Sustainability Innovation

A New Systematic Solution For Sustainable Transformation In Clothing And Luggage Industry In China.

Songtao Yu, The Affiliated High School of Peking University

Shiyun Huang, The Affiliated High School of Peking University

Panyu Chen, The Affiliated High School of Peking University

Haoting Yuan, The Affiliated High School of Peking University

Wuwei Cui, The Affiliated High School of Peking University

Summary

We live in a society which has an increasing trend of consumption of clothes. While this increasing demand, pollution from each part of the industry becomes to a considerable threat to our living environment.

However, these pollutions can be avoided if each of the owner of factories and consumers have a higher awareness about what they are doing. Unfortunately, most of them choose to evade the series of damage that comes from their irresponsible choices. Therefore, problems of this entire industry are formed.

Through the phenomenon we see in this industry, waste of water during planting the cotton of first industry, air and sewage pollution of second industry and the relationship between consumer and the willing of recycling of third industry become to our three major challenges.

However, massive waste and low awareness become to root causes at first. After the process of 'Generate Solution', lack of capital for purchasing purification equipment becomes to our additional root cause.

Nevertheless, in the first round of 'Generate Solution' we come out with 6 solutions for respectively first industry, second industry and third industry. We use SWOT analysis as the method to help us build a system of criteria.

Unexpectedly, none of six solutions—which are proposed in the process of 'Generate Solution'—is scored higher than 16. Therefore, we have to come up with new solutions. However, before we start a new round of generation of solution. We get stuck at the new possibility of solutions. Because, we realize that the solution from third and second industry is far more practical for us to implement. Also, the pollution from these two target industries is created in only two major ways which are the direct emission form industry and the clothes which are discarded by consumers. So does the solution. Therefore, the finiteness of solution forces us to revaluate the strength and weakness of these existed failed solutions.

As a result of our discussion, we select three solutions which are 3,4 and 6 as the basement of the final solution. Because all of our solutions focus on the segmentation of second and third industry of textile industry. Solution 6 thus is selected because its potency for the problem which is caused by the customer, or

environmental pollution of third industry in other words. By the same token, Solution 3 responses well for the pollution from second industry, factory indeed. Also, to response the intersection of the weakness for all of the existed solutions which get stuck by the lack of capital, Solution 4 has its advantage in economic feasibility. Therefore, if we can combine the advantage of these solutions, then the best solution will be inevitably established. But for this purpose, we must avoid the counterpart of their disadvantage in order to consolidate its practicality.

However, we decide to build an e-commerce platform based on the business mode of direct sales. The function of this platform is building a bridge which connects with trustworthy factories and customers. Furthermore, for attracting customers, we develop a system called 'green coin system'. In this system, customers can donate their obsolescent clothes. Then according to the offer of clothes recycling company, they will be rewarded by green coins which are vouchers that can be used when they are shopping in our platform. Therefore, by implementing this platform, the pollution which is caused by waste clothes can be reduced in a systematic way.

We live in a society which has an increasing trend of consumption of clothes. While this increasing demand, pollution from each part of the industry becomes to a considerable threat to our living environment.

However, these pollutions can be avoided if each of the owner of factories and consumers have a higher awareness about what they are doing. Unfortunately, most of them choose to evade the series of damage that comes from their irresponsible choices. Therefore, problems of this entire industry are formed.

Through the phenomenon we see in this industry, waste of water during planting the cotton and the overusing of fertilizer in the first industry, air and sewage pollution of second industry and the relationship between consumer and the willing of recycling of third industry become to our three major challenges.

However, massive waste and low awareness become to root causes at first. After the process of 'Generate Solution', lack of capital for purchasing purification equipment becomes to our additional root cause.

Nevertheless, in the first round of 'Generate Solution' we come out with 6 solutions for respectively first industry, second industry and third industry. We use SWOT analysis as the method to help us build a system of criteria.

Unexpectedly, none of six solutions—which are proposed in the process of 'Generate Solution'—is scored higher than 16. Therefore, we have to come up with new solutions. However, before we start a new round of generation of solution. We get stuck at the new possibility of solutions. Because, we realize that the

solution from third and second industry is far more practical for us to implement. Also, the pollution from these two target industries is created in only two major ways which are the direct emission form industry and the clothes which are discarded by consumers. So does the solution. Therefore, the finiteness of solution forces us to revaluate the strength and weakness of these existed failed solutions.

As a result of our discussion, we select three solutions which are 3,4 and 6 as the basement of the final solution. Because all of our solutions focus on the segmentation of second and third industry of textile industry. Solution 6 thus is selected because its potency for the problem which is caused by the customer, or environmental pollution of third industry in other words. By the same token, Solution 3 responses well for the pollution from second industry, factory indeed. Also, to response the intersection of the weakness for all of the existed solutions which get stuck by the lack of capital, Solution 4 has its advantage in economic feasibility. Therefore, if we can combine the advantage of these solutions, then the best solution will be inevitably established. But for this purpose, we must avoid the counterpart of their disadvantage in order to consolidate its practicality.

However, we decide to build an e-commerce platform based on the business mode of direct sales. The function of this platform is building a bridge which connects with trustworthy factories and customers. Furthermore, for attracting customers, we develop a system called 'green coin system'. In this system, customers can donate their obsolescent clothes. Then according to the offer of clothes recycling company, they will be rewarded by green coins which are vouchers that can be used when they are shopping in our platform. Therefore, by implementing this platform, the pollution which is caused by waste clothes can be reduced in a systematic way.

As for our iteration part, since we are unable to contact the secondary industry factory and recycling factory at present, we conducted a customer experience data survey on the e-commerce online website, searched for authorized users, conducted a qualitative survey, and issued a questionnaire survey on the clothing recycling system and green coin mechanism for quantitative analysis. We found that most users are very satisfied with the experience of the website, but we are not clear about the functions and information of some websites. We will improve the layout and usage mode of the website. At the same time, although we think our recycling mechanism is very good and perfect, there are still a small number of people who are not willing to recycle their clothes. This is the reason why we need to conduct investigation and analyze the root cause. At the same time, we admit that due to the limitation of geographical location, we only count the millennials in Haidian and Hangzhou, so we can't make the information completely accurate. There are many points that need to be improved, but we believe that our original intention and results are good. The sustainable transformation of some industries

will be completed after several iterations

Identify the Challenges

Preface:
1. We analysis the challenge based on the STEEPLE (Society technology economy environment politics law and ethical) model.
2. The logic of our analysis is to divide the product cycle of China's clothing and luggage industry into the primary industry, the secondary industry and the tertiary industry to be divided into three parts for analysis. The fourth part is the transportation problem that connects the whole industrial cycle

1.Pramary industry

1.1 Waste of water during planting the cotton
In the manufacture and cultivation of cotton, it also has an impact on the environment and even on us. One big problem is water, of which fashion is a major user. Cotton is a water-intensive crop that requires a lot of water to grow, putting a huge strain on precious water resources that are already scarce. It takes a lot of water to grow cotton, but because the temperature for cotton to grow is around 20 degrees Celsius, cotton is usually grown in warm, dry areas, which means more evaporation, so a lot of water is needed. It takes 20,000 liters of water to produce one kilo of cotton.

1.2 Soil pollution
Soil is an important element in an ecosystem. We need healthy soil to produce food and absorb carbon dioxide. Large-scale soil degradation is one of the major problems facing the earth. The heavy use of chemicals to grow cotton is also accelerating soil degradation. Both the use of chemicals in cotton growing and the heavy use of pesticides have had an impact on the soil. The effects accumulate over time and eventually harm us.

1.3 Lack of biological solution
Although artificial cotton has been invented and there are processes for recycling cotton, the positive impact of these is minimal. And is artificial cotton better than cotton? Is artificial cotton more environmentally friendly? Will artificial cotton cause other environmental pollution? All of this is in doubt.

2.Second industry

2.1 Waste of energy, water and materials during the dyeing process
Because of the boiling point of oxygen bleaching, the machinery is not sealed, a large amount of heat,H_2O_2 decomposition of substances lost in the form of

evaporative heat in the workshop, steam heat loss, long treatment time, high energy consumption and high weight loss rate, generally between 5% -8%. At the rate of 8 million tons of cotton fabric per year, the weight reduction is between 400,000 and 640,000 tons, a huge waste. Alkali washing is difficult to clean. Washing times, water consumption, high COD wastewater, wastewater treatment is difficult. Fabrics containing spandex, viscose, and other fibers should not be treated with alkali.

2.2 Air and sewage pollution

Through our team's analysis and investigation, the dyeing and finishing factory will release a large amount of the toxicity of ClO_2 and ClO_2, equipment corrosion, air pollution, harm to human health, and products containing spandex that cannot be processed, which is not a clean production.

Suppliers to international brands such as Zara and Levi's are located in such industrial parks, greenpeace said. Therefore, it is not clear whether a single factory in the industrial park is discharging toxic and harmful substances, which indirectly encourages the indiscriminate use and discharge of toxic and harmful chemicals and other harmful behaviors to the environment.

Greenpeace international has so far issued four similar reports, investigating the release of toxic and harmful substances in the textile production process and the residue of these toxic and harmful substances in clothing and footwear and other end products. The report also pointed out that after the clothing products are sold to the world, the residual toxic and harmful substances, such as nonylphenol polyoxymethylene ether, will be washed off and enter the water environment when consumers wash them after purchase, resulting in the pollution of the consumption place and forming a global pollution cycle chain.

The problem of water cycle is not clear, but the intuitive waste of water resources is extremely obvious. Due to the requirements of printing and dyeing processing technology, printing and dyeing cloth in the processing process need to consume a lot of water, at the same time, discharge sewage. According to 2003 China printing and dyeing industry printing and dyeing cloth production, printing and dyeing industry annual discharge printing and dyeing wastewater about 1.6 billion cubic meters, the average reuse rate of less than 10%.

2.3 Lack of capital patience in scientific investment

In knitting dyeing and finishing enterprises, most enterprises are raw material processing enterprises, as long as they can meet the quality requirements of orders, enterprises generally do not have research and development departments. Orders can be delivered on time, with quality and quantity guaranteed, which requires a lot of effort. There is no more manpower, material resources and energy to carry out

technical research and develop new products, and there is a shortage of qualified r&d technicians to work in foreign enterprises. Product quality is poor, grade is low. Due to the continuous development of the enterprise and the lack of technology and talent, the technology update is slow, in the production in response to the state, can only reach the lower limit of customer quality, quality control is not strict enough. Due to the lack of key equipment and technical r & D personnel, product quality is not high.

Most dyeing factories consume more than 1:150 tons of water per ton of cloth, which means they treat 7,500 tons of sewage every day to produce 50 tons of grey cloth. Most enterprises adopt pre-dyeing treatment for mass production of soft finishing, with bath ratio of about 1:10 and backward technology. In particular, there is no strict process design and process control on the train, so accurate dyeing cannot be completed at one time, resulting in a lot of maintenance and water consumption. High caustic soda consumption, high COD content in wastewater, wastewater treatment can not reach the discharge standard. Because of the mutual depreciation of product processing, the reduction of export tax rebates, exchange rate changes, the rise of labor costs, the decline of profit margins. This exacerbates their unwillingness to deal with pollution
Hangzhou, Zhejiang Shaoxing and the two major textile printing and dyeing industrial parks, every day the Qiantang River discharge nearly 10,000 tons of toxic waste water, sewage containing reproductive toxicity and carcinogenic toxic, harmful substances, at the same time, a serious pollution accident occurred in the industrial park in the river, but also found a variety of toxic and harmful substances.

2.4 Lack of efficient and environmental-friendly equipment for majority
The overall equipment level is backward and the update speed is slow. Except for wholly foreign-owned enterprises, listed enterprises and some large or very large enterprises, most of the existing knitting dyeing and finishing equipment in China were still in use 10 or 20 years ago. There is not much new equipment and it is slow to update. Some automatic control equipment, such as on-line monitor of process parameters, computer color matching, air dyeing, double slow flow dyeing of small bath ratio, open width preprocessing production line, etc., have just been started. The original capital accumulation of enterprises is slow and the working capital is insufficient. Dyeing factories in developed countries have become both capital-intensive and technology-intensive.

2.5 Politics :
There are some tough challenges to national policy. Most of the time, the plant's sewage treatment system is not inside the plant, but in a centralized government treatment center. According to the Chinese government's requirements, the plant's sewage needs to be sent to a centralized treatment center to check for excessive pollution and further purification procedures. This is a big problem. If the factory

USES unenvironmentally friendly materials, resulting in a large number of harmful substances in sewage exceeding the standard, and the sewage is transported to the testing center for inspection, the factory may face charges. Factories that add little value to their production and are in danger of going bankrupt find ways to dispose of the sewage themselves rather than sending it to centralized treatment centers-into rivers or into the soil. As a result of this policy, sewage from many factories has not been cleaned at all. It seems that China has set a higher environmental protection target than the world, but it is not used at all, because all the pollution sources in question have not been detected or cleaned

2.6 view of economy efficiency

The added value of the clothing and luggage industry in China is so low that each piece of clothing can only earn about 17% of the profit. Because a large number of factories are competing with each other, it is impossible for the famous brand industry to expand the profit of the factory to more than 25% in hiring factories. At the same time, in today's social environment, under the trend of economic globalization, the transfer of dye production capacity and technology greatly promote and promote the rapid development of the dyestuff industry in Asian countries, especially China and India, which further confirmed the location of the Asian countries, particularly China, as the world's dye production and supply center. In this way, in order to pursue profits, some unscrupulous businesses will take advantage of the cheap material loophole, it is difficult to pursue the green industry.

2.7 Labor issues

The last word in the word "clothing and luggage industry" refers to the sewing of garments and bags. Because these stitches are too meticulous and require people to use sewing machines by hand, this leads to a large amount of labor use. In fact, China is getting better at this, as demand for fast fashion in the developing Chinese market is gradually outstripping production, and the treatment of labor is improving. But the conditions for sewing workers are still worrying. In Shenzhen, China, there is a place called the People's Market. This place is where labor is traded. The job market is mainly for manual jobs. Many sewing factories were nearby, where a bowl of noodles cost only three dollars, using the cheapest flour and soup. Centralized residence a night needs 25 yuan but unexpectedly no one can afford to pay, all chose 5 yuan a night Internet cafe. Many even starve to death on the streets. This is the fourth most powerful city in China.

3.Tertiary industry
3.1 Worried methods of recycling
The different levels of the recycling of the clothing are:
3.1.1

To recycle directly---- sell the useable clothing on the second-hand market. In China it is impossible, the law does not allow people to sell the second-hand clothing in the formal market. In the other country, the government allows to sell these clothing. But it is possible to export to the other country, mainly developing country such as Africa.

3.1.2

To recycle the energy, this is easiest way to recycle but the most environmental unfriendly. To burn the clothing to transform it into energy, the smoke and poisoned gases were released, it not only destroys the environment, but also harmful to the human body. For the burning effect on the environment, first the toxic gases such as CO SO_2 they become acidic rain and very harmful to the environment. Then the other effect such as CO_2, they cause the greenhouse effect and global warming.

3.1.3

To recycle physically, there are three method to recycle in this level. First, to cut the clothing to pieces to make mops and mags. This is the most directly way recycling these clothing in an environment friendly method. Second, to separate the clothing into the woven and non-woven fabric, to machining the woven fabric, just to spinning it into the useable fabric. For the non-woven fabric, it can be made into non-woven fabric by spunlace method, spunbond method, pulping method, netting method and other methods. The main shortage is a complete industry chain.

3.1.4

To recycle chemically, this is difficult on technique. The chemical way is mainly to use the solvent to dissolve. To conclude the different kinds of the dissolving method, there are some widely used method exampled.1. Anhydrous ammonolysis 2. Aminolysis and anhydrous of amine aqueous solution 3. Alcohol decomposition of alcoholysis agents. For chemical method, we need to notice that the method shows below only used to processing the polyester.

3.2 the relationship between consumer and the willing of recycling

Actually, the willing of the second-hand clothing is enormous, to export the second-hand clothing to Africa, to process the fabric to transform it into manufactured goods and to process it further to become handmade product is "profiteering". also, the willing of the second-hand clothing for assistant use is required because of the economic gaps in China, children in the undeveloped region need the clothes urgent. But because of the action of the government and the awareness of citizen, the industry chain of recycling always can't be acted.

3.3government controlling

In Chinese law, there's no acts of trading the second-hand clothing, the existing way to trade or recycle are:

3.3.1

The recycle bin

3.3.2

The nongovernmental association

3.3.3

The clothing brand initiated itself to recycle the clothes they had produced.

For the existing industry in China, the mainly problem is the quality controlling and the sanitation of the clothing. (technique part), the other problem is mainly from the government.

3.4
Awareness of nature

There are two part of the awareness problem we have

3.4.1

The lack of policy decision from government

For the government part the England government had set the locked bin to recycle the clothing and the complete law of it.

3.4.2

The citizen diathesis

For the citizen awareness, the typical one is Japan, to control the whole recycling not only from the act from government, but also the people spontaneously have the sense of the environmental protection. (education issues)

For the whole part of the recycling and reusing of the clothing and bagging industry the mainly issues are appears on the "awareness" side, both the consumer the seller and the decision maker's side. the government cannot give a properly policy to constrain the citizen to recycle, the donation of the clothing always been squeezed the profit and finally meaningless to the recipient; the industry of secondary use cannot recycle environmentally because of the profit; the citizen have no awareness to recycle and to reuse them.

4. Freight mechanism---Throughout the primary, secondary and tertiary industries.

According to the survey of Ted, the freight transport mechanism of the clothing industry is to separate the first, second and third industries, and distribute the transportation in one ring set and one ring. Generally speaking, the farmland, factories and sales points of the primary, secondary and tertiary industries are distributed around the world. So transportation is needed to run through the industrial chain. Shipping by sea is usually cheap, but carbon emissions are staggering. The emission of raw materials for transporting clothes, bags and semi-finished products accounts for 10% of the world's carbon emissions. For China, China is the main producer of the first and second industries in the clothing and luggage industry (the second largest in the world, second only to Bangladesh), and a large number of semi-finished products need to be transported, which causes

huge emissions. It is a huge and inseparable harm to the whole industry cycle. This is an urgent problem.

Identify a Root Cause

1.High demand

We have known that the clothing industry has caused great damage to our ecology and environment, which is mostly caused by the manufacturing process of clothing and the collection and planting of raw materials. These damages are caused by a large amount of raw material consumption and a large amount of clothing manufacturing demand, which is rootedly promoted and caused by people's increasing desire for clothing.

Only by constantly reducing production costs, can cheap clothing be accumulated and eventually meet our needs. The decline in clothing prices over the past few decades has allowed us to buy more and more clothes. We probably have many times more clothes today than our parents and grandparents did. This huge demand for clothing is the root cause of today's environmental pollution.

2.Massive waste:

Because fashion trends change so quickly today, which leads to constant production and buying, it also creates a lot of waste. Clothes are clearly close to being disposable. As a result, we produce more and more textile waste. On average, a family in western countries throws away 30 kilograms of clothes every year. Only 15 percent of those discarded clothes are recycled or donated, with the rest going directly to landfills or incinerators.

Synthetic fibers in clothing, such as polyester, are plastic fibers. The fiber is not biodegradable, so it takes 200 years to break down. But 72 percent of our clothes are made of synthetic fibers. In general, this level of waste is undoubtedly a major factor in environmental damage.

3. Economic factors:

As a big bag producer in the world, more than 20,000 luggage manufacturers in China produce one-third of the bags for global marketing. But there are only few well-known brands. This lack of brands economically leads to a situation of massive selling with cheap price. Subsequently, without a matured environmental protection system and an omnipresent environment protection awareness as developed countries, this unbalanced ratio between manufacturers and tertiary industry enterprises leads to a further environment pollution.

4.Backward recycling system:

It is illegal to resale the second-hand clothing as the ready-to-wear garment in China. As we have known that every year in China there's 3.1 billion of second-hand clothing have been generated. Most of them were placing into the closet or discard as normal trash into trashcans. To resale those second-hand clothing the most common way is to sell them to Africa. Until 2012, China nearly have no

industry chain in this domain and only have few companies to operating this industry. Since 2012, there's more companies engaged this industry and export the clothes to the overseas market. The industry was mostly complete. But consider the massive quantity of second hand clothes with an unstoppable increasing trend of this quantity, the counterpart of the scale of the industry is far away to be filled up. But look back to the developed countries, the main market of exporting the second-hand clothes were occupied by them. Also, there's many countries have the law to encourage people to sell the second-hand clothing.

The mainly problem, because of the cost of the recycling, the of the second-hand clothing industry nearly have no prospective in the domestic market. First, to recycle the collecting part are not very easy, the most common way people to dispose the second-hand clothing is to sell them on the flea market and other second-hand market, the other clothes that cannot sell or difficult to dispose were discard to the trashcan. So the only channel to collect these clothes is second-hand market and garbage station. The chain of connection between the consumer and collector was broken. Second, the disinfection part, to disinfect those second-hand clothes cost huge. In China the industry that need to proceed the disinfection were mainly repast, food, medical and service industry. There's no standard of second-hand clothing industry. Also, there's no basic to construct the complete industry for recycling, so to recycle the second-hand clothes need to create a new form of how this industry work and to explore the rule of market and build their own industry chain. Finally, to ignore the cost of transportation and proceeding, the profit was few however your efforts were much more greater than the other industry.

5.Awareness:

According to our survey, the people themselves lack a concept of environmental protection for clothing, bags and bags. Now, as the masses, the only government investment we can see is that a small number of residential communities will organize donation activities for clothing for public welfare. In fact, that is to put a box in the middle of the community, we do not need clothes bags can be put in. But such behavior is actually very small. First of all, according to our survey, only 2% of households have provided products that they do not use. In fact, the global carbon emission of clothing, luggage and luggage industry accounts for 28%, and recycling only reduces the production problem. Its effect is also negligible. The most important is the discharge of toxic chemicals in the chemical fiber caused by repeated washing and drying by users, as well as the discharge of dryer and washing machine. The fundamental reason is that users lack an understanding of the environmental problems of the clothing and luggage industry. So far, the efforts have made little sense to change the whole industry cycle.

Generate Solutions

1. Using Environmentally Friendly Materials for Clothing

The production and processing of some materials can have a great impact on the environment, which is further damaged by the increasing demand for clothing. Some clothing raw materials themselves are not environmentally friendly. As mentioned in Challenge, cotton is a good example. It needs a lot of water and will cause damage to the environment in the process of planting and production. If we want to solve the problem of environmental damage, we can start from the root, and that is to use some raw materials that are less damaging to the environment, rather than raw materials that are more damaging to the environment, like cotton. For example, we can use Linen or Hemp to make clothes. These two materials are both plant-based fibers. Linen and Hemp do not require much water, energy, pesticides or fertilizers to grow. Linen can grow in poor soil that is not used for food production, Hemp is also good for the soil, it can grow in the same place for many years without running out. If we can promote clothing made from Linen and Hemp instead of the environmentally unfriendly material of cotton, we can save a lot of resources and reduce the damage to the environment. Major clothing brands can respond to the call to protect the environment by producing and promoting clothing made of Linen and Hemp, which are environmentally friendly materials.

2.Factory-basic technical solution

There are still some technological issues we cannot solve*

2.1Factory Technology

The modern control technology with computer as the main body has been widely used in the instruments, equipment, production and management of knitting dyeing and finishing, ranging from laboratory, computer color measurement, to computer process control of dyeing machine. The process design of dyeing and finishing of small batch and multi varieties should be successful at one time and reduce repair. This can shorten the delivery time, reduce the cost and enhance the competitiveness of products. The process test in laboratory must be refined, the process parameters should be determined, and the accuracy and reproducibility of small sample test should be done. From small sample to medium sample, large sample test can determine an accurate process, according to the process production can achieve one-time success.

2.2Application of dyes

2.2.1Application of enzymes

In the pretreatment process, pectinase and hydrogen peroxide are used to remove enzymes and cellulase, which can reduce water consumption, save energy and

reduce the burden of wastewater treatment.

2.2.2High temperature fast bleaching

As mentioned above, the caustic soda free fast oxygen bleaching process is a clean production process. The process only uses fast oxygen bleaching agent and hydrogen peroxide, and can be kept at ll0 ℃ for 15-20 min in high temperature overflow machine. When the dosage of oxygen bleaching agent is 2.5-3 g / L, the pH value can be stable between 10.5 and 10.8. With the increase of temperature and time, the decomposition rate of H_2O_2 can reach more than 85%.

The fast oxygen bleaching agent has the functions of osmosis, scouring, emulsification, degreasing, chelating and cleaning, and adjusting pH value. It can replace caustic soda, penetrant, stabilizer, deoiling agent and other auxiliaries in oxygen bleaching process. Compared with caustic soda process, this process has less fiber weight loss, soft handle (can reduce 1 / 3-1 / 2 of softener dosage), easy to clean after bleaching, only need to wash warm water once, pH value of bleaching wastewater is less than 9, COD value is reduced by half compared with caustic soda process, and it is easy to treat sewage and has good process reproducibility.

2.2.3Continuous steam oxygen bleaching of knitted fabrics

Compared with the oxygen bleaching with overflow machine, the continuous oxygen bleaching with open width of cylinder or section width can greatly improve the bleaching quality, the cloth surface is smooth and smooth, without sanding and fine wrinkles, the water consumption is 1:10, and the consumption per ton of cloth is 1:0.8. The continuous pretreatment of slitting and open width can be matched with open width singeing, open width mercerizing, open width pad dyeing and open width reactive dye printing to realize the production line of high-grade knitted fabrics.

2.3Personnel arrangement

In the short term, to reduce the use of external resources, we should plan the production and construction of the factory more reasonably, instead of promoting the production of sales. Instead of improving the craftsman's skills, there will be more waste and inapplicability.

3.Establish the primary purification process of the plant

According to the previous challenge and root cause, the reason why the factory has no way to carry out self-purification system and to evade the government's restrictions on emissions is due to the economic pressure including brand effect. In order to avoid such economic pressure and meet the purification demand, we can start from the low utilization rate of the dye itself. As long as the output of purification process can bring recycled dyes, the cost of purification system can be controlled to achieve the ultimate goal. At the same time, the government's investment in the unified purification plant will be gradually reduced, and the investment in the purification system inside the plant will be changed, which is a win-win situation. When the economic strength of the factory is not strong, the money that the government will spend and the money wasted by the factory dyes

should be used to invest in the primary purification process of the factory. According to challenge, dyes working at high temperature will lose certain activity, resulting in waste of certain components. We just need to find a filtration system to collect the waste dye. The specific scheme can be studied in the later stage, and it is preliminarily estimated that a large amount of paper reading and knowledge learning are needed. At the same time, what can not be ignored is the emission problem of the factory itself. The essence of the purification procedure is to purify the sewage. There are two aspects of blowdown, gas and water resources. First of all, for gas emission, we plan to introduce an innovative ventilation system similar to the fresh air system to collect the gas generated inside the factory. Then, after passing water and collecting at low temperature, a large amount of SO_2 and hydrogen sulfide can be diluted or dissolved. After that, it will gather together with the sewage for the next step. Before treating the sewage, just make sure that the available dyes have been collected by the filter before proceeding to the next step. For the purification project, there are many examples that can be referred to. It is only necessary to optimize the purification process of the existing comprehensive purification factory for the clothing and luggage industry, which can be used in the factory.

4.Building direct selling concept based on brand effect
It is mentioned in root cause that inefficient resource utilization, product competition and low added value brought by a large number of consumers reduce the economic strength of the secondary industry, thus reducing investment in emissions. If we can combine the tertiary industry and the secondary industry, and create avant-garde brand design, we can make the added value of products increase sharply. In brand design, environmental elements can be integrated into the whole product cycle to add environmental protection factors. Because the direct sales channel is through customers, mutual recommendation of customers and the existence of membership system, customers need to create products that customers like and love from the heart. Environmental factors are a good way out for clothing bags. With the development of fast fashion, the value of clothes and bags has changed from practical value to appearance and design concept. These clothes and bags are like walking works of art. Our direct selling system is to establish membership system. Customers need to continue to buy our products to maintain their membership. Members have the right to attract other potential customers to become members. When other potential customers purchase products on the premise of becoming members, they can get bonus points for their superior members, and the points will be counted into money and directly paid to members. In this way, the brand effect is not from advertising, but from the customer itself. Strong environmental protection and art concept can let customers spontaneously recommend it. Setting high commission interest rate can make the whole market incline to the environmental concept, so as to achieve the whole cycle of environmental concept construction from the primary industry to the tertiary

industry. Let the whole brand of clothing and luggage industry into a good environment.

5.:To create a complete industry chain on recycling:
According to the previous root cause that had listed, the mainly problem is the lack of a complete industry chain. Generally, to make the clothing recycling become feasible there's two mainly direction to imply,
5.1Recycle directly (second-hand sell)
First, in the previous challenge part, we have claim that we cannot sell the second-hand clothing in domestic market because of the policy, but we can sell them to the overseas.
The solution of this whole industry is approximately divided into three part1. Recycle the clothing 2. Transportation 3. Selling.
To recycle the clothing form the citizens, this part of the work is completed by the scavengers roughly and private company rarely. For this part, as a practitioner of the whole industry chain, the negotiation part is the most important. For the most problem of the recycling part is that the quality cannot be assured especially the recycling from the scavengers. If to create a specialized company the quality part can be assured, but the cost will increase corresponding, so to call up people to recycle their clothing spontaneously (the second solution) is the best idea.
The transportation and selling part are the normal marketing process, to negotiation to the foreigners and the cost of the transport are the basic process same as the other export process. The aspect should be controlled is the part of the sanitation part, this process always been ignored by the practitioner.
5.2 To transform into other material
The transforming into other material have two kinds of processing ways:1. Physically 2. Chemically
To recycling physically, first, to cut the clothing to pieces to make mops and mags. Then, conclude the fabric into woven and non-woven, the woven fabric can be spun to process to become useable fabric and reuse on spinning new clothes. For non-woven fabric just process it and use them on the industrial application.
To recycle the polyester in chemical ways, the steps are: 1. Anhydrous ammonolysis 2. Aminolysis and anhydrous of amine aqueous solution 3. Alcohol decomposition of alcoholysis agents.
To transform into other martial is not difficult, but if the industry chain even cannot allow to recycle directly, the transforming is meaningless.
6.Call up people to recycle the clothes spontaneously:
As the previous paragraph said, the most valuable and most feasible things is to let the citizen recycle their clothing spontaneously. We can make a propaganda and publicize the profit to the family itself and the goodness to the environment. If a family sells their useable clothing to make a secondary benefit, the family gains profit, the seller has the opportunity of survival in this industry, the consumer consumes the product they want, and the most important, the environment were

not destroyed, the society becomes to a recycling mode, the resource may not to be mined, healthier the society has become.

Identify the Criteria

The structure: Sustainability + SWOT analysis model.

1. Sustainability: （30%）

1.1 Whether the benefits of such a strategy for sustainable transformation of the clothing and luggage industry are large enough？（10%）

1.2 Will it cause new environmental problems？（10%）

1.3 Can the solution be applied again in the future? (10%)

2. Strengths： （25%）

2.1 Whether the strategy has sufficient advantages in efficiency and execution （10%）

2.2 Whether the strategy can attract enough target groups to participate under the existing resources（7.5%）

2.3 Did we have access to key resources such as factories and users prior to implementing this strategy？（7.5%）

3. Weakness: （20%）

3.1 Whether the technology and equipment are insufficient？(10%)

3.2 Whether it will directly lead to the disruption of the previous division of labor within the organization？(5%)

3.3 Is there enough money to go around？(5%)

4. Opportunity (17.5%)

4.1 How supportive is the society?

5. Threats (7.5%)

5.1 Does government policy allow it?

Evaluate the Solutions

Criteria: sustainability, strength, weakness, opportunity, threat. Three (sustainability, strength, opportunity) of them will positively contribute to the score which is 20 for maximum. And rest of them will negatively influence the score according to the criteria of previous page.

1: Using Environmentally Friendly Materials for Clothing
10+2-2+1-0=11 new affiliated industry chain is expensive; low-awareness of industry owner will inevitably obstruct this solution.

2: Factory-based technical solution
10+0-4+2-0=8 a large amount of capital is needed just for one factory in middle size; the sophisticated steps require more training in processing the clothes.

3: Establish the primary purification process of the plant
12+4-2+1-0=15 easy to understand the working principle; it is depended on awareness of industry owner.

4: Building direct selling concept based on brand effect
8+5-2+2-0=14 Long-run benefit; because the competence between factories is relative, therefore, only a few industries can apply this finally.

5: To create a complete industry chain on recycling
12+2-4+2-1=11 Large investment will be used to create it for the factory. More labors are needed.
6: A proposal of an e-commerce-based recycling system
6+2-0+2-0=10 it is not sustainable to maintain the partnership with those big e-commerce businesses; public awareness will be positively influenced.

Make an Action Plan

1.Introduction

1.1 Evaluation Results

Unexpectedly, none of six solutions—which are proposed in the process of 'Generate Solution'—is scored higher than 16. Therefore, we have to come up with new solutions. However, before we start a new round of generation of solution. We get stuck at the new possibility of solutions. Because, we realize that the solution from third and second industry is far more practical for us to implement. Also, the pollution from these two target industries is created in only two major ways which are the direct emission form industry and the clothes which are discarded by consumers. So does the solution. Therefore, the finiteness of solution forces us to revaluate the strength and weakness of these existed failed solutions.

1.2 The Priority for Making a Comprehensive New Solution

As a result of our discussion, we select three solutions which are 3,4 and 6 as the basement of the final solution. Because all of our solutions focus on the segmentation of second and third industry of textile industry. Solution 6 thus is selected because its potency for the problem which is caused by the customer, or environmental pollution of third industry in other words. By the same token, Solution 3 responses well for the pollution from second industry, factory indeed. Also, to response the intersection of the weakness for all of the existed solutions which get stuck by the lack of capital, Solution 4 has its advantage in economic feasibility. Therefore, if we can combine the advantage of these solutions, then the best solution will be inevitably established. But for this purpose, we must avoid the counterpart of their disadvantage in order to consolidate its practicality. Therefore, we have made two normal distribution graphs to verify our hypothesis.

1.3 Export of the final solution

Through the SWOT analysis in the round of 'Evaluate the solution', we can see that most of the solutions are facing a shortage of funds. However, as we mentioned in the root cause, there is an accelerating growth of demand for clothes. Therefore, we make a hypothesis that companies of their industry earn much more than the second industry. That is the root cause for the shortage of funds for these factories. For verifying this hypothesis, we randomly choose 20 T-shirts of branded shops which has more than 4.8 voting rate on Taobao and 20 T-shirts of nonbranded shops which also has more than 4.8 voting rate on Taobao in order to control the variation. Surprisingly, within the first standard deviation, the same cotton T-shirt with simple design, the price of non-branded factory is 68.53~154.57

CNY less than the price of branded clothing. Therefore, if we find a strategy which can creates more profits for qualified factories and OEM of bid brands which have matured assembly line and provides customers clothes with best cost performance at the same time. Then, the shortage of capital will no longer be the obstacle of purchasing equipment which can be used to reduce environmental damage. Thereby, we decide to build an e-commerce platform based on the business mode of direct sales. The function of this platform is building a bridge which connects with trustworthy factories and customers. Furthermore, for attracting customers, we develop a system called 'green coin system'. In this system, customers can donate their obsolescent clothes. Then according to the offer of clothes recycling company, they will be rewarded by green coins which are vouchers that can be used when they are shopping in our platform. Therefore, by implementing this platform, the pollution which is caused by waste clothes can be reduced in a systematic way.

2.Solution Design

1.1 the Online trading platform

Based on the brand effect, let the factory to the customer directly increase the profit of the factory space and have the ability and certain investment, sustainable development we will create a network of online trading platform, through this platform to connect directly to the factory and the consumer, in building a bridge between factories and customers, charge a small fee (is far lower than the brand effect of price difference) to stabilize the construction of the operating platform and iteration.

1.1.1 Homepage design of online trading platform to attract consumers

We will name the platform "Green Fashion" to fit The concept of "The sustainable transformation of clothing and luggage industry in China". We sell and advertise not only products, but also factory-to-customer characteristics under the premise of sustainable fashion - excellent products, fashion symbols and affordable prices. Therefore, in order to attract consumers, the design of the homepage should be carried out with the three points that consumers most demand: trend, quality and cheap price.

1.1.1.1 Fashion

Fashion design will focus on "Green Fashion" to design product advertisements based on logo posted on the homepage of the website. Customers can feel fresh and trendy information once they have entered the website, thus being driven to browse backward in the era of fast fashion.

1.1.1.2 Brand effect of qualified quality

First of all, it is clear that the manufacturers we require are qualified or have accepted the contract of big brands, so they are capable of designing and producing high-quality products in line with the quality requirements of the world's first-tier brands. In order to publicize this, we need to add "our Story" or similar home page module to let customers know how our products are processed from the factory to their hands. We still want to promote the brand effect, this time the

brand effect is not a sky-high price, but a symbol of quality.

1.1.1.3 Cheap price

Cheap price is the foundation of our platform construction. We plan to do two things in order to let customers know the existence of cheap price. On the basis of the low price of the product page, the price of the same level of products in the market will be marked next to it to let users know the low price of our products. The second reason is the low price of our products. That is to erase the high brand effect. We will list specific market data and details.

1.1.2 Design of trading platform to attract factories to settle in

To keep the platform running, it is essential to invite factories in. We plan to do three things to achieve this. They are the initial generation of sales from the investment products, the platform operation concept of publicity, fit the factory's psychological trading rules.

1.1.2.1 Sales of early-generation self-investment products

We know that in the early stage of platform construction, it is difficult to directly bring the platform to the factory for settlement. It is very necessary for us to invest in the production of a product in the early stage, which is directly purchased from the factory and sold at low profit. This initial pattern is divided into three phases. They are factory assembly line construction, factory settlement mode and sales.

1.1.2.1.1 Factory assembly line construction.

The value of this initial investment product is not only to prove the success of our concept, but also to meet the need for sustainable transformation - environmental protection and sewage treatment. Therefore, we will design a small, special sewage purification system for this assembly line based on the connection with a specific factory assembly line. We will ask the factory to design products according to the concept of "Green Fashion", such as clothing styles, logos and so on

1.1.2.1.2 Factory settlement mode

The premises of the factory must adopt our special sewage treatment, and then design their own style, which we approve and put on shelves.

1.1.2.1.3 Sales

The main content of sales is pricing, setting a price at which a factory can make more money and consumers can spend less. Since the price of the product affected by the brand effect in the market is usually 900 percent higher than the cost, we just need to find a figure between 900 percent to satisfy both sides.

1.1.2.2 Publicity of the platform operation concept

After the success of our first trial operation, we sent the design questionnaires and samples to various factories to invite them in and publicize the concept.

1.1.2.3 Trading rules in line with factory psychology

We will carry out pattern design on a one-to-one basis for each factory. For those with strong capital, they should establish environmental protection production line first and then settle in. For those with lack of capital, they should conduct trial operation first and immediately set up environmental protection production line (add the environmental protection workshop designed by us) after the revenue

from our platform. Then comes the pricing. We will follow the history of the factory to check the personnel composition and contract status of the factory, and offer a satisfactory price for the factory that can earn more money and spend less money by consumers considering the consumer psychology.

1.2 Factory transformation plan

We will scientifically design a point-to-point transformation plan according to the actual situation of the factory and national indicators and in accordance with the challenge and root cause we discovered before. Include: embedded green workshop and long-term operation contract.

1.2.1 Embedded environmental protection workshop

We will design an assembly line workshop that can be used by every factory to ensure that the production line is green. We plan to design a sewage flow in the sewage of the production line to investigate the chemical substances and harmful gases produced by the production. We design an environmental protection filter workshop with chemical and physical logic, which is easy to install and implement, and require each factory to use it.

1.2.2 Long-term application contract

For some powerful factories, we will require the embedded environmental workshop to be set up before entering into our platform and sign long-term and considered production and sales contracts. For factory economy is bad, in order to achieve the concept of sustainable transformation, we can lend to establish environmental protection workshop for them first, after a profit return debt or we will keep such factories from the platform of the profits to take the lead to meet consumer demand for lower prices and desire to promote the industry transformation.

1.3 Recycling system

1.3.1

We will issue green Coin. When customers send clothes or bags they want to recycle to the platform, we will give them a certain amount of Green Coin according to the real-time data of the clothing exchange market and the recycling market. The amount of Green Coin directly corresponds to the price of clothes sold on the platform. One Green Coin is equal to one unit of currency, which discounts the listed products. We will decide the upper limit of green Coin for each piece of clothing according to the implementation of the factory to ensure the sustainable development of the factory.

1.3.2

We will contact fabric production plant, electric power combustion plant, second-hand market, material recycling market for about 100 percent of the recovered clothing and create economic and environmental benefits. Because recycled clothing can be used directly in the secondary market to reduce production pressure in the primary market and the use of chemical fertilizers to ensure sustainable development throughout the industry cycle.

3. Implementation Plan

1. Build online network platform

1.1 According to the idea of solution design, the website is divided into main page and several sub websites. They are: 1 home, 2. Shop all, 3. Closures, 4. Luggage, 5. Our story, 6. Our craft, 7. Contact, 8. Shipping and returns, 9. Store policy, 10. FAQ, 11. My wallet, 12. My orders, 13. My accounts, 14. My wishlist, 15. My addresses. Their functions are: 1. Display the core themes and main products of the platform. 2. Display all products. 3. Display all clothing products. 4. Display all luggage products. 5. The purpose of the exhibition platform and the settlement of the factory, the profit-making mechanism of consumers and the construction scheme of the recycling system. 6. Introduction of the factory assembly line, mainly to prove the source of high quality goods. 7. Channels to contact us. 8. Questions and answers of express transportation system. 9. Green coins' preferential scheme and purchase instructions and other policies and regulations. 10. Question and answer section. 11. Customer wallet and green coins inquiry. 12. Customer order inquiry. 13. Customer account number inquiry. 14. Customer whishlist query. 15. Customer address management. Therefore, accomplishing them becomes to our top priority.

1.2 Preferential policies, the specific calculation method of green coins

According to the actual situation of the market, mainly according to the customers want to recycle the clothes for sale as a reference. A green coin corresponding to one RMB policy will be implemented, and the maximum 20% discount will be offered on the original price.

1.2.1 Calculation method when the platform does not directly connect with the recycling plant to form an industrial chain

The ratio is about + 5% of the cost of clothing bags in the sales price under the market brand effect

Customers send their clothes to the platform in exchange for green coin discount:

Green coin is allocated according to the brand and price of clothes

Luxury brands such as Chanel, etc. purchase price (RMB) * 10% to obtain green coins

Fashion brands such as Nike buy price (RMB) * 15% get green coins

Affordable brand & no brand clothing purchase price (RMB) * 20% for green coins

Green coin can be directly used as RMB equivalent value, and the maximum daily use limit is 20% of the products sold on the platform

1.2.2 Contact with recycling company

When there is a recycling factory directly connected to the platform, sign a contract with the factory to formulate the purchase policy of recycled clothes to determine the green coins preferential standard. Recycled clothing can be almost completely reused. The recovery value is high, and the recovery output can basically cover the cost of the product. Therefore, such a setting can even make a profit, but the recovery mechanism does not seek to make money.

2. The actual plan of factory settlement

This section mainly describes the technical transformation scheme of the factory, the contract details signed with the platform and the product pricing scheme.

2.1

Embedded sustainable workshop model Sewage quality is an important basis for sewage treatment scheme. In order to understand the composition of wastewater, samples were taken from the sewage treatment tank in three months, and a third party was entrusted to issue water quality analysis report.

According to the investigation of relevant product patents and designs at home and abroad, most domestic sewage treatment equipment has large volume or complex process, which has the disadvantages of high price and long construction period, which is not in line with the current situation of small and medium-sized enterprises' sewage treatment. This scheme selects waste water incineration technology as a simple and efficient wastewater treatment method which is not affected by water temperature, water quality and other factors It deals with industrial wastewater with high volatility and difficult degradation.

Communication art is the cornerstone of project management. When conducting SWOT

risk analysis on various products, it is necessary to communicate with suppliers whether the existing process parameters (such as energy consumption, voltage system, natural gas pipeline pressure requirements, water pressure, etc.) of the factory meet the equipment interface. Considering the quotation, technical level and domestic after-sales service ability, the evaporator of D company, a famous American company, was finally selected. This case is the first sewage treatment project of the United States in China. Company D requires full payment for the product before offshore. After negotiation, company d also expects to open up the Chinese market for the product, and finally agrees to reduce the price. It also presses part of the balance payment until the commissioning is completed before collection, thus reducing the project risk.

The principle of the evaporator is that most of the waste water can be oxidized into carbides

and steam when it is sprayed at a low speed. The oxidation rate mainly depends on the heating temperature of wastewater and air supply. At 1250 of, all VOCs and organic matter will be oxidized, and the efficiency is about 70% - 85%. The carbide sludge deposited at the bottom of the chamber can be removed regularly.

The daily operation cost of the system is mainly natural gas. Taking the monthly sewage volume of 6m3 as an example.

According to the incinerator interface, the P & ID diagram of the system is constructed, and the pipeline diagram of the plant gas path, circuit, water path and evaporator is established.

The key interface and design points are as follows: (1) the diameter of the natural gas pipeline is 1 inch, and the instrument is displayed by psi unit; (2) the power supply is 230VAC, single-phase and correctly grounded; (3) the compressed air can supply 10 CFM under the pressure of no less than 100 psi; (4) The 3 / inch NPT

connection of the water pipe is connected to the overflow tank and the supply tank respectively; (5) the upper and lower liquid level limit switches are set in the sewage tank to form a chain soft logic mechanism with the sewage pump, so as to avoid the waste of equipment burning and the danger of sewage overflow.

3. Platform---factory contract signing mechanism and contract theme.
3.1 Obligations of the platform
3.1.1
Provide an ideal design scheme of embedded pollution treatment workshop before the factory formally enters the platform to ensure the sustainable development of the plant. The cost shall be borne by the factory itself.
3.1.2
When the factory does not have funds to invest in the sustainable development workshop required by the platform, the platform should loan to the factory to build the workshop, and the factory is required to repay the fund in the later stage.
3.1.3
Inspect the supply line of the factory to confirm the quality of the assembly line and the quality of the goods. Analyze and calculate the cost of producing standard clothes or bags in the factory. Confirm the sustainability of raw materials in the plant.
3.1.4
The factory will provide exposure opportunities for the clothing and luggage products of the factory, and provide sales channels and sustainable passenger flow for the products of the factory. At the same time for the factory customer consultation services and delivery services.
3.1.5
The platform should clearly sign the exposure time and specific production line with the factory, so as to design and release the advertisement for the green environmental protection, sustainable development assembly line and high-quality raw materials.
3.1.6
The recycling preferential strategy released by the platform can not reduce the profit due to the factory by reducing the product price.
3.2 factory's obligations
3.2.1
The construction of the pollution treatment workshop designed by the platform must be accepted whether the loan is made to the platform or paid off in one time.
3.2.2
When the platform confirms the factory's supply line, the factory must produce according to the contracted assembly line, and other production lines cannot be used for supply.
3.2.3
The factory needs to ensure that the raw materials of the goods are reusable

environmental protection materials.

3.2.4.

The appearance design of the product needs to be designed by the factory itself.

3.2.5

The product pricing of the factory should be based on the highest pricing space after considering the cost of the platform in the factory assembly line.

3.2.6

Loan strategy of embedded pollution treatment workshop.

The premise of this approach is that the factory wants to enter the platform and has its own production line, but has no funds to build the pollution treatment workshop required by the platform.

The estimated price of the workshop is:

Scheme 1: the factory and the platform sign a supply contract, and the unit of validity of the contract is months. The factory needs to provide the platform with the same interest and workshop cost every month, which is 20% of the actual construction price of the workshop. The factory needs to pay all the loans before two thirds of the contract period. The specific amount of monthly payment is calculated according to the publicity: workshop construction cost * 1.2 A kind of Months of validity of contract A kind of zero point six six

Option 2: potential factories give shares to the platform in exchange for the construction and settlement of sustainable development workshops. The platform has the right to explain whether scheme 2 can be truly implemented.

3.3 Pricing scheme of factory products

Because the ultimate goal is to let users experience high cost-effective products, and at the same time, we need to let the factory really make money and develop healthily and sustainably. Therefore, the pricing scheme should satisfy two conditions. 1. The factory can make higher profits from being contracted by the brand before entering the platform. 2. The products purchased by users are cheaper than those of the same level in the market.

3.4 Specific scheme of platform recycling mechanism

According to the team's research on the clothing recycling market in the United States, the rate of clothing entering the second-hand market after recycling is 45%, the proportion of cloth into other textile products is 30%, the ratio of material extraction and renewable fiber utilization is 20%, and the ratio of incineration and power generation is 5%.

According to the data of smart, almost 100% of recycled clothing can be stored and re generated.

Our plan is that as the tertiary industry, we will cooperate with the secondary industry to return the purchased clothing to the secondary industry for recycling of the secondary and tertiary industries to reduce resource waste.

3.4.1 Second hand sales market

According to China's well-known second-hand goods market: idle fish, most of the second-hand clothing prices are 25-60% of the original price. (all items of clothing

are idle at home.) According to the green coats computer system described in 1.2 above, the profit margin caused by the selling price of most clothes is as high as 500%, and the discount rate is 25% - 60%. The sales price is still higher than the cost price of clothing. In this regard, the platform does not consume any financial resources of the platform by purchasing customer clothing through green coins. The profit margin of the factory's product pricing is about 30% (far lower than the market profit margin). On this basis, the selling price will be increased by 15% - 20% to balance the cost of purchasing customers' second-hand clothes with green coins. Even if this may lead to a 45% profit margin on the price of the product, the profit margin of 500% compared with the brand effect is still highly cost-effective. Or, according to 40% of the price of the customer's clothing, green coins can be used to purchase. The platform can almost balance the cost of purchasing the customer's clothing by contacting the factory and the second-hand distribution platform. In this way, the platform will not lose any profit, the profit margin of the factory will not change, but the second-hand old clothes of customers will flow into the market, which promotes the recycling of clothes.

3.4.2 Transformation into secondary textile products

For customers with poor quality clothes, they can only be transformed into cloth by factory reorganization and then converted into rags and other secondary textiles. For this kind of second-hand clothing, the platform needs to contact the secondary prevention industrial factory in advance to confirm the purchase price of clothing, and then compare the clothes provided by customers to purchase green coins.

3.4.3 Fiber recycling.

This type of treatment is a recycling method developed for the customer's high-quality clothing. For high-quality clothing, its material fiber is rare and can be reused. In the United States, 30% of the second-hand market is for fiber recycling. For this kind of clothing, the platform still adopts the factory contact mode to contact the fiber recycling association or the factory to determine the purchase price, and then compare the quality of the customer's clothing to return green coins.

3.5 Combustion and power generation

For customers who have been unable to use, seriously damaged cheap clothing can only be burned or generated electricity. For this kind of clothing, the platform still adopts the factory contact mode to contact the fiber recycling association or the factory to determine the purchase price, and then compare the quality of the customer's clothing to return green coins.

To sum up, the production platform of recycling mechanism will not lose any interests, the profit space of the factory will not change, but the second-hand old clothes of customers have entered the market, which promotes the recovery of clothes. This is a very favorable solution to promote the transformation of clothing and luggage industry: to establish the tertiary industry of clothing recycling and connect the industrial chain of the secondary industry.

3.6 green coins mechanism

See 1.2

4. Investigation and iteration

4.1 survey of pricing

According to the data analysis model of normal distribution, this paper analyzes the data of factory clothing and clothing under brand effect in the market to analyze the cost and brand profit space of the same quality. Then according to the production cost of the factory assembly line, the price is reasonable

4.2 positioning survey of products that customers want

Set up a survey form to find the type of clothing customers like to sell and iterate.

4.3 investigation and iteration of market development potential

Investigate with potential customers and check their approval to modify the solution strategy. At the same time, the special users of prototype test are selected for later prototype iteration.

4.4 web survey

Issue a satisfaction questionnaire to ask customers how much they like web design and modify the webpage

4.Response to Challenges and Root causes

4.1.1 First industry

Waste of water during planting the cotton is the most universal pain points for farmers who cultivate these crops. It is not realistic to promote water-saving facilities to farmers; it is also hard to applicate them in land of China which provides 30% of the world's cotton output. But we can reduce the demand of second industry for such raw materials by recycling the second-hand clothes. For this purpose, through the green coin system, more and more clothes will be transformed from our customers to us. Then we can donate our sale these recycled clothes to corresponding business. Therefore, such raw materials can be used again in production of new products.

4.1.2 Second industry

The phenomenon of the pollution in second industry is reflected in two major ways which are respectively the waste of energy, water and materials and pollution of air and sewage. These problems are caused by two main reasons which are respectively the deficiency of production equipment and lack of purification equipment. However, the crux of them is the lack of capital.

Nevertheless, our final solution responses to this challenge by building a website which is the platform that directly connects factories and customers. By building extended partnership with OEM of big brand, factories can independently provide and directly sell products with high quality to customers. Because there is a big price difference between material and labor costs and commodity pricing of big brands. Therefore, our partners can set a relatively low price in order to have more customers purchase these products with optimal cost performance. This will optimize both market share and incomes of these factories. As a result, the crux as

known as the insufficient capital will finally be solved.

4.1.3 Tertiary industry

The main problem of tertiary industry is the awareness of customers who dominate the whole textile industry. While the growing of population and demand of pop clothes, more clothes are produced subsequently. However, more and more clothes are obsolescent consequently. If there isn't an attractive bonus system which can encourage customers to join the recycling of clothes actively. Then those obsolescent clothes will be thrown away at will. Thus, the materials like fabric and other type of chemical substance may destroy our communal environment continuously. At the same time, none of the recycling company can collect these clothes with massive quantities and extensive distribution in entire China. Nevertheless, our final solution responses to this challenge by creating the system of green coin. By using this coin, consumers can buy the same product at a lower price. Therefore, we will give our customers green coins when they donate their obsolescent clothes in order to avoid such continuous damage to our environment.

📄 Normal distribution image: brand clothing unit price
📄 Normal distribution image: nonbrand clothing unit price

Prototype and Test

| Prototype Design

Because it is a prototype, and we do not have an opportunity to contact with clothing and luggage industry. So, the prototype part of factory settlement would not be designed.

1. E-commerce platform with green coin system

1.1 E-commerce platform

1.1 Prototype design of home page

Please refer to Appendix 1 for details. The main function of the home page is to display the brand logo, green coins mechanism, main products and other subpage channels. Green coins is the most unique point of the platform, which is highlighted with black characters on a white background. Selected some handmade clothing production pictures to decorate the website, presenting a concise and euphemistic style.

1.2 Prototype design of sub page

1.2.1 prototype design of shop all page

See Appendix 1, two series of products are designed, namely luggage and clothes. Since there is no factory in the prototype design stage, we simulated a series of products to carry out prototype testing. This simulation series is called green fashion pioneer. For the green fashion pioneer series of luggage, green fashion hand bag series and green fashion bag series are designed. For clothes, the green fashion T-shirts series was designed. The grid layout is adopted to present the product intuitively

1.2.2 prototype design of our story page

In order to show that our behavior is to create happiness for people, we chose pictures of hugs and gifts as decorations. The background color is light brown to render the simple scene. The main purpose of this website is to convey the mission of product industrial transformation and emphasize the environmental friendliness of products.

1.2.3 prototype design of the process page

The main purpose of this page is to show how the platform can provide customers with a low price, environmental protection, high quality products. This paper briefly describes the scheme of the factory and the selection of products. In order to let the customers, integrate into this thinking environment, we choose the photos of the draft design stage of garment manufacturing as decoration.

1.2.4 prototype design of contact (get in touch) page

This page is mainly about how to make the factories that want to settle in contact with us. This is equivalent to a contact window. The use of light brown and white as the background highlights solemnity, which means that we esteem about cooperation.

1.2.5 prototype design of other sub pages

Other subpages include order statistics, account balance and account login. This is not the focus of the prototype design, because each website has such a function. See the appendix for details.

1.2 Green coin system

Function: As we mentioned in solution design, by applying our system of green coin, more customers will be attracted because of the voucher and more obsolescent clothes will be proactively collected because of the mechanism of this function.

The homepage design of our website specifically described and showcased in the file in the attachment.

📄 E-commerce online platform website"Green Fashion"

Feedbacks learnt from users

In order to attract our customers and persuade our potential partners to take a part into our system. The research is divided into two pieces which are respectively qualitative research for website design and quantitative research for exploring the potential market.

2.1 E-commerce platform

We made two questionnaires for the website we built and the cash back system for recycled clothes, and put them in different social circles to ensure that the potential customers who visited our questionnaires had different backgrounds. In addition, we invited featured users to try out the prototype of our site.

2.1.1 Quantitative feedback of the online platform experience

2.1.1.1 the User satisfaction survey.

There are 33.3% of the survey consider the design of the website is great.

2.1.1.2 User's impression of the mechanism of Green Coin

There are 38.1% of survey takers consider the expression of green coin mechanism is very clear. 42.86% of survey takers consider the expression has no Pain and there are 4.76% of Survey takers considering it is not that clear.

2.1.1.3 User's Impression of our mission: The sustainable transformation of clothing and luggage industry.

But it's the takers' decision that makes the decision takers consider the expression is very clear. 23.81 of them consider the expression is OK and There are 9.52% of them consider the expression is not that clear.

2.1.1.4 User's impression of our Factory-direct sale Mechanism and its benefit (Lower price, high quality and sustainable).

There are 28.57% of survey takers consider the expression is very clear. 47.62% of them consider the expression is clear The expression is not that clear and 4.76% of them cannot receive anything about our mechanism at all.

2.1.1.5 User's Overall Text Feedback

But it's the decision that makes a text feedback question to the potential customer in order to make sure that We would not lose any aspect of feedback. There are 71.4% of survey takers' interface design, Of Survey takers consider that the recycling mechanism is not clear, they have no idea where they old clothes go.

2.1.2 The qualitative feedback of the online platform experience.

We invited five featured users to test the prototype site with us. We will experience the site from them in the context of our undirected instructions and intentional explanations. We can only explain when the specific user is unable to get the information to ask questions. We will analyze the user's web browsing order, order of operation and access to the site mission and business mechanism information.

2.1.2.1 Web browsing order of special users.

After browsing the homepage, three special users click "Shop All" to browse All the products and then place an order to finish browsing. Two special users found and visited the hyperlinks of each subpage after browsing the home page.

2.1.2.2 Order operation of special users

One special user did not open the product description by himself. There were two special users who placed orders directly without opening Green Coin system instructions. Two special users placed an order and used the Green Coin for discount after browsing the promotion of Green Coin system.

2.1.2.3 Read the mission and business mechanism information of the website by special users.

Two special users never visited the platform introduction and business mechanism page. One of the special users did not see the business mechanism page. There are two special users who read all the website information.

2.2 Green coin system

The objective of the research for this prototype is proving the attractiveness of the green coin to customers and showing the market potential to our partners, in the other words, factories and recycling companies. Therefore, we choose quantitative questionnaire to achieve our objective.

2.2.1 Quantitative feedback1

We want to find out exactly how much clothing in an area needs to be recycled. Therefore, we chose the place of delivery in Haidian District and asked the following question: Summer is almost over. How many summer clothes do you not plan to wear next year?

2.2.1.1

Through the normal distribution we make for the first question, we find that average value is 2.568.

2.2.1.2

Through the normal distribution we make for the first question, we find that within the first deviation standard, the range of value is from 0.251 to 4.885. Therefore, according to the population of Haidian District in 2020, which was 3.27 million. There are totally 8.39 million clothes can be recycled in average.

2.2.2 Quantitative feedback2

We want to find out the attractiveness of our green coin system. Therefore, we asked the following question: If we return the voucher to you according to the material price of the clothes, which can be used to offset the price of the clothes, would you like to recycle some of the clothes you are going to eliminate?

2.2.2.1

According to the analysis, more than 81.28% participants have a 'yes' for this question.

📄 The sustainable transformation of clothing and luggage industry customer survey-Online platform test - report

📄 The sustainable transformation of clothing industry-- Green coins system customer survey report

📄 Normal distribution image: Clothes to be recycle

Improvement for next iteration

3.1 Improvement for the e-commerce platform (website).

3.1.1 For the quantitative survey part:

First of all, we know that at least 81 percent of our users think our web art design is very suitable. But there is an error, because the audience groups of this part of the questionnaire are mainly high school students and college students, that is, Millennials. Their aesthetic is more avant-garde. We will do more surveys in the future and iterate on it. Secondly, a considerable number of users think that the mechanism of website recycling system is not clear enough. This is a point that we didn't consider before. We only made clear the role of green coin in the website, but didn't write in detail how we recycle and where the clothes go. In order for users to better feel our team vision, we will improve this part in the next iteration.

3.1.2 For the qualitative survey :

We invited five special users, but only two of them visited the introduction page of

the team's vision and strategy. In order to enhance the platform's cultural benefits, we will add a simple website logic system in the next iteration to facilitate customers to quickly switch between websites for browsing. As for the discount part of Green Coin, customers may encounter some problems when they pay. We will add clear module function keys in the next iteration.

3.2 Improvement for the Green Coin (recycling) system

3.2.1 For the first quantitative feedback:

Although the result is good to us. However, there are still two points for us to improve based on the realistic marketing information. First, most of the participants are students who can't represent the normal phenomenon for all residents in Haidian and Hangzhou. Therefore, we should change our delivery locations in order to improve the credibility of this research. Second, we should specifically segment these clothes to be recycled into different segmentation. Because different type of clothes represents different recycled materials which may have a difference on their recycled value.

3.2.2 For the second quantitative feedback:

Although we get 81.28% participants who is willing to recycle their clothes. There is still 18.72% people who don't want to recycle their clothes in order to get green coins for shopping. Therefore, in order to attract more customers to join this recycling system, we should design a quantitative research in order to find the root cause for their refusals, then come out with solutions for their worried psychology.

Team Credits

黄诗云 Shiyun is responsible to decide the overall topic, follow up the progress of each team member, summarize and adjust the structure of the whole thesis, conduct actual investigation and analysis, analyze and write :Summary, Identify the challenge, Identify a Root Cause, Generate Solutions,Identify the Criteria, Make an action plan, and Prototype and test.

袁浩庭 Haoting is responsible to summarize and adjust the whole thesis, conduct actual investigation and analysis, modify : Identify the challenge, Identify a Root Cause; analyze and write: Summary, Evaluate the solution, Generate Solutions,Identify the Criteria, Make an action plan, and Prototype and test.

余松涛 Songtao is responsible to analyze and write: Identify the challenge, Identify a Root Cause, Generate Solutions and collect resources.

陈泮宇 Panyu is responsible to analyze and write: Identify the challenge, Identify a Root Cause, Generate Solutions and collect resources.

崔无为 Wuwei is responsible to summarize the resources in: Generate the solution and Root Cause.

Judge Comments

" Review Comments:

I really appreciate the amount of research that has gone into this project – it is one of the best researched projects I have come across in this competition. The team has done a detailed and systematic breakdown of the challenges facing the industry. I particularly appreciate them identifying the land/soil degradation linkage to the clothing industry as well as the severe labor issues usually associated with the industry.

It would also have been nice to see the model developed being applied to the proposed solution. While various aspects of the solution is systematically thought through, I think some of the likely challenges in getting support for the project in the early stages (including for the Green Coins) is underestimated. Better incentive mechanisms exist and there might also be opportunities to integrate the app-based market concept with the original solutions considered.

The STEEPLE model is an alternate model that brings in the environmental/sustainability angle as well (you can consider it in lieu of the Sustainability + SWOT model). I like how detailed the applied criteria is – The SWOT analysis can be improved (It is in-fact best applied as a static criteria). For instance , for O, the team has a subquestion "How supportive is the society? ". This question already assumes that societal support is an opportunity. The question should be applied in reverse. You consider 'society' as a factor that affects your project and analyze if it is an opportunity or a threat (and what conditions make it that). A supportive society could be an opportunity (O) but an unsupportive society could be a threat (T) to the idea. The same logic applies across the whole analysis.

I do want to point out that the lack of capital and R&D pointed out is not as severe a problem as the team suggests – while not every producer will be investing in R&D, there is in fact ample research into creating better techniques and technologies being done across the world. This is true for every sector – you always find large sections of industries involved primarily in the manufacturing/retail side without interventions in research or development.

I think the team has done an exceptional amount of research on the topic and should consider ways to take the project forward and to apply their learning to improve the social and environmental sustainability of the sector further!
"