frequency, our platform will collect these books. There are some welfare organizations that focus on education in backward areas. We cooperate with them and send these books to their contact school to build up libraries. These books will play a greater role in there than in Shenzhen.

## 8. Cooperate with Shenzhen Volunteer Alliance

SVA(<http://www.sva.org.cn/>) is an influential organization and most of the Shenzhen students are its members. We might need some help to hold campaigns and maintain the equipment in a different schools. Therefore, we would ask for their support. Another advantage of cooperating with SVA is that we can use its influence to promote our idea in all schools in Shenzhen.

# Identify the Criteria

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- 1/ Is this plan workable?
- 2/ Would participants like to join this plan?
- 3/ Is this plan convenient for participants to operate?
- 4/ Can this plan be popularized to a wide range?
- 5/ Can this plan contribute to environmental protection?

# Evaluate the Solutions

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Please see the attachment.

 [evaluate the solutions](#)



# Make an Action Plan

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## 1. Results of Surveys

The idea of a welfare platform is the most reasonable and welcome.

## 2. Platform Concept

### 2.1 The Platform Contains Three Elements:

2.1.1 Website: promote our idea of “let used book to be reused” and manage the whole system.

2.1.2 Wechat mini-program: students can join this project and proceed with his operation through the WeChat mini-program, create his account, donate books, and find the wanted books.

2.1.3 Smart cabinet: consider the course in different schools has his own characteristic we decided that the book should be circulated in a school not involve others. Thus, we use smart cabinets and don't invite third part logistic service.

### 2.2 Working flow:

2.2.1 When a school decides to launch this program, we would register an account for this school in the system.

2.2.2 Students in this school create his personal account through WeChat mini program. Please notice that until a school opens its account in our system, its students can't participate in this project.

2.2.3 Students can list their books or wanted books through WeChat mini program.

2.2.3.1 Donation. When a donor has a book to donate, he can input book names to see if anybody demands it. If not, he needs to select the right bibliography, input book name, size, and pages. The management system would then categorize and publish this book to all members of his school.

2.2.3.2 Demand. When a demander wants a book, he needs to input book name to see if anybody has and want to donate. If no, he needs to select the right bibliography, input book name, size, pages. The managed system would categorize and publish this book to all members of his school.

2.2.4 Carbon coin. To encourage students to join our project, we create the concept of carbon coin to reward their actions. We calculate that 1kg book(with size and page it is easy to know roughly how many kgs a book is) worth 3.5 carbon coin. Reusing books, all participants contribute to environmental protection. It is fair to reward both sides. The donor will get 2/3 carbon coin of aggregate and the demander get the rest 1/3.

2.2.5 Circulate. Once donation and demand matched, manage the system inform donor to send the book to a specific smart cabinet. The donor put the book into the

smart cabinet and he will get a pin cord. Then he inputs the pin code to the management system. Manage system would inform demander the pin code. Then, the demander can use the pin code to open the smart cabinet and take out the book. When the circulation is done, the corresponding carbon coin will deposit on both accounts.

2.2.6 Interaction diagram. Please see the attachment.

### 3. Promotion Plan

#### 3.1 School

We would make some posts and videos, hold campaigns in school. Share knowledge about how our life style would affect our environment. Promote our idea "let used book to be reused". Call students doing something to contribute to environmental protection.

#### 3.2 Cooperate with Other Welfare Organization

If we have collected the nimiety of used books, we would cooperate with other welfare organizations that focus on education in the backward area and they will send these books to their contact schools and build up some libraries. This action would arouse the awareness of environmental protection more effectively.

#### 3.3 Cooperate with Shenzhen Volunteer Alliance

We need people to help us to hold campaigns and maintain our smart cabinets. We ask support from SVA. It is also a good way to promote environmental protection cooperating with SVA since it is a so influence organization.

### 4. Innovation

4.1 We focus on doing what we can do. "Let used book to be reused"; reduce waste of unnecessary repetitive buying; reduce the environmental impact as much as possible. We don't try to solve everything.

4.2 Consider a school as a dealing unit. In this way, we make things simple and easy to popularize it in all schools. Without third part logistic service, no extra payment is needed for donor and demander and this eliminates the potential obstacle for students to join our project.

4.3 Carbon coin. This virtual currency is interesting so that it would encourage students to join this project to the greatest extent.

 [interaction diagram](#)

# Prototype and Test

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## | Prototype Design

### 1.1 The Platform Contains Three Elements:

Website: promote our idea of "let used book to be reused" and manage the whole system.

WeChat mini-program: students can join this plan and proceed with his operation through the WeChat mini-program, create his account, donate books, and find the wanted books.

Smart cabinet: considering courses in different schools have their own characteristic we decided that the book should be circulated in a school without involving others. Thus, we use smart cabinets and don't invite third party logistic service.

### 1.2 Working flow:

1.2.1 When a school decides to launch this plan, we would open an account for this school in the system.

1.2.2 Then students in this school can create his personal account through WeChat mini program. Please notice that until a school opens an account in our system, its students can't participate in this project.

1.2.3 Next, students can list his on-sell book or wanted book through WeChat mini program.

1.2.3.1 Donation. When a donor has a book to donate, he inputs book names to see if anybody demands. If not, he needs to select the right bibliography, input book name, size, pages. The managed system would categorize and publish this book to all members of his school.

1.2.3.2 Demand. When a demander wants a book, he can input the book's name to see if anybody wants to donate. If not, he needs to select the right bibliography, input book name, size, pages. The management system would find the donor and build a connection between them.

1.2.4 Carbon Coin. To encourage students to join our project, we create carbon coin in order to reward their actions. We calculate that 1kg of book(with size and page it is easy to know roughly how many kgs a book is) worths 3.5 carbon coin. Reusing books, all participants contribute something to environmental protection. It is fair to reward both sides. The donor will get 2/3 carbon coin of aggregate and the demander get the rest 1/3.

1.2.5 Circulation. Once donate and demand matched, manage system would inform the donor to send a book to the smart cabinet. The donor put the book into the smart cabinet and he will get a pin code. Then, he needs to input the pin code to

manage the system. Manged system would inform demander the pin code. The demander can use the pin code to open the smart cabinet and take out the book. When circulation is done, the corresponding carbon coin will deposit into both accounts.

## | Feedbacks learnt from users

348 people have participated in the survey of our plan and system.

1. The result shows:

- 1.1 More than half of the students buy 5 plus reference books per year.
- 1.2 More than 66% of the books had been put aside or sold as waste.
- 1.3 More than 95% of people would join and support our project. They thought our plan was beneficial to environmental protection.

2. People also gave us valuable comments:

- 2.1 Wechat mini program should be simple enough.
- 2.2 How to secure a book's hygiene is important.
- 2.3 The donor and demander should share the carbon coin half. In their opinion, the more difficult part was encouraging people to choose used books.

 [survey of reusing used book](#)

## | Improvement for next iteration

1. People concern hygiene a lot especially in the background of Covid-19 spreading all over the world now. We discuss with the cabinet supplier and add an ultraviolet disinfection lamp in every cabinet. The lamp will work for a while after the door is closed so it is both energy-saving and environmentally friendly.
2. We will adjust the carbon coin allocation to half instead of 2/3 and 1/3.

# Team Credits

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This is a team project. We worked together, discussing the challenges, generating the solutions, making the questionnaire, analyzing the feedback, improving the prototype. Zifeng Ye plays the role of the team leader. The writing is assigned to each team member.

Zifeng Ye: I wrote the part of the challenges, the root cause, and the summary. I also alongside Jingpeng Li wrote the part of the action plan.

Jingpeng Li: I alongside Zifeng Ye wrote the part of the action plan.

Yanchen Liu: I wrote the part of the evaluation of the solution alongside Zhiyi Zeng.

Yizhi Hu: I wrote the part of the solutions.

Zifeng Chen: I wrote the part of the criteria.

Zhiyi Zeng: I wrote the part of the evaluation of the solution.

Xinyue Lyu: I wrote the part of the prototype test.

Xinlin Wang: I wrote the part of the improvement of the next iteration.

# Judge Comments

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" Overall Comments:

really appreciate that the team identified a valid and manageable problem and have proposed a very workable solution on how to address it. Kudos to the team in the very innovative use of carbon coins.

Couple of suggestions for the team to consider while they pursue this further:-

(i) Consider including other incentives (including money) -

While the project team makes a case that the prices of books are small and that the primary motivator for people participating would be environmental concerns, I think that it would be possible to identify the right price that encourages more participation (non-zero but cheaper than a new book). Two primary questions to answer - What would someone be willing to sell their used book for? What would someone be willing to buy used books for? Obtaining information from the parents who pay for the books is also likely to give very useful insights into this model

While the carbon credits is a very innovative idea, the number of people participating is likely to go up higher if the carbon credits are paired with other incentives. Or consider working out a scheme on how carbon credits can be used by a user – can it be converted into points, or gifts or other products?

(ii) Hygiene considerations –

I appreciate that the team has used iterative feedback to improve their design and to consider solutions to address this. I suggest that there might be relatively cost effective solutions to ‘sanitize’ the book that does not require costly equipment like a UV lamp. For instance, a very simple option is to build in a delay built in between drop off and pick up that accounts for the potential lifetime of bacteria and viruses in paper surfaces. Think through other potential ways while you take this forward.

(iii) Long term sustainability –

Think through how issues like app maintenance, marketing, student turnover etc will play a factor in long term sustainability of a platform like this.

Good job in coming up and designing a good project.

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