Sustainability Innovation

New System: Solving The Problem Of Overpackaging In The Delivery System In An Eco-friendly Way

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Summary

A world where consumerism leads development by a leash inevitably causes clashes between economic interests and environmental preservations needs.

These clashes between morality and financial gain leads to the unfortunate but inevitable pitfall of being overtly neglectful about environmental devastation as well as a self-preserving mentality that leads many to hide when facing such conflicts.

Thus, naturally, such conflicts generate problems, one of which is the over-packaging of delivery packages commonly seen in online shopping sellers and products.

On the topic of this question, we see many potential problems within: worrisome psychology of sellers and buyers, subpar delivery companies, the awareness of the common crowd, and the technical limitations of materials.

Examining the problems, we see that it consists of two major root causes: the disparity between current social-cultural and technical development, and the mutual distrust between vendors and buyers due to the nature of capitalism.

Thus, knowing these problems and deeper conflicts that cause them, we generated solutions that yield varying strengths to face such problems: would an incentive system work? Or would a new policy work better? Perhaps a technological development would be the solution?

To address these uncertainties, and to sift out the lesser solutions, we evaluate the to-be solutions with a fixed criterion, giving and subtracting points when necessary: would it be efficient, practical, expensive, or complex? To our surprise, the one with seemingly the best prospect lost to a more conventional and "softer" way of solving the problem.

It was to alter the delivery system itself by enforcing that no additional packaging be put on products, but use standardized, reusable, and more effective protection (customized crates, boxes, and receiving machines) provided by delivery companies. Its benefits were clear: it was both financially and time efficient. It altered nearly no steps in the original method of delivery, thus, the delivery people that both take and deliver the packages do not need expensive training to adapt to a new way of package delivery. It utilizes an already popular method of sending and taking

packages (beehive-like temporary packaging saving unit) and legitimizes it, putting it to a canon position, where it can potentially gain more financially in the process: a mending procedure for their fees of repurposing their machinery in the steps to implementation. Finally, it aims for no difference to the public — buyers and sellers using the new system would not be bothered or inconvenienced. Yet, with such a process, all external and unnecessary packaging would be eliminated, and distrust would be halted: after all, how can one judge the quality of packaging when there is none?

A proper solution indeed, as surveys examining states: with high popularity and confidence that it would be successfully implemented, and high willingness for people to try it out themselves.

Feedback can be made — of course — to a few design flaws within: the inherent inability for such machines to regulate or enforce people to take packages from the machine, and worries about certain products to be too private to be shown in public. Under the guidance of these feedbacks, in the next iteration of such products, these problems would be solved, by digital tracking and exceptions/exemptions.

In short, a simple yet effective solution to the modern problem of over-packaging is to stop it entirely, and rely on better and reusable methods of protection, which is both time and money efficient, as well as altering no steps from usual in customers and deliverymen. Feedback shows highly positive reviews and willingness, and proposed criticisms easily improvable.

Identify the Challenges

1. Worried Psychology of buyers
When buying commodities from the internet, many buyers are worried that their goods might be hurt during delivery, especially those needing special protections such as fragile ceramics or glass, and fresh vegetables or fruits. Thus, the quantity and quality of the packages become what they pay attention to: How well can the carton protect my glass vase from fragmentation? How well can the thermal box prevent my fish and meat from rotting? These are all included in buyers' apprehension toward the packages. Therefore, this "worried psychology" drives them to request the sellers to provide as good packages as possible, resulting in many unnecessary additions of materials, such as airbags, holders, or ice bags, to the delivery packages, which causes over-packaging problems to occur. For many buyers, when facing the tradeoff between saving plenty of packing materials and decreasing the risk of broken goods a little bit, they will rather choose the latter.

2. Worried Psychology of Express Companies
Express companies will concern about the quantity and quality of the packages the most because they depend on it to survive and earn a profit. As a result, they would consider a wide variety of factors. For one thing, they should consider the quality of their service. Thus, they would make sure the packages are hard and thick enough to ensure the safety of the goods. Also, they want to send the goods to the consumers as fast as they could. The other aspect that the express companies need to consider is the profit. Only when the packages are delivered to their consumers safely and quickly, the next time when people choose a delivery company, they will remember this firm again. For these two reasons, they will try to perfect their packages as much as they could, either adding packing layers or padding fillers such as airbags or bubble wraps, resulting in a huge waste of materials, which are often hard to be degraded or recycled. Also, to increase the efficiency of the delivery process, delivery guys usually need to throw the packages instead of gently putting them down: this also requires thicker and harder packages to avoid hurting the commodities.

3. Worried Psychology of sellers:
Sellers also play an important role in the overpackaging issue. First is that when merchandise is damaged during transportation, the online store is responsible to resend a new one and take the losses. Therefore, they have the tendency to use excessive materials to pack their merchandise. Moreover, in the E-commerce system (digital business platform), since sellers are very concerned about their ranking,

which is largely based on the evaluation from customers, they are afraid of receiving negative comments because of their insufficient packaging. Thus, overpackaging even becomes a way for sellers to obtain more positive comments and a higher ranking.

4. Insufficient and fixed Package Designs

Another cause of over-packaging results from the design of packages from the delivery companies. From our experience of online shopping, delivery companies will devise several models of packages based on their sizes and materials. These models are often made by cardboard or plastic foam, which are both hard and inflexible, meaning their sizes and shapes are fixed. However, we cannot make sure that all commodities perfectly fit the criteria of the packages. For example, if you buy a series of comic books, it will be too big to use a small-size carton, but too small to fulfill a middle-size one. In this scenario, to prevent the books from damaging, the delivery company has to fill the interspace between the packing box and the books, either using airbags or bubble wraps, which are often useless for consumers and are very likely to be just thrown away after delivery. And because these filling materials are usually made by plastic, it adds considerable stress to the environment if these plastic products cannot be well recycled or resolved.

5. Accessibility of packing material

Another challenge of this topic is how to deal with the low cost of packing material compared to compensating cost for damaged goods in the package. If sellers choose to use less packing material in order to be environmentally friendly, they would need to afford the risk of damaging products because of less protection of the package, which costs are extremely high compared to the cost of the package. In other words, the cost of the package is too low to be worried by sellers. The marginal cost per package will be counted as little if they choose to use an extra package to protect the goods. They would, for example, if a china seller uses less package to reduce pollution leading to damaging a ceramic valued 200 RMB, they would just change to use more packages, 0.5 RMB per one, to avoid this situation happening again. As a result, it forms a vicious circle that sellers will keep adding more and more materials to their packages without paying a high price.

6. Environmental awareness

Actually, most people do not even realize that it is necessary to reduce the waste of packaging. Although people have known that humans need to protect the environment they live in, so that humanity could survive longer and develop in the future, they cannot connect their daily life with the action to protect the environment. They just regard the environment protection as the accomplishment of the government and some social organizations, instead of trying to do something feasible by themselves, such as garbage classification. In this case, they would not find that the package of delivery actually wastes lots of resources at all,

and they won’ t perceive that it is harmful to the environment, so that they will believe that spending extra time and money to reduce waste of package is meaningless. What’ s more, they might require more packaging materials, which worsens the situation.

7. Material technology

One of the most important reasons that the problem of overpackaging exists is because of our limited material technology. This is because our present technology can only provide nondegradable material for packaging with an acceptable cost in mass production. Other environmentally friendly materials such as degradable plastics and degradable foam boards are either too expensive to apply or incompetent for the use of packages. Furthermore, the development of new materials is not well supported by national policy, so it will be slower for people to invent new feasible materials for packages.

8. Human Nature

Humans, including consumers, sellers, and producers, trends to be lazy, which is one typical Human Nature. People would be more than willing to finish a task as soon and conveniently as possible. For example, if people now need to throw their garbage without any restriction, they will drop litter carelessly instead of dribbling away their time and energy to recycle and protect the environment. In the same way, for consumers, if now there are new environmental but more complicated products of express packages in the market, they would not want to take their extra time and vigor to understand how to utilize them. Also, for producers and sellers, even though they could be zealous to produce environmental products, if there were a lack of market demand, they would give up their enthusiasm either without profits. Therefore, one challenge of the topic is to increase people’ s willingness to be environmental.

9. Current Crisis

The excess packaging materials brought by the challenges above result in our current environmental problems of packaging. Because a large proportion of these materials are plastic, which can tolerate in the natural environment for thousands of years, the overuse of plastic materials adds pressure to the global environment and ecology. Marine creatures are dying out because of miseating plastic materials; microparticles are polluting the water resources; toxic gases brought by burning plastic are darkening our atmosphere. The overpackaging problem is currently causing a global crisis.

Identify a Root Cause

I. A Mutual Distrust Dilemma:

Psychology has revealed that we underestimate the credibility and generosity of others, while their actual kindness towards other people are constantly high. Thus, when this distrust happens on the buyer, the seller, and the delivery companies, it causes them to be unnecessarily careful in their actions. For this reason, sellers fear that if their packages are not excessively packaged, they will lose customers which would think the product is low quality, while buyers fear their packages would be damaged without excessive protection. Reality, however, shows that this is painfully unnecessary. Moreover, when either side tries to make changes towards a better future, they would find it nearly impossible: sellers lose sales, and buyers cannot alter such a reality. This causes the awareness of the system to stay low, and everyone have been conditioned to maintain the status quo, where the situation is like a cradle full of crabs: one crab tries to escape, others stop it. Yet without a productive system that can curtail or even eliminate such distrust, the actions and steps towards a better future will never become a reality. This is the mutual distrust dilemma.

II. A Byproduct of Social-Cultural Development

Countries develop in a similar manner, the government from barbarism to democracy, the technology from primitive to modern, and people from dull to intelligent. Such development of society has caused problems, one of which being the conflict between nature and humans, and between materialistic desires and state of mind. Humans have reaped the benefits of natural destruction while nature have suffered, this is yet another example of it. Our technology is powerful enough to mass produce plastic bags millions at a time, but not enough to do so in a recyclable, or environmentally-friendly manner. Yet we as a species do not have enough awareness to limit our endless consumption. This is the conflict of the fast-paced technological development to the slow-paced societal development. Such examples have been present countlessly in the past, such as the population boom caused by the gap between medical development and people's willingness to reproduce, or the burning of coal to boost technological development. Many countries have suffered to this day because their wrongdoings in their past. Thus, a government not aware enough to make public policies that support package

reduction and novel material development, a people not aware enough to care about their actions to recycle and reuse, a society not aware enough to care about the future to motive people to do the right thing will inevitably cause a crisis around packaging. For the slow paced societal development to catch on the technological development is nearly impossible, this is the worrisome byproduct of development.

Generate Solutions

Solution 1: Giving a Choice For Eco-Friendly Packaging
A proven successful way of reducing excessive and environmentally harmful packaging is to encourage consumers to have a choice between eco-friendly packaging or normal packaging. In fact, many companies are initiating the model of using compostable material and un-compostable ones at the same time. With compostable packaging, we successfully mitigate the harm of using packaging on a root level – any packaging that will last 1000 years to compost is bad packaging. In this phase, companies give consumers the choice of using either one. This is because compostable material packaging is a new field, of which prices are inevitably higher than normal, and to a business that uses packaging commonly, packages like these cost a lot. We should not demotivate sellers by requiring them to sell at a loss. However, by giving the consumers a choice, we connect their inner motivation of protecting the environment to an action that is actually achievable, which helps them make a choice towards the better good. This business model is sustainable, proved by the success of the “Ant Forest” project that was initiated by Alibaba, which was launched to encourage public transport and lower carbon emissions, similar to the one we have at hand. A similar successful model is the “#TeamTrees” movement in the US, which was a more straightforward way of helping the environment – a crowd-funded plan to plant one tree for every 1 dollar donated. The popularity of both proves that by channeling the need for a human being to help the ecosystem with a concrete action such as paying money or using public transport, such a business model would prove successful. Thus, by giving the consumers a choice for both, and providing information for them that one would be much more eco-friendly than the other, they would autonomically choose the better choice, as it channels the inner motivation of them.

Solution 2: Online Shopping Ranking Stimulus
Addressing the main reason that is causing the sellers to overpackage them: we observe that they are deeply concerned about rankings in search results. Thus, we propose a stimulus program that can be used to increase rankings based on the percentage of sales being eco-friendly packaged. Such eco-friendly packaging may be the “original package” of the product, without additional overhead, or it may be a novel material, or even additional processing. The incentive program goes as follows, if a larger percentage of products on a seller's shelf support eco-friendly packaging, they get an additional weight when ranking their shop. If the consumer chooses such a way of packaging, they would get additional points that may be converted to goods or coupons. By providing both sides with sufficient incentives

from online shopping corporations that can afford the cost, they can provide long-lasting beneficial effects on the environment.

Solution 3: Choose-Able Package System

Because the size, material, and filler of delivery packages are only determined by either the sellers or the delivery companies, who often cannot know the preferences of the customers, it causes many misunderstandings and disputes. With a system that customers are allowed to customize the packages, they could choose how many boxes or bags, which kinds of materials, how much filler, how rigid or stretchy they want the outer package to be. More importantly, it can resolve many worries of sellers' of being reprimanded for packaging being subpar. In addition, with the express fee correlating to the number and quality of the package that the buyers choose, they will be more deliberated and considerate when choosing the package they want and be responsible for it, which can prevent the problem of overpackaging. There will be a system designed to enable the buyers to do the choosing when they place an order online. (This system is special because it strongly depends on the knowledge of buyers about the protection function of the packages. One important element that must be taken into concern is who will bear the consequence if buyers do not choose sufficient package materials for protection, so this will be one problem that reduces its score in the "safety" part of the evaluation.)

Solution 4: Reusable Package with Delivery Lockers

When thinking about how to reduce the use of the delivery package, there is another way to resolve this issue effectively, or even to eliminate it fundamentally. Delivery companies can totally abandon paper boxes or plastic bags, and instead use high quality and reusable packages for carrying the commodities. When the delivery men reach the place, they can just hand the stuff to the buyers or store them temporarily in the delivery lockers and withdraw the packages for later uses. And the buyers can access the lockers at any time to get their goods directly. In this way, no more one-off packages would be produced or used, and this problem is solved completely. The key point of this solution is to construct a thorough express system consisting of lockers as well as the reusable packages, which are both essential to implement this method.

Solution 5: Offer Consumers a Sense of Achievement

There are many ways to deliver eco-friendly packages, but at the end of the day there is a central question: will consumers accept them? If consumers are unwilling to accept such an approach, then no scheme will work. One way is if the government or local community is willing to provide a sense of accomplishment to the customer. The government or community will recognize people who are willing to accept the green package, which can provide the inner motivation to consumers and promote people's green behavior to a greater extent. For example, when

consumers are praised for their environmental behavior, there will be more environmental issues between consumers and their friends and whether there is peer pressure to be recognized by the government. This could lead to greater acceptance of green packages

Solution 6: Improve the Process of the Express Service.
As we all know, the meaning of the thick package is to protect the goods from the crack in the way. If the expressage company could decrease the unnecessary crash during the way, they don’ t need to add packing to protect the product. One of the practical ways is to add something soft in the walls of the vehicle and try to put all the packets as close as possible. The packets in such vehicles will suffer less crash although the vehicles themselves shake extremely drastic. Because the short distance between two packages limit the intensity of the clash between the packages, and the soft walls could decrease the influence of the shake of the vehicles. What’ s more, the training could make sure the worker does not crash the packets and then lead to the broken of the packet by fault operation.

Solution 7: Classification
As we all know, in modern society, people could buy almost anything through the internet, such as books, computers, foods, or clothes. It is easy to find that some of these goods really need thorough protection to make sure they can work well for consumers, like a phone or a computer. Other goods, however, just need a thin package to keep them from dust, like clothes. These two kinds of packets should not have the same packages. However, the expressage actually uses a similar package for all goods. In this case, if the expressage companies could classification the goods, and just add a thick package to protect those valuable or easily broken goods, they could really reduce the waste of packets.

Solution 8: Recycle Station
Create a place near the delivery locker for people to open their packages by providing scissors and carton knife. As a result, immediately after consumers receiving their packages, they are more likely to open it right away and recycle the delivery materials. There are also signs beside to encourage people to put their packages into different recycle boxes label with “Cardboard”, “Plastic bag”, etc. Every day at 6 am, a recycling car will come and remove all delivery wastes and transport them to the recycle canter to further reuse or dispose of the wastes. In this way, people, especially consumers, are more willing to do their recycling and help the environment. It will also be more convenient and efficient to reuse the package materials.

Solution 9: Environmental Publicity
Arouse people’ s awareness of the damage to their community environment cause by the overpackaging issue. This goal can be reached through publicizing both in

the local area and nationwide. In the local area, people can use their announcement boards to post posters about the importance of recycling, organize activities that encourage families to participate and learn about recycling, and provide lectures about this in local schools. Setting a National Environment-Friendly Day or Recycle Day would also be a good choice to awaken people' s awareness of the necessity and immediacy of reducing the delivery packages to protect the environment. The provincial and central government can also subsidize firms to produce noncommercial ads about environment protection.

Identify the Criteria

PRACTICALITY

Before applying a solution, it is most necessary to consider whether the plan is practical. In other words, people must apply a solution that can be realized in the now available situation in a different area. If the solution needs some devices or technics, it should make sure the devices and technics are based on the existing material and theory. If the solution needs the ability of the workers, it should make sure that after training systematically, most workers could achieve the standard to implement the solution. If the solution needs cooperation between the sellers and the consumers, it should make sure that both sides would have the will and ability to do so. It has nothing to do with complexity but a simple possibility. If out nowadays capacity does not allow us to implement the solution, it will just be ideal but not realistic.

COMPLEXITY

When applying any solution, there will always be extra work and effort needed to implement those changes. Therefore, it’ s important for us to consider the complexity — how much extra effort do people need to perform compared to the original way of package delivery — of the solution besides practicality. In order to measure this aspect more statistically, complexity can be analyzed from two directions: people and resources. Here, people mean the extra work of anyone participated in the delivery process (seller, transporter, buyer, recycler, and maintainer of the solution) (including coordination cost and propagandize cost). Resources include the space needed to perform the solution, the necessary tools, the needed materials with quantity and quality, etc.

ECONOMY

A solution’ s value is directly in correlation with its practicality, which has a major determining factor of price. If a solution would cost any party excessive amounts of money, it would be deemed low value. These parties include the government, the sellers, the consumers, and the delivery companies, be indirect or intermediate costs, or even taxes. It would be no doubt that if it is financially costly, there would be denial, refusal, or even protests against such practices, leading to a higher consequence than money, a sight that no one desires. Thus, we can reasonably conclude that only a solution that provides the least loss, or even gains, can be chosen and given a high score. Having established the importance of it, to analyze it more statistically, we may compare the price of the current solution – plastic packaging bags – to any proposed solution, be it a differently priced packaging,

novel machinery, or an additional manual process. Long term solutions such as machinery will be valued in equivalence in per-piece price, which is judges in the same way as any other method. The final point-wise score will be made by such factors.

SAFETY

When buying commodities on the internet, the very first issue we care about is the safety of our goods. We cannot scrutinize the goods and take them back home as we did in the stores, but instead can merely have a look at the publicity page and have no idea what will the real goods be like when they are delivered to our hands. No one would like broken glass or a piece of cracked cookie. Therefore, when we make a solution to solve the over-packaging issue, one element we must concern is how well will our solution assure to protect the goods when we reduce the packages, as we cannot simply take off all the protections of the commodities and disregard the safety of the goods. For example, for fragile products, the new solution needs to keep them from being broken, and for fresh vegetables and fruits, the new solution should avoid them from being rotten.

EFFICIENCY

Will the solution physically help the environment and recycle the packages? This is one crucial factor when we need to judge a solution, because our core aim is to solve the problem of excessive packaging. If this method is economical and convenient, but the solution to the problem is not effective, that is not good. For example, if a delivery company sacrifices its delivery speed for the sake of environmental protection, consumers are more likely to buy faster delivery services but not the one more environmentally friendly. Thus, this solution does nothing helpful to solving the problem. So, when it comes to thinking about how to make packaging more environmentally friendly, one of the most important factors is efficiency.

Evaluate the Solutions

Criteria: Practicality, Complexity, Economy, Safety, Efficiency
Each criterion contains 8 scores, and 40 scores in total
(We eliminate the one "Offer Consumers a Sense of Achievement" since it is too vague and there are so many uncertainties and difficulties to implement it, and leave the other eight solutions for evaluation)

1: Giving a Choice For Eco-Friendly Packaging 5+6+6+8+5=30
Higher-cost new material; Based on people's awareness; Research/tech needed

2: Online Shopping Ranking Stimulus 5+7+7+6+6=31
Depending on the platform; Can't avoid extreme behavior (reducing the package too much for credits)

3: Choose-Able Package System 7+5+7+6+6=31
New system; difficult for buyers to decide; no new materials

4: Reusable Package with Delivery Lockers 6+6+7+6+8=33
Long-run benefit; High fixed cost but negligible marginal cost; New system with high efficiency

5: Improve the Process of the Express Service 4+6+6+6+7=29
Not likely; Limited by current technology; High changing cost

6: Classification 7+4+6+7+5=29
Large labor cost; complex procedure

7: Recycle Station 7+6+6+6+6=31
Easy to be implemented; Depending on people's awareness; More labor force

8. Environmental Publicity 8+7+6+8+1=30
SO EASY; COMPLETELY Depending on people's awareness; Slight efficiency…

Make an Action Plan

1. INTRODUCTION

1.1 The Superiority of This Plan

Based on the result of the Solution Evaluation part, “Reusable Package with Delivery Lockers”, with the highest total score of 33, becomes our superior solution to deal with the over-packaging problem. This solution is essentially a reformation of both the packaging materials and the delivery procedure, which wins especially in economy and efficiency.

1.2 Survey Results & Action Plan Aim

Based on our previous survey, people’s wish for reducing excess packaging materials is high: more than 80% of survey takers say they will be happy to see those excess materials to be saved, especially focusing on the reduction of wrapping paper and filler. However, they still have the requirement to avoid fragile commodities to be broken and fresh food to be rotten. As a result, the aim of our action plan is to design a system both effective for reducing packaging materials and guaranteed for the safety and freshness of the goods.

2. SOLUTION DESIGN

2.1 Locker

The design of the locker is definitely the most critical aspect of this action plan. To make the lockers fit our requirement, it must have a standardized design, with varied sizes, provide sufficient protection of the goods, and be placed in proper locations.

2.1.1 Standardized Design

Since we are building a holistic system, every locker being used must be identical, to avoid situations that the size of the locker boxes does not fit the size of the goods. Every locker put into use must be uniform in design, size, and function. In this case, the work of the deliverymen will also be easier.

2.1.2 Varied Size

Since we cannot make sure that every good’s size is identical, there must be a diversity of the box sizes of the locker. To make the job easier, we could make locker boxes in “big”, “medium”, and “small” sizes, and classify goods accordingly. This both allow the goods to be put in and prevent a waste of space.

According to the existing delivery locker system in China, the "big" box will be approximately 45.4 * 34CM * 29CM (5kg maximum), the "medium" box will be approximately 45.4CM * 34CM * 19CM (3kg maximum), and the "small" box will be approximately 45.4CM * 34CM * 8CM (1kg maximum). Goods that exceed these limits will be treated specially, being delivered directly from the deliverymen to the customers.

2.1.3 Sufficient Protection

Different from conventional delivery lockers in which the whole delivery packages are put, our system's lockers only contain the goods themselves without the packages. In this scenario, the protection of the lockers to the goods is rather important. According to the survey, people's concern is mostly in protecting fragile and fresh goods. Considering this, although the delivery lockers themselves are made by metal, every locker box's interior surface will be covered by rubber for buffer function. Also, every box will remain an air vent with an on-off switch. For those goods needed to be kept in low temperature, when the air vent is off, the low thermal conductivity of rubber blocks heat from coming in and keeps the temperature constant. For fresh fruits and vegetables, opening the air vent to allow air circulation and reduce fermentation (one critical factor of rot) will be a good choice. This kind of design offers the opportunity to provide suitable protection of the goods to the deliverymen, and with enough training, the deliverymen will know which strategy to be implemented to well protect the goods.

2.1.4 Proper Location

To avoid waste, the locations of the delivery lockers must be confirmed after precise deliberation. We must first consider locations with high population density or a large stream of people, such as big housing estates, large office buildings, bus stations, etc. After setting, staffs of the system need to do regular return visits to check the people using and accessing the lockers. For those with insufficient users, they need to be recycled and put in other locations to avoid waste.

2.2 Package

Another aspect we should talk about is the packages we used to store the goods temporally during transportation. The packages need to be recycled, made by environmentally friendly materials, easy for the deliverymen to carry, and provides sufficient protection of the goods.

2.2.1 Package Material

When choosing the materials to make the packages, two factors we should consider is the recyclability and environmental friendliness. There are several choices. We might use high-density polyethylene (HDPE) for making firm boxes, and animal and plant fibers for making soft bags, for the need of storing different goods.

2.2.2 Varied Size

Similar to the delivery lockers, to store goods in different sizes, the packages also need to vary in their sizes. We can take the technical specification of the lockers for reference: “big” box approximately 45.4 * 34CM * 29CM (5kg maximum), “medium” box approximately 45.4CM * 34CM * 19CM (3kg maximum), and “small” box approximately 45.4CM * 34CM * 8CM (1kg maximum). This provides the uniformity of the sizes of lockers and packages, and allows the packages to carry goods in different sizes.

2.2.3 Protection

Similar to the lockers, the packages also have protection requirements. However, considering that the packages should be carried by the deliverymen, the protection setup must reduce the weight as far as possible. In this case, we might use sponge to replace rubber for buffer function, and use vacuum technique to keep fruits and vegetables fresh instead of opening air vents, to avoid contaminating the goods.

2.3 Delivery Process

A typical process of the delivery system is described below. Three people are involved.

2.3.1 Seller

After checking the indent carefully, the seller registered for a new delivery order through an online app. He/she will take a picture of the good and select required protection (fragileness, freshness, etc.) What he/she has to do now is waiting for the deliveryman to come and take the good.

2.3.2 Deliverymen

After getting the good from the seller, the deliveryman settles it carefully in the package, with required protection. Though a regular transportation process, the package will be delivered to a certain location. Based on the preference of the buyer, the package will be hand directly to the buyer, or it will be placed into the delivery locker at a certain location. If the buyer chooses the locker, taking the good carefully out from the package, the deliveryman will set up the protection (rubber buffer and air vent) system, and close the door. A message will be sent to the buyer’s cellphone reminding him or her to take away the good in time.

2.3.3 Buyer

As mentioned above, the buyer can get the good directly from the deliveryman, or from the locker. If he/she chooses the latter, what simply should he/she do is to walk to the locker, open the door and take away the good. What’s more, if he or she finds out that the good is damaged, he or she could use the same online app to make an appeal.

3. IMPLEMENTATION PLAN

3.1 How to make the consumers endorse it

Primarily, the solution proposed - using standardized shipping boxes and storage containers - is not so much different from the current status quo. In cities in China, the presence of "beehive" containers for packages is predominant, and many residents have already become used to such things: making the adoption of this novel way of reducing packaging material and cost much easy for the consumer. Thus, the steps towards implementation are simple and well placed: Because there is already infrastructure in place - companies that benefit from the placement of packages in storage facilities - we can transform them, either through mandated change (environmental laws4), or through interest (high repay and revenue methods). The people, who are used to use these original storage systems would not experience major changes when the new ones are in place: if they still receive messages when they are placed in the storage, and they can retrieve packages with ease. In addition, due to the packages removal of outer packaging material (black bags in the outside), they d need not spend huge amounts of time and effort to open up the package, nor do they need to throw them away quickly, essentially benefitting the people. In addition, due to many garbage laws, many cities in china mandate garbage collection, separation, and recycling, which is a headache for people: they would waste time throwing away garbage in specified times and places. If the unnecessary packaging material is reduced, people would directly benefit from the time-saving effect. Thus, convincing the people of adopting the method when there is already infrastructure laid in place (China) is simple and straightforward.

For other places where there is not an abundance of these storage boxes, there are, still, significant benefits for the people. In American postal and express systems, stealing and trashing of packages are rampant. Yet, it is hard to track down, or prevent due to the nature of individual houses, where monitoring can only be done by individual households. By employing such methods, the decrease in stolen goods would be a large pushing force towards this cause. Thus, because of the efficiency and simplicity of such systems, it has a high potential for widespread adoption among people, regardless of geographical location and nationality. Yet, the adoption of collected systems is shown to be successful in many places and metropolitans, which prove again that this system can beneficial and useful, as well as easy to adapt to. First, there are already many places in places like America that have such systems, especially in big cities, which are not exact replicas of Chinese models, but are quite similar. These systems are often provided by Amazon, and has workers being service workers in them. Thus, using such systems can reduce the cost of facilities using them, as they can cut costs of workers that can, essentially, be replaced by machines. The placement of our novel facility can be done anywhere, and usage can be easily adopted, given how widespread mobile phones are in modern society. As an additional benefit, we can be able to reduce crime rates (of

stealing packages), acting as a pushing force. Given the success of such in China, it is not difficult to see the simplicity and potential of such systems, which would be easily successful in other places.

3.2 government

3.2.1 Ways of contact
Email of Guangzhou Government: webmaster@gz.gov.cn； Guangzhou Municipal Ecological Environment Bureau: contact number: +86 12345

3.2.2 Content of persuasive letters
- the glory of protecting the environment
If governments did help to protect the environment by implementing our methods, they would be praised by the Environmental Protection Agency (EPA). As the first government to achieve full recycling of parcels, it is sure to receive recognition from the state and all the environmental protection associations in the world, which is a culture victory.
- promotion of economy
As the packages could be fully recycled, the national income of our country would beneficially increase. When a country doesn’ t need to dispose of discarded express parcels, it would save a great number of labor force and economy to develop other industries, increasing the economy of the country and reducing the deadweight loss.
- Promotion the quality of citizens
When the government implements the measures of environmental protection, the citizens will have the responsibility to protect the environment together. When the government tries its best to improve the environmental protection of the express industry, citizens will be more cooperative with the govern

3.3 Platform etc (amazon)
Platform adoption for this kind of system is simple and possible for widespread use. We can separate platforms into two subcategories: online commerce platforms, the box management platforms, and delivery systems.
Firstly, regarding the online platforms, they can benefit from many perspectives, and have a clear path of endorsing these beneficial practices. First of all, they would receive many fewer phone calls and requests for replacements because damage to packages will be drastically reduced. They would be trusted more for their beneficial and convenient systems, and they would receive more traffic from customers. To adapt to using this, it would be simple for them to set up a system that allows choice for normal packaging versus environmentally beneficial packaging, the same way they allow people to choose to pay upfront or pay online. From a technical standpoint, it is also very simple, because it just requires a change in forms. With the system in place, they can place an incentive system that makes sellers that give

such options: when sellers sell many products that are chosen to be environmentally-friendly, they get a boost in either ranking, or monetary incentive. Secondly, regarding box management platforms, they can easily transform into an environmentally-friendly platform simply. Regarding their benefits, it is simple to see that they would have the potential to spread their business in more places because there will be government incentives and monetary gains for such actions. Thus, they would have the potential for making themselves much larger in the adoption of such systems. They can simply adapt their machines to be the custom made models by implementing a few changes, which would cost little to them. Their monetary system is unscathed. Thus, they are not harmed financially, nor would they receive public backlash.
Lastly, the transformation of delivery systems can be difficult, but is do-able. They need not alter their methods much, as the process is similar: they deliver obscured packages to a destination. They simply need to add a system that sorts the packages in appropriate "sizes" and "boxes," which would make the rest identical. This can be achieved by allowing the delivery person to choose package size when they take it, which is not so much of a complex step, as they measure your packages and weight them already to calculate the expenses of your object. Thus, we can envision training would not be difficult, and adoption will come quick

3.4 Publicity

Campaigns are essential to the system for the adoption, as people may not be as aware of them being in place. This is because, the transformations are all silent, and based on systems already in place — we simply adapt them to a more suitable way to the environment. Thus, rather than calling forth action for people to use these systems, we ought to tell them about it, and how they would benefit from it. We do not require much public attention, but we need them to be silently transformed. Thus, we need not huge street-side ads, but a simple banner or notification on the e-commerce website or app would do.

4. RESPONSE TO CHALLENGES AND ROOT CAUSE

4.1 Response to Challenges

4.1.1 Worried Psychology (trinity)

One of the core challenges to solve the over-package of the expressage packet is the worry of sellers, expressage companies, and consumers. At first, both sellers and expressage would worry about the broken of the product because it will hurt their profit. At the same time, the sellers would like to require a packet as thick as possible in order to protect products. Therefore, they would like to add a completely unnecessarily thick packet, which leads to severe waste of material. Luckily, using a uniform reusable expressage and locker to displace the traditional could completely solve the question. In the system, the expressage companies only

need to operate and maintain the system, getting goods from sellers, and sending them to consumers. Also, the sellers only need to prepare the goods without any packet to protect the products. It could create a uniform standard to protect the products with the least material and money.

4.1.2 Fixed Package Designs

The goal for fixed package designs is to simplify the delivery process and reduce the cost of producing different package to suit different goods. Our solution has well considered this problem. By using a certain classify system, most packages can be sorted into "big" (45.4*34*29CM, 5kg), "medium" (45.4*34*19CM, 3kg), and "small" (45.4*34*8CM, 1kg). With this classification, our goal of reducing costs can be reached. At the same time, it will be easier for the deliveryman to arrange packages during transportation.

4.1.3 Packing material / Material technology

Many of the problem today about delivery waste comes from limited material technology. The cheap material will damage the environment if not disposed properly, and the expensive one will add burden to both consumer and producer. However, this solution of locker and package doesn't depend on our limited material technology. This is because everything used in the transportation process can be reused. All we care about is the durability of the packing material. Therefore, the plastic products, which are known for their stability and difficulty to decomposition, will be a great choice. Moreover, this perfectly avoids the environmental problem caused by the thrown-away delivery wastes that are hard to break down.

4.1.4 Environmental awareness

The Public's environmental awareness is important to encourage recycling. Fortunately, this solution doesn't depend on people's environmental awareness as well, so this challenge can be solved directly in this way. This is because all the recycle process is performed by deliveryman, so public environmental awareness is not necessary in this case. What's necessary is the delivery company training their employee about recycling the delivery material for the next delivery.

4.1.5 Human Nature

Human nature tends to avoid troubles and wants to finish things in the easiest way unless there are other profits. In our solution, for both sellers and buyers, there aren't any extra things they need to do, so their human nature won't cause any trouble when implementing our solution. The only difference is the work of the deliveryman has increased. However, since they are paid to do this work, their human nature won't interfere with the extra work, or the company can raise their wages to solve this challenge.

4.2 Response to the Root Cause

4.2.1 A Mutual Distrust Dilemma

A core cause of the over-packet problem is the dyadic distrust dilemma, which means that three main relevant about the over-packaging problem; sellers, consumers, and expressage companies; aren’ t likely to completely trust each other. When consumers found that they get broken packets, they actually didn’ t know who should take responsibility for this, so they will distrust both the sellers and expressage companies. In order to protect their profit, the sellers and expressage companies are likely to add a thick packet separately because they didn’ t trust each other, which cause severe waste of material and money. By adding a uniform system to replace freely send the packets to consumers, it is impossible for expressage companies to record the situation of the packets from the sellers to consumers and public them. Once expressage companies public all information during the expressage, the distrust dilemma wasn’ t a problem because they all know the fact and did not need to trust each other. For the consumer, they could get compensation from the right people. For sellers and expressage companies, they could find the problem during the expressage and make an improvement.

4.2.2 A Byproduct of Social-Cultural Development

Another cause of the over packet problem is that the development of the social does not match the development of the technology. Nowadays, the development of technology could thousands even hundreds of packets, which could allow people to consume randomly on the internet and enjoy the extremely convenient expressage services with just a little money. However, most people actually haven’ t realized the waste creating by the packages and the importance to protect the environment. In this case, if someone asked consumer to pay more money or spend lots of time to reduce the waste of the packet, they will reject. Similarly, the sellers and expressages companies will not be likely to use new materials to protect the environment because it will reduce their profit. The problem can be solved by the new reusable system. The consumer just needs to walk for a short distance to get the packets with less fee of expressage, which is quite acceptable. Also, although the expressage companies need to spend lots of money at first, they could earn more money because the new system is more efficient and need less money to maintain and operate. The sellers would be happy, because they don’ t need to package the packet anymore without doing any extra. Overall, the system doesn’ t rely on the awareness of people, because people are likely to accept a plan which is good for them. On the other hand, maybe people would like to take part in the environment activity because they know that they could protect the environment without hurting their profit by the system.

Prototype and Test

Prototype Design

New Delivery Locker System with Reusable Package

Locker: Metal delivery lockers that contain boxes in “large”, “medium”, and “small” size, with rubber inside for protection and air vent. Lockers are positioned in certain locations with high population density or a large stream of people, such as big housing estates, large office buildings, bus stations, etc.

Packages: Reusable packages made by environmentally friendly materials such as high-density polyethylene (HDPE) and animal/plant fibers, with sufficient protection (sponge buffer, vacuum technique), which can store and transport the goods by the deliverymen.

Specific process: The deliveryman gets the goods from the seller and stores it into the packages. Through a regular transportation procedure, the package will be delivered to a specific location, where the deliveryman could hand in the good directly to the buyer, or could also take the good out from the package and store it into the locker. The buyer could access the locker and take away the good in a certain period of time, and the package will be taken away by the deliveryman back to the center for reuse.

The lockers, packages, and the delivery process are specifically described and showcased in the file in the attachment.

Prototye Design with Graphs

Feedbacks learnt from users

We elaborate our prototype design into a concrete online survey paper and hand it out, and collect it back after one week. Our survey-takers are of different ages, genders, and jobs, such as students, teachers, company employees, and parents, etc. This guarantees the diversity and impartiality of our users' pool.

1. Quantitative feedback 1.1 82.35% of survey takers consider the system will

mitigate the overpackaging issue to a certain extent.
1.2 88.25% of survey takers think the system is convenient to buyers/consumers, but for sellers, delivery companies, and deliverymen, the number drops to at most 80%
1.3 Survey takers seem not confident toward the protection function of the system. For most of the takers they choose the “Maybe” option when considering the protection function (38.24% for fragile goods and 67.65% for fresh/alive goods), meaning that we might take this into consideration when we make improvements.
1.4 Most survey-takers (over 70%) say they will be glad to accept this new system.
1.5 Privacy might be an issue as over 1/3 of survey takers think this new system might harm their privacy
1.6 Over 50% of survey takers believe the system will remain or reduce the delivery cost.

2. Qualitative feedback
2.1 Some survey takers worry about the sanitation of the locker and packages, especially when storing fresh/alive goods.
2.2 Privacy is a great concern for many survey takers.
2.3 Some survey takers worry about the unfit size of packages and goods.
2.4 Some survey takers concern about the high fixed cost of the system.

Improvement for next iteration

Based on the users' feedback, we come up with four aspects of improvement.

Feedback 1: Some survey takers worry about the sanitation of the locker and packages, especially when storing fresh/alive goods.
Improvement: In this case, couriers should no longer store fresh/alive goods in lockers as this will directly damage customers' fresh goods. Better yet, during the delivery process, the corresponding fresh/alive goods will be delivered with special freezers. Couriers should communicate with consumers before delivery to know when the delivery will reach customers, so as to avoid damaging the fresh/alive goods.

Feedback 2: Some survey takers concern about the high fixed cost of the system.
Improvement: First of all, from the economics side, although the fixed cost of this new system is high, the variable costs are merely labor wages and training costs, which are negligible in the long-run operation. For the issue of high fixed cost, the long-run profit caused by the low variable cost will attract firms’ investment. Based on its environmental significance, the government may also be willing to offer subsidies. The key to deal with the cost is to actively seek for cooperation and

investment during implementing the system.

Feedback 3: Some survey takers worry about the unfit size of packages and goods.
Improvement: Instead of only providing large, medium, and small boxes with similar shape, the delivery boxes can be divided into three kinds: one-dimensional boxes (a thin long box for stick-like objects), two-dimensional boxes (a flat box for paintings, books, and any flat objects), and three-dimensional boxes (a common delivery box for everything that can’ t be put into those two boxes mentioned earlier). Moreover, for each kind of boxes, there are three different sizes: Large, Medium, and Small. In this case, consumers and sellers are more likely to find a box fitting their packages and goods.

Feedback 4: Privacy is a great concern for many survey takers.
Improvement: It reasonable to offer an additional option for the consumer to protect their privacy. The expressage companies should provide the choice that the consumer could pay extra money for an opaque recycle bag which could conceal their packet and protect their privacy. What’ s more, because the bag is recyclable, the consumer could also utilize it in their daily life, for example, they could take the bag shopping. This solves the privacy concern with minimum waste.

Team Credits

杜沄泽 Yunze(Zedd) Du is responsible for deciding the topic of the project, scheduling overall assignment timeline, contributing in the writing of challenges, solutions, criteria, action plan, improvement, and is in charge of evaluating the solutions, designing the prototype, and gathering the feedbacks

陈志聪 Zhicong(Marin) Chen is responsible for prototype design and graphing, survey design and data collection, identifying flaws and improvement and action plan.

孟义骞 Yiqian(Ethan) Meng is responsible for making solutions, designing and graphing supporting facilities for the prototype, writing a part of the action plan, and making improvements based on the data collected.

钟达之 Dazhi Zhong is responsible for the overall Summary, All Root Causes, making solutions, identifying criterion, criteria evaluation, and part of the action plan, specifically, the implementation plan.

程志恒 Zhiheng(Mark) Cheng is responsible for the writing of the criteria, root questions and improvement, designing solutions and evaluating it, finishing the responding to root cause part of the final draft, designing the survey questions.

Judge Comments

" Overall Comments:
The team has done an excellent job in systematically breaking down the problem and proposing practical solutions to a specific angle of the problem of resource consumption and waste. The inter-disciplinary analysis of the problem is well received and considers most of the pertinent issues.

While the abstract explanation in the root cause section about societal evolution and mistrust is somewhat valid, further systematic analysis is required to identify a problem that can be tangibly addressed through a project of this size.

Some suggestions to consider while your team takes this important issue forward below –

- In the overall ecosystem, the person with the least invested interested in a quality transaction is the shipper (or shippers as most delivery chains pass through numerous hands as well as organizations before it gets from the buyer to the seller). Placing the responsibility of the final delivery of the unwrapped product in the locker on the shipper/driver is risky. Additionally, there will be privacy related concerns in a system like this. Consider other options to allow the reusable packages to work. I believe there is a workable solution here.
- Additional research into expected savings (environmental, financial, volume..) will add more depth to the findings.
- Economics suggests that the buyer is likely to expect an incentive through reduced price when the seller offers her more choices as the liability of the packaging decision (and any associated damage henceforth) is shifted to the buyer. Some of the plausible solutions that move decision making closer to the buyer will need to factor this in.
"