Sustainable development strategy of beverage straws for environmental load reduction

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Abstract. The destruction of the ecological environment by white pollution is a serious threat to the survival and development of mankind, and the small drinking straws have become the main plastic waste increasing the environmental load due to their huge daily use. In line with the background of the strongest "Plastic bags ban", plastic drinking straws are completely removed from the shelves, and the sustainable development strategy of drinking straws is explored from many aspects, such as the development of new environmentally friendly material drinking straws, beverage price incentive mechanism, public guidance and brand reputation win-win, policy promotion and market activation.

Keywords: Environmental load reduction, Eco-friendly straws, Sustainable Development.

"White pollution" has always been a very important part of environmental management. The Organization for Economic Cooperation and Development (OECD) reports that global plastic waste production continues to increase, with more than 300 million tons entering the environment each year, and that this hard-to-degrade plastic waste continues to damage global ecological health (Figure 1).

China introduced the "Plastic bags ban" in 2007, namely the "General Office of the State Council on restricting the production and sale of plastic shopping bags notice". All supermarkets, shopping malls, marketplaces and other merchandise retail field implementation of plastic shopping bags paid use system, the use of plastic bags is therefore limited to a certain extent, some consumers began to consciously bring their own recyclable canvas shopping bags. However, over the past decade, many industries still have a "gray area" of plastic restrictions, courier, fast food industry is still filled with a large number of non-recyclable, degradable plastic products. In 2020, the National Development and Reform Commission and the Ministry of Ecology and Environment jointly issued the "Opinions on Further Strengthening Plastic Pollution Control", a policy that expands the types of restrictions on plastic products, strengthens the restrictions, specifies the steps and paths of restrictions, etc.

Currently, the beverage industry is booming and the usage of plastic beverage straws is increasing day by day. Drink straws seem to be a small part of the "plastic restriction" team, but its use is huge, so "Opinions" pointed out that by the end of 2020, the nationwide restaurant industry will ban the use of non-degradable single-use plastic straws. As one of the types of restrictions on the regulation of plastic drinking straws has also become a difficult problem that must be overcome.
1. Domestic new material drink straws on the replacement of plastic drink straws

Under the strict enforcement of the latest plastic restriction, traditional plastic straws began to withdraw from the beverage market. There are two main alternatives: one is paper straws; the other is polylactic acid biodegradable straws, i.e. degradable straws.

1) Paper straws and their advantages and disadvantages

As the "replacement tube" for plastic straws, paper straws are preferred because of their relatively low cost. According to the different raw materials of pulp and subsequent process, the main paper straws in the market now are natural color paper straws and colored paper straws. Natural paper straws mainly use kraft paper as material, generally yellowish brown, half-bleached or fully bleached kraft pulp is light brown, cream or white, lack of visual sensory experience; colored paper straws are based on white paper straws with the addition of surface spraying ink process; its characteristics are colorful, pattern-rich, attractive for children and women. Paper straws have high hardness, not easy to break and soften, etc., and can generally withstand high temperatures up to 50 ℃.[1]

The biggest advantage of paper straws is that they are biodegradable, and in addition, they have a price advantage over some of the new biomaterials currently available. The current market, the price of a paper straw is about 0.1 yuan to 0.2 yuan, although compared to plastic straws 0.01 to 0.05 yuan each price still seems very high, but compared to the price of other environmentally friendly straws on the market, paper straws have an absolute price advantage, which is the main reason why it occupies the main market for drinking straws.

Paper straws in the process of use, its problems continue to appear. The first is the poor consumer experience. The most serious problem is that paper straws soaked in drinks for a long time can cause them to soften or even be soaked in drinks. The most common measure taken to address this issue is paper coating, which brings new problems is the degradability of paper straws is greatly reduced; in addition, more and more consumers say that paper straws seriously affect the taste of drinks, the entrance that is the taste of paper. Secondly, from the perspective of resource consumption, the increase in demand for paper straws directly leads to an increase in wood consumption, and the process of processing and making paper will also continue to emit pollutants, so if a product life cycle assessment tool is used to comprehensively evaluate paper straws, the end result may only look "environmentally friendly".

Although the problem of easy softening and odor of paper straws can be solved by technological innovation, its problem in resource consumption is unavoidable and unsustainable. In the long run, paper straws can be used as a temporary alternative and transition, but better alternatives need to be found.

2) Polylactic acid biodegradable beverage straws and their advantages and disadvantages

PLA straws are the second type of "replacement" for current beverage straws. Polylactic acid (PLA) is a new type of biomaterial made from starch derived from renewable plant resources such as corn.[2] Glucose is obtained by saccharification of starch raw material, then high purity lactic acid is made by fermentation of glucose and certain strains of bacteria, then polylactic acid of certain molecular weight is produced by chemical synthesis method, and then processed and molded, which has good biodegradability.[3] As you can see, PLA straws are superior to paper straws in terms of resource conservation.

PLA straws can withstand temperatures from -10°C to 80°C, which is more stable than paper straws. Moreover, their appearance and sense of use are similar to plastic straws, so from the perspective of consumer experience, PLA straws are better than paper straws.

The physical and experiential advantages of PLA straws are obvious, but from a commercial perspective, its high commercial cost limits its market penetration. 1 plastic straw 0.01 to 0.05 yuan, 1 paper straw 0.1 to 0.2 yuan, 1 polylactic acid straw 0.3 to 0.6 yuan. Therefore, despite the many advantages of PLA straws, they are not yet popular because of their high price.

2. Development of new environmentally friendly material drinking straws

In general, the domestic environmental protection straws a single type, the existing products also have raw material selection, cost control, processing technology and other issues. China's drinking straws
want to embark on the road of sustainable development, can not be separated from the research and development of more new environmentally friendly straws. The following are three foreign cases of research and development on environmentally friendly drinking straws, to provide some inspiration for the development of domestic drinking straws.

(1) Seaweed straws
LOLIWARE, a product brand with the world's leading seaweed technology, has developed an edible and eco-friendly straw called Lolistraw (Figure 2). Its raw material is seaweed and edible sweetener, the straw can be soaked in drinks for more than 24 hours, non-toxic, non-genetically modified, edible, and can be quickly and completely degraded in soil and ocean lakes, truly from nature, back to nature. Of course, consumers can also eat the straw after drinking the drink, truly "zero pollution". Seaweed is a raw material that is extremely abundant in China. According to the information, the total production of seaweed in China accounts for more than 60% of the total production of seaweed in the world. Given that our seaweed resources are so abundant, it is perfectly possible to conduct research and development of seaweed straws.

(2) Rice straws
A Korean food company has successfully developed a "rice straw" straw (Figure 3), which is made of 70% rice and 30% cassava and has a similar taste to rice potpourri. The durability of the straw is also good, able to stay in the hot drink for two hours. These straws are now able to be produced on an automated and large-scale basis, and the unit price of each straw is only 15 won, which is equivalent to RMB 0.09. The universality, environmental friendliness, and edibility of the raw material of rice straws, as well as the price advantage, make it an environmentally friendly straw that can be widely promoted.

(3) Pasta straws
The Italian company Stroodles has developed a straw made of pasta (Figure 4). The appearance and size of this straw are close to those of ordinary plastic straws. The pasta straw is a good solution to the softening of paper straws due to long-term immersion, as it can be immersed in drinks for at least an hour without deformation, and its form can be maintained even longer in cold drinks. Of course, longer soaking, pasta straws will eventually soften, when it can be eaten as a snack.

From the above foreign excellent case can be concluded, plastic straws alternative material research and development space is huge, we can learn from foreign successful cases for research and development, improvement; also from a wider range of raw materials to find more alternative solutions; in addition, can also develop reusable straws, reduce the use of disposable straws.

3. Limit and promote the sustainable development strategy of beverage straws
The effective implementation of China's "Plastic bags ban" is ultimately through the replacement of plastic products by environmentally friendly materials, the development of new environmentally friendly drinking straws to fill the huge market demand for plastic straws receding; at the same time, environmental awareness, resistance to disposable plastic products should also take the opportunity to popularize and enhance the public, so as to achieve the sustainable development of drinking straws. Sustainable development, not just through the "Plastic bags ban" to force business and consumers to "compromise", or irresponsible business to plastic outside the non-environmental drinking straws to plastic straws of the replacement, wandering in the gray area of laws and regulations. Therefore, the "Plastic bags ban", as a clear restriction regulation and policy guidance, also needs to propose promotional measures on this basis in order to ensure the sustainable development of drinking straws. In this paper, from the perspective of the closest stakeholders involved in beverage straws: consumers, beverage brands, and beverage straw manufacturers, we present a sustainable development strategy for beverage straws in three aspects: beverage price incentive mechanism, public guidance win-win and brand reputation, and policy promotion and market activation.

(1) Drink price incentive mechanism
There are reports that the release of plastic restrictions in the EU per capita use of 200 plastic bags per year, while there is no restriction on plastic regulations in Germany per capita plastic bag use of 68. As you can see, strengthening citizens' awareness of environmental protection is one of the most
effective ways to implement the "plastic restriction".

The "beverage price incentive mechanism" refers to the development of an incentive mechanism in beverage stores to boycott plastic straws and choose environmentally friendly material straws, so that consumers are rewarded for not using plastic straws (or bringing their own reusable straws), gradually developing the habit of using environmentally friendly material straws and building environmental awareness. Specifically, when consumers bring their own eco-friendly straws or drink cups when buying drinks, merchants should deduct the price of the straws or drink packaging provided by the drink store from their drink consumption as an incentive; for example, cashiers can give customers a price incentive of 0.2 to 0.5 yuan. Consumers can choose to credit the rewards on the spot for this purchase, or they can accumulate the rewards as drink points in the membership card of that beverage store and redeem them for corresponding items and other rewards later. In this way, the amount of straws can be reduced, but also in a subtle way to strengthen consumer awareness and behavior of environmental protection.

(2) Public guidance and brand reputation win-win

Consumer loyalty to the brand can be an excellent way to guide the establishment of "plastic restriction" environmental awareness, and can make full use of the brand charm of the beverage store to influence consumers. Beverage stores can launch posters or videos about "plastic restriction" in the APP, so that customers can gradually understand the great harm caused by plastic products in their daily consumption. At the same time, as a socially responsible enterprise, its social reputation is accumulated precisely through these social welfare activities and publicity, gradually establishing a good brand image and reputation in the hearts of consumers, and eventually becoming the added value of the brand, as consumers, are also willing to pay for such a socially responsible brand. Therefore, the active participation of companies in environmental protection is a win-win thing to help consumers build awareness of environmental protection and build brand reputation.

(3) Policy promotion and market activation

The development and production of new environmentally friendly material straws still need policy promotion and market activation.

First of all, the government can develop investment channels to actively attract new environmental protection material-related industrial projects to inject new vitality into the drinking straw market; in terms of construction, the government can issue a list of key new edible-grade environmental protection material development catalogs and build up an innovation system for the research and development of edible-grade environmental protection materials, so that manufacturers can clearly develop their routes; in terms of production, the government can provide technical and equipment support to new environmental protection material manufacturers and environmental protection in terms of production, the government can provide technical and equipment support to manufacturers of new environmentally friendly materials and environmentally friendly drinking straws to ensure their stable productivity; in terms of finance, the government can provide corresponding subsidy support to manufacturers of environmentally friendly drinking straws that have been developed and have generated actual benefits, such as subsidized loans, scientific and technological research and development incentives, etc., and can also give preferential treatment in the price of land for production, water, electricity and gas to reduce the financial pressure of enterprises; in terms of taxation In terms of taxation, we should reduce the taxation of this type of environmental protection material research and development companies, with tax incentives or tax rebate mechanism to attract more new environmental protection material manufacturers to join the ranks of environmental protection drinking straw industry. For plastic product manufacturers facing operational difficulties or facing bankruptcy, the government can support the transformation of such enterprises to an environmentally friendly drinking straw industry and provide them with financial, technical and equipment support.

At this stage, there is still a lot of room for improvement in the market dynamics of the development and production of new environmentally friendly material straws. Affected by the research and development and production costs, the price of new environmentally friendly materials straws are mostly high, most businesses tend to choose paper straws for cost control considerations, resulting in a lack of market vitality of new environmentally friendly materials straws. Therefore, in addition to the
establishment of public awareness of environmental protection from the source, in the market activation period also need to rely on policy support to properly reduce the transaction price of new environmentally friendly material straws, so that different varieties of new environmentally friendly material straws to become a business purchase products, so as to mobilize R & D production enthusiasm, to steadily enter the market development and maturity period, and then rely on technological innovation and business profit concessions to maintain market vitality. In addition, in the new environmental protection material enterprises to carry out the selection activities, the excellent indicators of the enterprise to award, so as to form a benign competition between enterprises, to further activate the new environmental protection material industry market dynamics.

4. Conclusions
In 2020, the annual consumption of plastic straws in China is nearly 30,000 tons, about 46 billion straws. According to this data, the strongest "plastic bags ban" undoubtedly promotes the market of new environmentally friendly material straws to a broader space, and the sustainable development of environmentally friendly straws will certainly promote the development of environmentally friendly consumption in China. Therefore, consumers, beverage brands and beverage straw manufacturers should gather consensus and participate in the supervision and implementation of the "Plastic Restriction Order" to help build a beautiful China.

4. References
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