Sustainability Innovation Plans To Promote "environmental Price" And Rational Consumption Among Teenagers With ECoD (Environmental Cost Detector) App

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Summary

As online shopping grows rapidly and objects replacement rate increases surprisingly, teenagers, often lack of strong environmental awareness and sound consumption values, can be easily allured by promotional prices online and negate the environmental cost of products.

Our group generally attribute this problem into inner causes of teenagers and outer causes of social influence. We come up with a series of possible solutions that aiming to either root ideas of environmental cost and rational consumption into teenagers' thoughts or preventing relevant groups from continuing to exert negative impacts on teenagers.

Through detailed surveys and evaluation, we decide to adopt the solution of designing an app ECoD (Environmental Cost Detector). ECoD is an app that gathers numerous information of a large variety of products, enabling users to check the "environmental price," namely the price with environmental cost, of different goods before purchasing. Users can either identify the products by scanning pictures or entering the product name with brands. ECoD can also provide recommendations of eco-friendly products and employs incentive mechanism and daily learning mechanism. Our goal is to make the concept of environmental cost more familiar to people, especially teenagers, expand their background knowledge of what environmental impacts some common products may cause, and help them form the habit of considering environmental prices when shopping and thus avoid impulsive purchases. Also, in an attempt to promote our app, we plan to propagandize it through an assortment of action, mainly aiming the characteristics of teenagers. In order to make improvement, we collect feedbacks from users and make plans for improvement according to potential problems.

As a product, our app ECoD possesses certain economic and social values. Companies producing eco-friendly goods can increase sale and thus obtain profit because our app will probably recommend their products. As a result, the advertising space and recommendation space can be sold to those companies, though certain evaluation of their products is necessary. Meanwhile, the prevailing trend of shopping can be led to a healthier one, and people are encouraged to buy eco-friendly goods. Firms are also encouraged to produce eco-friendly goods to cater the preferences of the public.

In conclusion, we hope to promote the concept of environmental cost of products

among people and lead teenagers to form habits of rational consumption by our app ECoD.

Subjects of out questionair mainly clustered in cities with higher income (cities along southeast coast of China), so they tend to have higher level of comsumption. As a result, respondents may buy more than average and cause more pollution from consumption.

ECoD is originally designed as an app consumers use to check the "environmental price" of a certain product. In the future, it can be developed as a "standard" system used by government to determine whether a product should be put into market, further preventing the purchase and use of goods harmful to the environment at the source.

Key words: environmental cost, rational consumption, teenagers, ECoD app, promotion

Identify the Challenges

1. Environmental Awareness
According to our rough analysis, a large number of consumers do not realize or understand the environmental influence associated with the production, service, and discarding process of many products they purchase, including some daily necessities. Since teenagers are often lacking professional knowledge, and companies often avoid showing negative environmental information either intentionally or not, consumers can barely identify the harmful ingredients in some products and thus keep purchasing without concerns. For example, many schoolgirls love to buy better sunscreen regardless of their half full old ones, but few of them know that the chemical composition, like Oxybenzone, in sunscreen is very toxic and seriously threatens the marine ecology, especially harmful to vulnerable coral reefs. Another example is palm oil, which is found in many commodities and food popular among teenagers, from soap and toothpaste to chocolate and ice cream. Palm oil plantations, however, release a lot of carbon dioxide, fuel climate change and can destroy habitats for animals such as orangutans. Sadly, teenagers don't see that these common products are destroying the environment in places we can't see, which prevents them from controlling their purchase behaviors

2. Consumption Views and Money Management Skills
Teenagers are experiencing a period when various aspects of their thoughts are developing freely, and consequently, they may have not yet formed a sound value for consumption. In other words, teenagers often act on their instant impulse when purchasing, considering little about actual quality, or practicality, cost performance, not to say the hidden environmental cost. As the result, impulse often leads to unnecessary consumption. What worsens the situation is some teenagers' poor money management skills. As teenagers don't earn money themselves and their pocket money mainly comes from parents, they sometimes lack frugality and have the potential to make unnecessary purchases. Poor money management skills lead to immoderate consumption of goods. In the United States alone, almost $259 billion was spent last year by teenagers on "non-essential items" according to the Organization for Economic Co-operation and Development.

3. Social Comparison
Comparison is the trigger of purchasing some non-essential items for many teenagers. Social media has become important channels for teenagers to be in contact with classmates, keep up with news among friends, follow common idols,

and build up a sense of community. Teens spend some amount of time on social media updating their profiles and posting, but they also spend the vast majority of time looking at peers' profiles and photos, which leads to constant comparisons. Because of the need to develop a sense of belonging and be accepted by a peer group, adolescents choose to do the similar things or buy common goods. When one girl in a group puts up the latest dress, other girls in the same group start to follow: they even want to have better ones. Few adolescences in the group will think about whether they like the dress or whether the dress is suitable; instead, they just want to have one like their friends. Without clothes or electronic devices in the latest fashion, teenagers feel like they are out of date and are afraid to be laughed at or crowded out. To stay among the group, they choose to spend money on purchasing fashionable goods with unreasonable prices. Some teenagers, especially students without income, even force their parents to spare money to afford expensive goods like the latest Nike shoes with celebrity signature, clothes with celebrity endorsement or the newest iPhone. Under stress of social comparison, young people are "pushed" to buy things they don't really need or do impulse consumption frequently, considering nothing about the true value or environmental cost of the products. According to Adobe Analytics, online spending hit a whopping $6.22 billion in 2018 Black Friday—a lot of which isn't budgeted for or planned.

4. Stimulate Consumption
Numerous companies hold up shopping festivals or discount promotions to attract consumers to purchase items with so-called "sale prices". For instance, Double Eleven (11.11), also called Singles' Day Festival, is a global shopping event held by Alibaba. During 11.11 each year, consumers can expect the largest discount of the year while businesses expect a significant portion of annual revenues from this one-day sales. Alibaba's revenue reached 10 billion yuan in less than two minutes (00:01:36) and 30 billion yuan in about 5 minutes (00:05:25), 50 billion in 13 minutes (00:12:49) in Double 11 Global Shopping Festival in 2019. Companies utilize large discounts to stimulate consumption. Young people who have just started their career and are short of money snap up plenty of discount products during these shopping festivals. An online impulse purchase, which is a kind of sudden online buying with no previous intentions, accounts for up to 60% of all purchases online in 2015. This leads to huge waste and most people do not realize that they may purchasing many unnecessary goods that are harmful to the environment.

5. Fast Fashion Industry
Cheap but good-looking products provided by the fast fashion industry stimulate teenagers to buy goods more than need. Fast fashion is a phenomenon that takes advantage of the short-lived trends in fashion and puts out new clothing every day. Products of the fast fashion industry are cheap and fashionable but have poor quality. While those famous brands cost thousands of dollars, the cheap but good-looking items in the fast fashion industry are better choices for young people. Many

teens and young adults list stores such as Forever 21, H&M, Zara, and American Eagle as their favorite clothing stores. These stores are all productions of fast fashion, as they frequently come out with new clothing and sell their products at fairly cheap prices. These inexpensively produced garments might contain chemicals that are harmful to the environment. The dye in the clothing sometimes contains toxic chemicals, which may cause serious water pollution. Besides, some consumers even imitate certain celebrities and refuse to wear any item of clothing more than once. Throw-away action leads to astonishing waste. In Germany, 1 million tons of clothing are thrown away every year. In the US the 3.1 million tons of textiles generated in 2010 made up 5.3% of municipal waste, while in the UK it is 1 million tons a year.

6. Education

Throughout school days, courses about environmental awareness are seldom provided. In geography or biography books, students learn and recite key terms. Few teachers will teach them how human being's daily actions are destroying the ecosystem, causing the extinction of thousands of animals or insects, and threatening our living environment, and few students know that some common products they often purchase can induce serious pollution to the environment. Students may know that the degradation of millions of tons of plastic bags does great harm to the land, but they seldom realize that pollutants like chemical fiber materials and highly toxic dyes can be contained in common products and making unnecessary purchases is also harming the environment. We lack long-term and systemized education on environmental awareness and rational consumption.

7. Notification

Products causing serious environmental problems are barely labeled. While environment-friendly products usually have green logos marking their benefit, harmful substances in some items are unknown to the public. People seldom read the ingredient list printed on the package of a product. To remind consumers, notifications, or markings, should be placed conspicuously on the package as a warning.

8. Internet Celebrity Economy

Internet celebrities have attracted millions of netizens, mainly teenagers and young people, to buy their products. According to China Daily, the market size of the internet celebrity economy has been larger than the box office in 2016. Chinese internet celebrities, known as "Wang Hong", are people who have become famous on social media and online communities. Working with internet celebrities, many companies have made the Internet part of their market. The Internet has become a popular advertising platform because sellers found that the Internet possesses greater control over advertising. Different from pop stars or actors, internet celebrities have strong personalities on social media. They share their lifestyle,

experience, and opinions on their channel, keeping interaction with fans and guiding them to buy certain goods. Fans will then become willing to follow the suggestions as they feel internet celebrities are a representation friend. Dayi Zhang, one of the best-known Chinese internet celebrities, has approximately five million fans on social media channels. In the 'Bachelordom Day' 2016, she presented herself on Taobao Livestream show, guiding her audiences to the fashion store and brands of Taobao, which made a huge amount of 100 million sales on the day. The media, magazines, TV, films, advertising, music all emphasize that a person's self-worth should be based on appearance and internet celebrities present an ideal of beauty that is almost unattainable. Teenagers at a young age have received the idea that beauty is crucial in this society. Adolescences start to purchase things recommended by those beautiful internet celebrities: they want to look like what they are seeing.

Identify a Root Cause

1. Inner cause: Lack of envrionmental awareness and immuture consumption views
As main force of online shopping, teenagers often lack the awareness of the importance of the environment and what influence their action may have on the environment. As a result, they tend to buy and throw away things they bought without deep consideration of certain environmental cost. In addition, teenagers are not mature enough to develop sound consumption views, which makes them the main "deception targets" of online merchants. With the help of the Internet, an assortment of promotional methods stimulate adolescents' unplanned online shopping behaviors and lead to overconsumption. This reveals the problems of lacking proper education and announcements on goods.

2. Outer cause: Superabundant internet promotions,fast replacement rate of society, & insufficient environmental education protection
In the modern society, the replacement rate of all kinds of products is so fast that teenagers often discard half new products and buy new ones, which cause unnecessary waste and pollution. They have been used to pursue the latest fashion of products like clothes, shoes, and electronic devices, considering nothing about the real values and environmental cost, and thus can be easily allured by online promotions. Peer comparisons, business promotions, and celebrity effects together contribute to stimulating blind consumption. Moreover, schools often provide little or no courses about environmental protection, failing to take the responsibility of rooting the environmental awareness in teenagers' mind.

Generate Solutions

1. Environmental Influence Labels on Products

The fact that most teenagers are not aware of the negative environmental influence of many products they consume is one of the main reasons that cause the phenomena we are concerning about. Since they have no awareness, they will purchase those products without any concern even if they want to protect the environment. Consequently, it is important to raise their awareness. Our group hope that the government can require companies to put labels that illustrate the possible environmental impacts on products, telling consumers more information about what they cannot see behind the products.

Specifically, we recommend setting up a standard that stipulates the largest tolerable amount for various kinds of pollution, such as sewage discharge or index like "water quality index". If the pollution exceeds the standard when producing one product, the company should be required to put a label illustrating what pollution the product has caused. On the contrary, if the product is environment-friendly, which is to say, not causing any pollution or much pollution that exceeds the standard, the company can put a label to emphasize it, eliminating possible concerns of consumers. We do not think that precise numbers should be included on labels because it can be somewhat difficult to explain those to consumers without professional knowledge; however, it is necessary to make it clear what type of pollution is caused. In addition, we can set different colors to represent different levels of pollution, making it clearer and faster for teenagers to recognize.

On one hand, we believe that these labels, either associated with the production process or discarding process, on products can effectively provide teenagers with relative knowledge of the products they want to purchase, enabling them to take the environment into consideration. On the other hand, companies that produce products harmful to the environment may fear that labels with negative information will discourage people from purchasing their products and thus hurt their profits, they may regulate their production process to reduce pollution or even switch to produce more environmentally friendly products.

2. Relevant Courses, Club Activities, and Other School Activities

Teenagers are at a stage when both their mind and body are developing, and it is reasonable that they have not yet form strong consciousness of environmental protection and sound values of consumption. Nowadays, teenagers can often enjoy higher material standards of living than before. Some of them buy whatever they

want and throw it away if they don't want it without knowing what the consequences will be. Undoubtedly, schools play considerably important role in educating teenagers and therefore should take responsibility and educate them, raise their awareness of protecting the environment and develop their consumption values. Considering their convenience of interacting with students and faculty resources, schools have the advantage of influencing students in the long term, both explicitly and implicitly. However, the knowledge we learn in primary schools and high schools can hardly be applied to our daily life, not to say helping us determine what impacts a product may have on the environment. As a result, our group hope that schools can launch a variety of courses and activities for young people to participate, either voluntarily or compulsively, enabling them to understand the meaning of protecting the environment and negative environmental influence of certain commodities and learn how to purchase reasonably.

Specifically, we suggest that the education bureau can convene some experts within the fields to discuss the appropriate and useful contents about environmental protection and reasonable consumption that can be learned by young people at different ages, and issue a series of teaching materials to be distributed to students through schools. Then, the school should also arrange relevant courses and teachers to popularize the knowledge and educate the students. Also, if arranging new courses generates too much trouble, the education bureau can add some relevant contents to our pre-existing courses. For example, knowledge about environmental impacts of products during their production and discarding processes can be included in chemistry courses as part of practical application or common senses; how to form sound values of consumption and avoid being allured by promotion prices can be taught in ideological and political education classes.

Some students may have resistance to these extra courses and do not listen carefully, so the school should carry out some other livelier activities. For example, schools can create a club that aims to protects the environment and allows students to initiate activities to learn about relevant knowledge. In this way, students will be freer to take in the knowledge they want to know without the teacher's compulsion. In addition to the club, the school can regularly ask students to make a blackboard newspaper on environmental protection or green consumption. With competition, there come motivation and fun. In order to obtain a good ranking, students will take the initiative to find relevant information and then present the results on the blackboard by writing, drawing and other methods. In these processes, knowledge will be learned implicitly.

3. Stronger Supervision of Merchandising Videos
It is common that many young people like watching videos made by some Internet celebrities, or anchors, who constantly recommend some products, such as clothes

and cosmetics, for the audience to buy. Usually, these recommended products are cheap and thus can be afforded by teenagers. The anchors typically praise the products a lot but mention nothing about the possible negative environmental impacts. For instance, many recommended cosmetics are particularly high in mercury and other pollutants, which will give rise to allergic dermatitis, or even skin cancer, according to many reports. Many adolescents, who lack the professional knowledge of environment and the ability to resist price temptation, tend to be misled and purchase these products a lot, knowing nothing about the environmental cost.

Therefore, it is necessary to apply strong supervision on the contents of the videos that advertise products. If all the merchandising videos provided by the anchors can be checked before posting to the public, the platforms will be able to eliminate the pettifogging ones. Once people found the anchor deceives young people, the platforms are supposed to seal that account and warn people to pay attention. In this way, the purchases will go down, along with the negative impacts the product brings. In addition, most of the young do not know about the ingredients of products they purchase and whether those components are harmful to the environment. The anchors are normally influential and skilled in leading people's thoughts, and we should take advantages of their characteristics to do something good. If the internet celebrities can provide the consumers with some background information of the products, recommend green and healthy products more frequently, and tell them the right handling methods when people run out of some products, young people will be conscious of the influence those products have on the environment and deal with them more properly. Consequently, teenagers will gradually learn to take environmental cost into consideration under the positive guidance.

4. Warnings on Products That Do Much Harm to the Environment
As we all know, smoking is a bad habit and can cause serious consequences to both the smokers and people around them. We can often see scary pictures that illustrate the harmful effects of smoking, such as a black lung which results from long time smoking, on cigarette boxes in order to persuade people not to smoke. Also, we can see warning sentences, such as "Smoking is harmful to health" on boxes to alert people.

Our group believe that this method can also be applied on goods that have negative impacts on the environment, such as cosmetics, plastic toys, and chemical fiber clothes. Things mentioned above can hardly be recycled or reused, and producing those products will release harmful gases or chemicals to air and rivers, which then cause pollution. Normally people are not aware of these consequences, but putting pictures of plastic mountains or polluted water and slogans that tell the harmful effects on the package boxes can show the consumers how terribly the

environment can be damaged by those products and call on people to reduce unnecessary purchases in consideration of environmental cost.

5. Online Advertisement

Living in an age of information, most teenagers have access to the Internet and love browsing different websites and social media, such as QQ, WeChat, Weibo, etc. As a result, propagate information on the Internet can be a powerful way to promote ideas. Therefore, our group hope to disseminate knowledge about environmental protection and rational consumption to young people through the Internet, and thus consciously raise their awareness of these things.

Specifically, we suggest that each software can insert some advertisements about environmental protection and brief knowledge about environmental cost of some commodities. For example, some video software can appropriately insert an advertisement for several seconds when the video is loading. In this way, the positive advertisements are neither long nor obtrusive, but play an effective role of publicity. In addition, some websites usually have advertisement sections, so they can put advertisements about environmental protection or green consumption. In order to make the propaganda more interesting and not rigid, the comic software can upload some new comics relate to the themes. These interesting comics can also be posted on public account on some social media. It will be even better if some celebrities or cartoonists can help post these comics. In this way, more people learn about the harmful impacts of some commodities, and teenagers will be influenced most because of their activeness on the Internet.

Moreover, growing in a society in which Internet almost dominates everything, many teenager are used to do online shopping on some websites like Taobao and Jingdong, and each time they go to the home page, there are always many advertisement of different commodities at relatively low price to attract consumers. It is not a rare case that some teenagers see that their wanted things, for instance nail polish that contains harmful chemicals, have specials and consequently they may buy more than they really need. Later the surpluses that are thrown without being used will produce waste, and sometimes pollution, during the manufacturing processes as well as the refuse disposal. Therefore, we recommend that the online shopping platforms can postpositive slogans like "You should nurture nature to get nurtured by nature" or "Do not buy more than you need" on home pages and order submission pages to remind consumers to take environmental cost into consideration and consume rationally.

6. Hold Lectures

It is usually difficult for teenagers to receive professional education that tells them about environmental cost and protection, as well as how to avoid impulsive consumption. Our group believe that professional lectures can positively affect

young students if schools are able to hold lectures at least twice a year to raise their awareness of protecting the environment and teach them how to consume rationally. Schools can invite famous professors to teach a lesson about the process of producing some materials and the potential impacts of certain products to expand students' knowledge background and also arouse their interest. Gradually, young people's awareness of protecting the environment will be aroused. Students will be encouraged to feel responsible to make a change to their daily life, try to avoid buying things just because of low prices, and instead place more emphasis on the quality and environmental cost. In addition, communities can also put their effort into organizing some lectures for residents for free. It is a good way for teens to take part in community activities to learn some useful knowledge. If they do not want to go out, online lectures can also work, enabling teenagers to watch the records at any time in any places. Backed up by professional knowledge, the teens will learn to avoid buying unnecessary products after they know how some badly certain products can harm the world we live in.

7. Announce the Environmental Taxation on Products

According to our research, our country puts tax on companies generating pollution that exceeds standards when producing products. This type of tax can be called the environmental taxation. It seems that the environmental tax is put entirely on producers. Analyzing from the side of economics, however, this tax is borne by both producers and consumers because while producers have to give part of their revenues to the government, additional tax normally results in higher prices, which is paid by consumers. In this way, both producers and consumers in fact have to pay for the environmental cost of the product, but almost no consumers are aware of this. Therefore, consumers will continue to buy these products without proper concerns.

Our group think that if consumers can be informed that they are also paying part of the environmental tax, the sale of the products that harm the environment will be reduced from the root, since less demand leads to less supply. In order to achieve this, we suppose that companies should be required to put labels on their products to inform consumers that their products have high environmental cost that will be borne partly by them. Once they realize this, they will tend to consider more and reduce unnecessary purchases, as everyone is concerned about their own interest and does not want to pay extra.

8. More Authoritative Online Secondhand Product Transaction Platforms

As we all know, many people, especially teenagers, impulsively consume products when shopping online, only to find that they don't need these things at all later. Also, as the rapid development of modern society, teenagers are used to the high replacement rate of products that they tend to throw away many nearly new products and ask parents to buy new one. These phenomena rise our concerns

because they will lead to unnecessary resource waste. What complicates the problem is that some of the discarded products will cause pollution. Therefore, at many times people are encouraged to resell their things on online secondhand product transaction platforms, such as "Xianyu". However, many people do not choose to buy products on these platforms because of quality and information concerns. That is to say, the public often regard these platforms as unreliable and are suspicious of the quality of the products. As a result, these platforms do not work quite well in light of reducing waste and pollution.

Therefore, our group hope that more authoritative online second-hand, third-hand, or even n-hand product recovery and transaction platforms can be established to make transactions more transparent and reliable. Only if the public trust the platforms enough can we actually generalize the actions of recycling products and consequently reduce pollution.

Specifically, real-name registration should be adopted in order to ensure the reliability of transactions. This enables relative departments to promptly investigate suspects when any frauds or other illegal behaviors are reported. Also, more effective systems of complaint handling should be built in order to protect consumers' right and interest. In this way, consumers will feel relieved to buy secondhand products on the platforms, knowing that they are under protection. The platforms should also set stricter standards in the process of supervision to guarantee the quality of secondhand products. We suggest that they can formulate a set of specific requirements for second-hand goods recycling and transfer to show authority.

9. ECoD (Environmental Cost Detector) app
We have designed an application to more clearly and objectively reflect the cost of dealing with the environmental issues left by the goods, and compare it with the original selling price. Through the numbers, users can see the true "price" of the goods they buy at a glance, without blindly having to consume some highly polluting goods. The APP is a very powerful promotional tool. Through daily recommendations in the app, users can learn more about the concept of rational consumption. Most of them are used and developed by young people, which corresponds to the young people in question. Through the display of data, people can instantly feel the level of environmental costs. Using daily recommendations on the APP homepage will make young people more or less realize the importance of some correct consumption. In order to prevent young people from being kidnapped by low prices and pay more attention to the cost of environmental treatment, this APP will be a good choice.

10. Recycle waste products harmful to the environment
Contemporary young people like to follow new trends and thus often consume

impulsively, resulting in unnecessary waste. Many of them lost interest after using certain goods once or twice and then put them aside. It is common to see expired cosmetics and abandoned plastic products. If they are treated as ordinary waste, a harmful effect will certainly be caused to the environment. In order to prevent improper disposal of garbage, we need to recycle them reasonably.

Our team put forward several proposals. As for some expired cosmetics, which contain a lot of organic solvents, and some contain alcohol, you can use their cosmetics to clean a lot of stains, can be used to clean dust, oil stains and other stains, non-alcoholic lotion can be used to wipe Bags, shoes and other items. Although discarded facial cleanser can't act on the skin, it can be used to clean plush toys, collars and other places. It acts as a lubricant during cleaning. It can not only remove the oil on the items, but also make it taste more fragrant. With respect to some unused plastic toys and used plastic fast food boxes, they can be collected and processed in a unified manner. One ton of waste plastic can be recycled into 600 kg of unleaded gasoline and diesel.

Identify the Criteria

1. Effectivity: (30%)
Is the solution able to help teenagers establish the concept of sound values of consumption, environmental awareness, and negative impact of certain products?
2. Feasibility: (25%)
Is the solution feasible technically speaking and able to cost within a reasonable range?
3. Acceptability: (15%)
Is the solution able to be accepted by teenagers or other interest-related groups?
4. Influence: (15%)
What is the effective influencing range of the solution and is it possible to generalize it to a large range?
5. Sustainability: (15%)
Can the solution be solved for a short term or a long term and applied again in the future?
Total Score: 100

📄 criteria

Evaluate the Solutions

No.	Solution idea	1(30%)	2(25%)	3(15%)	4(15%)	5(15%)	Total
1	ECoD (Environmental Cost Detector) app	27	22	13	13	10	85
2	Hold lectures by professionals	24	24	14	10	10	82
3	Relevant courses, club activities, and other school activities	23	21	12	12	12	80
4	Environmental influence labels on products	23	20	9	13	14	79
5	Recycle harmful waste products	23	19	11	13	12	78
6	Announce the environmental taxation on products	26	16	10	13	12	77
7	Online propaganda	23	18	10	13	11	75
8	More authoritative online secondhand product transaction platforms	22	17	10	12	10	71

📄 evaluation

Make an Action Plan

1. Motivation
In modern society, young people are the main consumers due to rapid development of the Internet. Inevitably, problems appear: a great number of teenagers do not consume rationally and can easily be led by appealing advertisements and sales promotion. The phenomenon is common among the authors' classmates. On Double Elevens Shopping Day, a popular shopping festival in China, they are blinded by the discounts on online platforms and buy many seemingly cheap but may be useless goods. They are deeply attracted by all kinds of delicate promotional pictures without thinking about the cost performance of goods. They throw away "outdated" goods but never consider the potential negative impacts on the environment. In an attempt to stop this woeful trend, our group has taken a series of actions to guide teenagers to think rationally about the meaning of online shopping.

2. General illustration
Aiming to solve the problem comprehensively, our measures are typically categorized into two groups. One group deal with internal causes, to wit, teenagers' own thoughts, while another group deal with external factors, meaning to reduce outer temptations. In order for make our plan more convenient to be implemented, we assign different measures to different groups of people.

3. Previous survey
In order to have a comprehensive understanding of the general consumption habits and environmental awareness of people, especially teenagers, we conduct a survey. Here are the results and analysis:

Eight hundred and thirty seven (837) people online responded to the survey.
The 837 respondents were primarily: female (62.7%; N =525); male (37.3%; N=312).
Of the 837 respondents, the age of 62.26% (N = 521) is between 16 and 20; 17.04% (N=143)of them are between 21 and 25 years old; 10.32% (N=86) of them are between 10 and 15 years old; 3.7% (N=31) of them are less than ten years old and 3.12% (N=26) of them are more than 30.
Almost all the respondents fill in the questionnaire online.
Majority of the respondents (more than 80%) are from Jiangsu Province and other respondents may come from places like Hong Kong, Xinjiang, and Shanghai.
The average time respondents spent filling in the form is 106 seconds.

3.1. Online Shopping

According to the data collected, 38.89%(N=327) respondents shop online once a week. 19.05% (N=159) respondents, almost one fifth of all respondents, shop almost every day. To wit, around 60 percent of the respondents do online shopping more than 50 times a year. By contrast, only 1.59% (N=14) respondents never shop online and it's very like these respondents are primary students who haven't created their online shopping account. Online shopping is becoming the mainstream of young people nowadays.

When asked the question about stocking up on a large number of items during shopping festival with great discount, 45.24% (N=378) respondents choose yes but they indicate that they will choose based on their future needs. There are 32.54% (N=272) of respondents choose not to buy things during shopping festival. Even though the vast majority (52.38%; N=438) of people said they would run out of items bought in most shopping festivals, some people (14.29%;N=119) said that only a small portion was useful, and some (8.73%; N=73) even mention that all of products were eventually thrown away.

3.2. Environmental impact of products

38.1% (N=319) respondents show they take the environmental impact of product into account when buying most products and 34.92% (N=292) of respondents choose not to purchase a product with negative environmental impact. However, there is still nearly one fifth (16.67%; N=140) of respondents don't consider Environmental impacts of items and 7.14% indicates that they will continue to buy as before, even knowing the negative environmental impact of the product. Less than 40% of people recognize that daily necessities could be harmful to the environment and less than 35% are willing to do something to protect the ecosystem. Most of them still lack the awareness of protecting the environment. Even if they realize the importance of doing so, they rarely practice it in daily life.

When asked if they have taken courses in environmental protection, over 70% mention they have had lessons but 59.52% (N=498) of them points out the courses they took were relatively simple and often not so systematic. That is to say, nearly half do not realize the importance of protecting the environment after receiving coerces. The remaining 50% is not exposed to related courses at all. As a result, even as young people, most of them (66.67%; N=559) believe that environmental education for students is very important and can even improve the effectiveness of future environmental protection.

Compared with getting student educated, fewer people (47.62%; N=400) will fully support if the government start to collect environmental taxes, and nearly 40% (39.68%; N=332) are conservative about the proposal.

3.3. Secondhand market

In this survey, over 90% of people rarely choose to sell things they don't need in the secondary market: only 4.76% (N=40) of people will actively sell all unwanted things online. Because of the extreme distrust of the domestic second-hand trading market, more than 95% of people rarely or never buy second-hand goods. Only 7.94%(N=66) of respondents expressed confidence in the domestic secondary market while 66.67% (N=558) of respondents believe a small amount of online markets are reliable. Based on this phenomenon, vast majority of daily necessities that were not damaged but not needed were eventually discarded, and more than 90% of people lack the environmental protection awareness of recycling.

4. Our design

4.1. Purpose of the app

Considering that teenagers normally lack professional knowledge about potential environmental influence of most products, our group hope to provide convenience for teenagers to learn about impacts of products whenever they see them. Inspire by an app called Xingse, which can tell users the name of a plant by analyzing photos, our group decide to design an app, named ECoD(Environmental Cost Detector).

In this app, we store information of many common products, illustrating how they would impact the land, water, or air. When users are purchasing products, they can just take a photo of the product and upload the photo. Then they will be able to see the environmental cost of the product, namely, whether the product has negative impact on the environment. According to our survey, when getting to know the environmental cost is fast and easy, consumers tend to take it into consideration and thus purchase more rationally. In addition, users can use this app to learn about a large amount of knowledge related to the environment when they have spare time.

Our goal is to help encourage people, especially teenagers, to consider more about the environment when they are doing shopping and also improve their knowledge background relevant to environment. After all, people need information to make decisions.

4.2. Design of the app

The name of the application is ECoD (Environmental Cost Detector). This application can scan the merchandise and their flat pictures to analyze and infer the cost of processing the product's impact on the environment. We call the cost "environmental price"

This application mainly has the following functions:
1. Scanning function of barcode or QR code of products.
2. Displaying information after entering the product name.

3. Identifying and classifying typical contaminated materials.

4. Displaying information of contaminated materials. (analyzing and producing corresponding parameters)

5. Automatically scoring the degree of environmental protection of the product.

6. Daily recommending environmentally friendly products.

7. Scanning the 2D figure and inferring what it is (able to scan pictures on electronic devices).

8. Calculating the "environmental price" based on items and materials.

4.3. Database source

Healthline

1. 20 Foods That Are Bad for Your Health

https://www.healthline.com/nutrition/20-foods-to-avoid-like-the-plague

2. Is Phenoxyethanol in Cosmetics Safe?

https://www.healthline.com/health/phenoxyethanol#how-does-it-appear-on-the-label

3. The Health Dangers of Buying Cosmetics On the Internet

https://www.healthline.com/health-news/health-dangers-buying-cosmetics-online

4. 7 "Toxins" in Food That Are Actually Concerning

https://www.healthline.com/nutrition/7-food-toxins-that-are-concerning

Food Matters

1. Top 10 Food Additives to Avoid

https://www.foodmatters.com/article/top-10-food-additives-to-avoid

2. Food Addiction: The Darker Side of Food

https://www.foodmatters.com/article/food-addiction-darker-side-food

3. Why Refined Grains Are Harmful + 8 Gluten Free Whole Grain Alternatives

https://www.foodmatters.com/article/why-refined-grains-are-harmful

Ecology Center

1. ADVERSE HEALTH EFFECTS OF PLASTICS

https://ecologycenter.org/factsheets/adverse-health-effects-of-plastics/

Harvard Health Publishing

1. Common food additives and chemicals harmful to children

https://www.health.harvard.edu/blog/common-food-additives-and-chemicals-harmful-to-children-2018072414326

2. Which foods don't belong in a healthy diet?

https://www.health.harvard.edu/staying-healthy/which-foods-dont-belong-in-a-healthy-diet

4.4. Core technologies of the app

4.4.1. Picture recognition

In the app, users can use the camera to take a photo of a certain product or choose a photo from their album for the app to recognize. This function can be achieved by the picture recognition technology. When an image is inserted, our app will take a series of actions to process the image. First, the original image is converted to a gray level image and then to a black and white image. Next, the boundary of the object is erased, and the distribution pattern of the pixels is determined. After that, some interference points are eliminated, and the characteristics of the product is determined. Finally, the characteristics are compared with data in our database to recognize the product.

4.4.2. Name recognition
Users can input the name of the product, including its brand name. Our app will compare the name to the data in our database and match the keywords to give a list of possible products for users to choose from.

4.5. How users use the app
When users open the app, they can see the following icons: 1. Search for the product name. 2. Scan the QR code or barcode of the product. 3. Recommend daily product. 4.Scan the plat figure. 5. Look through the historical search.

When the user clicks on the first icon, they can enter "product name + brand", and then, through the search engine in the app, the user can see a series of related products. They can click on the product they want to see, and they will jump to an interface that displays the materials of the product. On this interface, users can see the environmental price of the product. Also, the selling price will be close to the "environmental price", which can be obvious to users to compare. Users can click on each name of materials to see the contamination parameters of materials.

When the user clicks the second icon, they can scan the barcode or QR code on the product in their hands through the mobile phone camera, and then the page will directly display the environmental price, selling price, and materials of the product. Users can also click on the material name to see the contamination parameters.

When the user clicks the third icon, they can see a product with a higher environmental score, and an app will introduce an article describing the features and advantages of this product. We will encourage consumers to buy this product.

When the user clicks on the fourth icon, the user can perform two operations:
1. Take a real-world shot. The user places the selected picture into the musk area and takes a picture. After the photo is taken, the application system will automatically analyze and identify it. Finally, the product displayed on the picture will be obtained, and its "environmental price" and selling price and material composition will be displayed.

2. Make album selection. The user filters the pictures from the mobile phone album and puts the pictures into the recognition area by capturing, zooming in, zooming out, and dragging. The application also automatically identifies and analyzes the results and displays the "environmental price", selling price, and constituent materials.

When the user clicks the fifth icon, all the products that the user has browsed will be listed in chronological order. Click to see the detailed description of the product (including "environmental price", selling price, and materials).

4.6. Additional mechanism of the app
4.6.1. Incentive mechanism
In order to encourage users to use ECoD to check the environmental cost of products, we will include incentive mechanisms in our app. The app will automatically record the times and frequency a user uses it to check the value of products. If the use frequency or accumulated times reach a certain level, the user will be rewarded, both in titles and in materials. The material incentives may be little gifts or certain amount of money. In this way, users will become more active and passionate to make use of our app, and gradually their will form the habit of taking environmental influence into consideration when shopping online and avoiding impulsive consumption.

4.6.2 Daily learning mechanism
We hope to root the concept of environmental cost deeply in our users' mind and help them form the habit of considering this value when shopping and avoid impulsive consumption. Therefore, we include a daily learning mechanism in ECoD, namely, helping users to learn something about environmental cost every day. We will post interesting stories that contain environmental knowledge every day, encouraging users to spend a little time reading and learning for fun; we will also assign simple daily tasks and randomly popping out little questions based on environmental cost for users to answer, such as "What kind of pollution does lipsticks cause," combing these with the incentive mechanism to lead users to learn voluntarily. These activities are subtle but will improve users' background knowledge and change their ways of thinking gradually.

5. Ways of promotion
5.1. Schools and communities
5.1.1. Invite experts for lecture
We will write emails to our schoolmaster, Mr. Zhuojun Zhu, proposing that the school can invite experts to hold a series of lectures, taking this opportunity to propagandize our app, ECoD. It will be great if the school can contact some experts in the fields. For the first lecture, we will contact Dr. Hengfeng Miao, a professor in College of Environment & Civil Engineering, Jiangnan University, to invite him to

visit our school and give a lecture. Dr. Miao is a professional in pollution and Jiangnan University is in our city.

We plan a series of lectures that focus on topics such as pollution, green consumption, and rational monetary management. We will negotiate with experts who are going to give lectures in order to make sure that the contents of the lectures are quite related to our daily life and can easily be understood. These lectures will be quite educational and will help teenagers to learn more about the environment and pollution, build sound values of consumptions, and avoid being deceived by sales promotions. At the end of the lectures, we will introduce our app, ECoD, to the students, explaining the purpose and functionalities of it clearly. After listening to the lectures which arouse their interest in environmental cost, student will care more about the environment when shopping, make more rational purchases and thus realize the effectiveness and importance of our app. Only if they know how significantly environmental cost of products can influence our earth, will they become aware that ECoD is useful in daily life.

In order to encourage more students to listen to the lectures, we will cooperate with the Propaganda Department of our school to promote the lectures, along with our app. We will post articles that introduce the lectures and short videos that encourage students to join on the both public accounts of our school and clubs. In noticeboards of our school, we will put up posters to raise students' attention.

5.1.2. Organize club activities

Our school has fixed amount of time for club activities every week, which can be a perfect time for extra-curricular learning and discussions. Our group is part of an environmental protection club in our school and thus it is easy to carry out club activities. We will negotiate with presidents of other clubs and invite them to hold a combined conference. During the conference, students will be encouraged to express their ideas of topics such as the relationship between consumption and pollution, what exactly "green consumption" is, and how to avoid impulsive consumption, etc. Also, students will get an opportunity to introduce their beloved products that are environmental-friendly and suggest alternatives to those products which have negative impacts on the environment. We will also invite students to try out the app ECoD, express their experience feelings, point our flaws of the app, and offer suggestions.

In this way, students will be provided with an opportunity to become part of the research and development group of the app ECoD, which gives them a sense of engagement and contribution within the developing process of the app. Consequently, their interest of the app will be aroused, and they will become more willing to use ECoD in their daily life. Meanwhile, this activity provides a place for students to express their own ideas about online shopping and green consumption

and listen to peers' opinions meanwhile. While some teenagers are bored with experts, parents, and teachers, generally they are willing to listen to people of the same ages. After all, it is often easier for teenagers to communicate with classmates and friends instead of adults, who are always considered to be preaching. Under the influence of peer models who can purchase rationally, teenagers will be likely to feel compelled to learn from them and consequently form more sound values of consumption.

5.2. The government
5.2.1. Propagandize concepts of environmental cost and environmental taxation

Currently, our country taxes companies for pollution during their production process. It seems that only producers bear the environmental tax, but economically speaking, this tax is borne by both consumers and producers because taxes often result in increasing prices. However, most consumers are not aware of this, and some even do not know that the prices of certain products comprise environmental tax. As the result, consumers will continue to buy these products without concerns. Therefore, we want to let consumers know that they are actually paying part of the environmental taxes when purchasing the products that have negative impacts on the environment. We will write emails to the government, recommending them to announce this to the public that they actually have to bear certain environmental cost of these products. Consequently, consumers will tend to pay attention to environmental cost, and in order to avoid purchasing products that do harm to the environment so that they can avoid paying extra money, people will learn to use ECoD frequently when shopping.

5.2.2. Propagandize sound consumption values

Since the government typically has powerful ways of propaganda, we hope to promote our ideas with the help of the government. We will try to contact with the government, describing the common phenomena of impulsive online shopping, explaining the importance of rational consumption, and emphasize teenagers' role in reducing consumption of goods that do harm to the environment. We hope the government can promote the idea of rational online shopping and encourage teenagers not to be allured by promotional prices. Instead, they can find out the real cost, including environmental cost, of the products by making effective use of ECoD.

5.3. Network Platforms
5.3.1. Online shopping platforms

We will contact and negotiate with the managers of some popular shopping platforms, such as Tao Bao and Jing Dong, promoting the idea of green development. We will try to persuade them that as the nation's largest and probably best online shopping platforms, they should take long-term development of our country into consideration, paying attention to environmental cost of

products and leading consumers in a right and healthy way. We will recommend that they adopt the strategies that ECoD uses, illustrating the actual value including impacts on the environment to consumers and guiding them to make fairly sound choices instead of purchasing out of instant impulsive.

In this way, these shopping platforms will be able to build images as being reliable and positive, increasing trusts by the public. Meanwhile, teenagers who are not mature enough to develop a sound value of consumption will be able to see the real costs of goods and thus may not be easily influenced by compelling promotion prices.

5.3.2. The live streaming platforms

We will ask people around us who are willing to protect the environment to popularize ECoD on online live streaming platforms such as Tik Tok and Dou Yu. They can upload videos or perform live streaming. If it is possible, we can also find some anchors to help us promote. The anchors will be willing to help us promote our app because this act will benefit themselves. Since ECoD is an environmentally friendly app, the anchors will be considered as positive influencers, which will earn them good reputation. At the same time, our app ECoD will be able to get popularized with the help of the anchors' popularity and influence, recognized by more people, and thus be used by more people. Through watching the live streaming, people will become more familiar with the term "environmental cost" and begin to take it into consideration when shopping. What is worth to be mentioned is that teenagers account for a large audience of live streaming, meaning that the anchors will be able to exert influence on many young people.

📄 previous survey data details
📄 design sketch
📄 picture recognition process
📄 previous survey
📄 Calculation method of environmental price

Prototype and Test

| Prototype Design

To promote "environmental price" and rational consumption among teenagers, we developed a prototype of an app names ECoD. We used markers to draw the prototype of the app and scanned it into the form of PDF. We designed three sections in the app. In the first section, people can search for the products' "environmental price" and the analysis of the raw materials and producers of the products by inputing the name, taking a picture, or scan the code of the products. In the second section, people can get some popularization of science. By learning these knowledge, people get to care more about the environment. The third section includes some producers whose impacts to the environment are estimated by our app through a serious of calculations. We will recommend people to choose these environmentally friendly producers.

| Feedbacks learnt from users

We made a detailed introduction of our app ECoD to some people and let them experience what it would be like when using this app. Afterwards, we made a questionnaire for them to complete. 317 people have responded in our survey towards our app, ECoD. This survey is based on people from age less than 10 to more than 30 and the majority of them are young people age from 16 to 25. Among them, 56.4% are female and 43.6% are male. Generally, respondent hold positive opinions toward our app.

1. Quantitative feedback
1.1. Utilization frequency
Around 66.55% of the respondents indicate that they will use our app frequently. Only less than 2% of the respondents say that they will never use the app.

1.2. Effectivity of expanding knowledge
Only 2.34% of the respondents cannot identify eco-friendly products after using our app, and among all respondents, over 80% mention that our app is able to help them distinguish good products for environment. Also, 74% of the respondents say that they can learn more about the environmental impacts of products when

purchasing through our app.

Up to 84% of the respondents think the app increases their knowledge of environmental protection, while only 3.1% people indicates that the app doesn't improve their knowledge at all. In addition, more than 60% of our respondents think that the knowledge they learn from the app is very useful in daily life.

More than 80% of the respondents begin to understand or become willing to learn about the environmental cost of products through this app, but there are still around 15% people report that they have no interest in this.

1.3. Effectivity of habit forming
Nearly 80% of the respondents indicate that they will always or often learn about the environmental price of products before purchasing.

Nearly 70% respondents say that this app effectively reduces their frequency of impulse purchases and only 9.19% says it doesn't work at all. The rest respondents indicate this app works from time to time.

Close to 80% respondents think that they usually or often read our daily recommendations and science publication and considering these posts as useful guidance that assisting them to make green and rational shopping choices.

2. Qualitative feedback
2.1. A few respondents think that they do not want to read the recommendations and science publication because they are too long or too professional.
2.2. Some respondents consider that the design of app may not be that attractive to them.
2.3. Several respondents hold concerns about the credibility and comprehensiveness of our data base.
2.4. Two respondents suggest that we should make effort to letting the producers make changes to produce eco-friendly products.
2.5. Some respondents suggest that they are confused about the what exactly environmental price is.

📄 survey2

| Improvement for next iteration

1. First, we will put vivid pictures or videos on the daily recommendations. Second, we recommend users to watch some interesting environmental and consumer videos. Finally, we will edit the manuscript of the recommended content to make it

more vivid and attractive. We would avoid using academic terms throughout our articles and let our readers catch our point easily using comparsion (for example: when thrown into lakes or river, some chemical in this product may pollute over 1000 tons of water, which is close to annual water consumption per capita).

2. First, we will make the app icons more interesting. Second, we will set different background templates in the app. Finally, we will consider adding fun quizzes on environmental protection. We will design a version specifically for children with cute colorful icons and explanation easier to understand.

3. First of all, we will allow experts to identify our data sources through email, letters or visits, and we will continuously modify them. Secondly, we will increase the expansion of the data network to make the data on the app more accurate. Last, we will accept ideas from public accounts and other methods and verify our data.

4. First, we will search the Internet for companies that produce a lot of pollution and write to their managers. In the letter, we would recommend that they adopt a greener production method and use greener energy sources such as solar energy. Second, we'll list some advanced companies which use clean energy and are environmentally friendly in our app's "our recommend" plate, and recommend people choose their products.

5. In our app, we will add some detailed introduction about the "environmental price" to let the public know more about it. We will publish some short videos on the environmental costs on the short video platforms such as Tik Tok to let more people know about it.

Team Credits

Yinglin Sheng takes the responsibility of collector and propagandist. Yingling Sheng is responsible for collecting some information from the group discussion, writing part of solutions part and spreading the questionnaire out for more people to fill in.

Wenxin Deng is responsible for coming up with some ideas throughout the innovation and writing part of solutions, the criteria, part of the action plan, and the summary. Wenxin Deng also takes the responsibility of general editing and deriving the calculation method of the environmental price.

Xinxin Zhou is responsible for coming up with some ideas, writing part of the action plan and part of the root cause. Xinxin Zhou also takes the responsibility of drawing the sketch of ECoD app, writing the prototype design part, and deriving the calculation method of the environmental price.

Xinyi Wu is responsible for taking notes when the team members are discussing and writing part of the solutions. Xinyi Wu also takes the responsibility of spreading the questionnaire out for more people to fill in.

Yuxin Wang is responsible for writing the challenges, designing of a previous survey, and data results analyzing reports. Wang Yuxin also takes the responsibility of integrating users' feedback of prototype and writing the quantitative and qualitative feedback.

Haocheng Zhang is responsible for writing part of solutions and part of the action plan. Haocheng Zhang also takes the responsibility of evaluating the solutions and making an evaluation chart.

Yihan Yao is responsible for writing part of the root cause and collecting the data for both surveys. Yihan Yao also takes the responsibility of searching for the database source for the product.

Judge Comments

" The team did a great job in breaking down a complex problem like consumption, especially the social aspects of it and in proposing a good solution to start addressing it. I was particularly impressed with the range of solutions identified and analyzed, how the action plan was developed and the level of detail in the solution (app) developed.

The points suggest below will help to strengthen the current project -
- Clarify if the predominant focus is on the purchase of non-essential goods (cosmetics, textiles, electronics etc.) or if the app is also looking at daily goods like fruits, vegetables and other consumables. While the report has focused predominantly on the former, it is not clear if that was intentional.

- Think about how incentives are addressed. If you expect an app to become the source of legitimate information about environmental benefits, how can it be made to stay 'honest'? How do you prevent the app from becoming the next 'internet influencer' that pushes products that benefit the app maker financially? How do you ensure your customer base trusts the information provided, especially once the app subscription becomes large?

- Some sections could use additional detailed understanding of the background and existing baseline scenario. For instance, (i) Identify scientific research on the age groups that are the best suited for habit forming and look to incorporate some elements of environmental education to this age group. Is teenage the appropriate age to develop sustainable purchasing behavior? What type of steps/actions can be taken to inform appropriate behavior at earlier ages (4th to 7th grade) when many of these ideals are formed? (ii) What are the existing baselines for product certification in China and Hong Kong? How are harmful chemicals in beauty products currently regulated?

- Increase the sample size of respondents who are adults (especially to see if there are differences in how that group perceives the suggested solutions)
"