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# Free Distribution of Plastic Bags and Consideration of Global Environmental Problems in Japan

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**ABSTRACT**

We introduce the current state of Japan and consider the contribution of plastic bags (disposable shopping bags that are freely distributed at stores) to global environmental problems. Plastic bags require the consumption of a large amount of oil at the time of manufacture, accompanied by emission of carbon dioxide. Particularly, polyvinyl bags cause dioxins to be generated by incineration at the time of disposal and contribute to environmental pollution. Similar to other countries, Japan is considering reduction of plastic bag use by diverse methods, such as charging fees and encouraging shoppers to bring their own shopping bags. In this paper, we report on the effectiveness of various reduction methods and the reasoning for their levels of efficacy, including the authors' opinions.

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## INTRODUCTION

The term "global environmental problems" refers to the source (cause) of and damage (influence) done by environmental hazards throughout a wide area and on a global scale. These include 1) air pollution and acid rain caused by industrialization and proliferation of automobiles, 2) water pollution and soil contamination by industrial and domestic wastewater, 3) ozone layer destruction by Freon gas, 4) global warming caused by emission of greenhouse gases, sea level rise, and melting of frozen land such as Antarctica, 5) land development without consideration of its impact on nature, logging of large-scale forests without considering deforestation, and 6) attenuation of biodiversity concomitant to development and ecosystem destruction. These are major problems whose influences spread across national borders. Moreover, global environmental problems are some of the most important and difficult issues faced by humanity for the following reasons: A) The problems are extensive, diverse, and complex, B) Causal relationships concerning the problems and effective countermeasures have yet to be fully grasped, C) It is impossible to fundamentally solve these problems with merely superficial measures, and individual problems of ethics and lifestyle need to be considered, D) The interests of each country with respect to the problems are not consistent, and there are conflicts of interest between industrially developed countries that have turned their attention to the environment and developing countries that are about to develop industrially, E) There is a close relationship between the earth's population problem and economic development, and it is necessary to compromise while maintaining compatibility with the needs of both, F) In general, these problems are not deemed to be very serious, but if solutions are delayed, there is a risk of the problems progressing to an unrecoverable state.

In this paper, we discuss the distribution of plastic bags (disposable shopping bags), which is being addressed at the business and individual levels in Japan, including the authors' opinions

about this contribution to addressing global environmental problems. This is considered to be particularly related to 4), C), and E) above.

***Definition of plastic bag***

Plastic bags comprise a category of bags made of materials such as polyethylene that are distributed at cash registers of retail stores like convenience stores and supermarkets to transport purchased products. In Japan, since 1970, they have been strong and water-resistant, and bags made of such materials as polyethylene and polyvinyl chloride began to be used instead of paper bags at retail stores such as supermarkets and convenience stores. Almost all plastic bags are now made of polyolefin. In recent years, there have been reports that as many as 30 billion plastic bags are consumed annually in Japan (approximately 300 bags per person) [1].

***Significance of plastic bags***

Many bags have been printed with store names and logos. Because there are opportunities for exposure to many people in various locations before shoppers return home, the use of printed logos aims to provide publicity, informing other people of where a person shopped. In Japan, bags containing the logos of popular shop brands are sometimes used as fashion items. After shopping for souvenirs and other items at sightseeing spots or famous department stores, bags containing logos may be used as proof of purchasing at that place. In contrast, some chain stores use plain white bags to reduce cost. In any case, it was customary to distribute plastic bags as a service to customers free of charge in the past.

***How to find additional uses for plastic bags***

Although the original purpose of shopping bags was to transport shopping products, they are commonly used for other purposes because of their robustness: a) Trash bags (to dispose of

garbage and bring it to a garbage incineration facility as-is). In the case of Kyoto city, which will be described later, in recent years, it gradually became impossible to use opaque bags in colors such as black and blue, and only transparent (translucent) ones are now gathered in incineration facilities. Furthermore, the number of municipalities in which only designated garbage bags can be used for a fee has increased. However, some people still continue to put garbage into recycled shopping bags, and some put them in garbage dumpsters as plastic garbage. Municipalities may use various methods. Some areas have designated shopping bags as garbage bags, and some areas prohibit the use of plastic shopping bags instead of garbage bags. Generally, it seems that supermarkets and convenience stores in each area may adjust plastic shopping bags' color and transparency according to the provisions of their municipalities' garbage bags and inner bags. b) Etiquette bags (when one feels nauseous and does not have a dedicated etiquette bag, it may be necessary to rely on a plastic shopping bag.) These are necessary for motion sickness during travel, and they are often available at the time of purchase of items like food and drinks. Sometimes, they are used to pick up excrement when walking a pet such as a dog. c) Covers (plastic bags can also be used to protect bicycle seats from rain or to protect the rider from wet bicycle seats.) d) Dust protectors (plastic shopping bags are sometimes used to prevent household articles from gathering dust over many years or to pack items in a single bag or divide them between multiple bags for long-term preservation.) e) Transport bags (plastic shopping bags are useful not only for shopping purposes but also for carrying items such as valuables.)

***The situation with plastic bags in Japan***

Analysis results by Kyoto City and Kyoto University indicated that lead (a harmful heavy metal) was detected in colored plastic bags distributed at department stores. For this reason, Kyoto city has refused to continue using the contractor that manufactured the bags [2].

In Japan, from the viewpoint of emphasis on environmental problems and environmental protection, a movement to reduce the use of polyethylene plastic bags has emerged in recent years. The environmental hazards associated with plastic bags stem from the fact that large amounts of petroleum are used in their manufacturing, and gases such as carbon dioxide are generated by combustion at the time of their disposal, causing air pollution. Depending on retail businesses' policies, they can charge for bags or promote the use of tote bags at the time of shopping. This is commonly referred to as MY-BAG activity. MY-BAGs are nylon shopping bags and baskets that can be used continuously and are sometimes called eco bags (Table 1, Fig. 1). Unlike the case with environmental pollution reduction, no dealers oppose reduction of plastic bag use for economic reasons (by reducing the use of free plastic bags, not only can equipment costs be reduced, but profits from private garbage bag and MY-BAG sales will also rise). As the cost of plastic bags increased under the influence of high crude oil prices, the flow of MY-BAG recommendations accelerated. The idea that plastic bags should be free is still strong among convenience store consumers, although many shops are presently forced to pay a supply cost of a few yen per bag (Fig. 2). In some cases, trouble may arise between shops requiring customers to pay for plastic bags and customers who wish for bags to be provided free of charge. Since plastic bags were abolished in some stores, there have been some negative consequences, such as an increase in shoplifting losses, as the lack of shopping bags makes it difficult to distinguish whether a product has been purchased or not. There is concern that MY-BAGs will become a common way to hide shoplifting. For this reason, store employees are starting to focus on crime prevention measures. Efforts to reduce shoplifting while maintaining MY-BAG activity are widespread. For example, managers should formulate rules on MY-BAGs and post them publicly, with items purchased at other stores being put in other private bags. In contrast, some retail stores have made efforts to abolish MY-BAG activity (for example by forbidding the use of shopping baskets and resuming distribution of plastic bags as before). Another opinion is that replacing plastic bags

originally made from surplus oil resources with MY-BAGs or dedicated garbage bags consumes more oil [3].

***The situation with plastic bags overseas***

Among locations outside Japan, markets in Europe began charging for plastic bags before those in most other regions (beginning in the early 2000s) because of its high level of environmental consciousness. In Italy, where the use of plastic bags had been high, their use was prohibited nationwide beginning January 2011, except for those made of biodegradable plastic. In France, a ban on plastic bags was implemented in July 2016. In Asia, stores in Korea and Taiwan are required by law to charge for plastic bags. In China, a charge for plastic bags was implemented on June 1, 2008. According to the results of a survey released on June 1, 2009, consumption of plastic bags had decreased by an average of 66%, saving about 40 billion plastic bags. In Hong Kong, stores began charging for plastic bags on July 7, 2009. In the United States, the movement to ban plastic bag distribution has spread throughout an increasing number of states since the mid-2000s. In Canada, the first large city to begin prohibiting the use of plastic bags was Toronto, in January 2013.

As shown in Fig. 3, the reduction rate of plastic bags is highest when money is charged for them. Our opinion is that this reflects actions by Japanese people to avoid disadvantages. In systems characterized by charges for bags, consumers have to pay for plastic bags. This suggests strongly that the strategy of requiring consumers to be conscious of bringing alternative bags because they do not want to pay money for plastic bags will work. In the study by Funaki *et al.*, higher prices of plastic bags were associated with a higher proportion of customers bringing their own shopping bags [3], which is not contradictory to our consideration. If plastic bags were sold for about 10 yen each, consumers estimate that they would bring nearly 100% of their shopping bags from their homes [4]. Unfortunately,

because the payment amount and payment itself are arbitrary in the donation box and price box methods, it seems that consciousness of the fact that money must be paid may be lowered. However, the stamps/points methods are considered to be effective from the viewpoint that consumers can earn profits, but it seems that these methods are difficult to select because the rates of repeat shoppers are too low. Considering the above comprehensively, it seems that there is a tendency to accelerate conversion to MY-BAGs. However, it may be necessary to improve some troublesome aspects of carrying MY-BAGs by responding when they become dirty and acting to clean them.

Apart from socio-economic factors, a scientific reason why plastic bags in Japan are usually made of polyolefin is for suppression of dioxins by combustion [5]. We also note that each year, 600,000 kL of petroleum is burned and a large amount of carbon dioxide is discharged during the manufacture of 30 billion plastic bags in Japan.

## CONCLUSION

The production, distribution, and disposal of plastic bags are considered to contribute to global environmental problems. Historically, plastic bags have been distributed as a free service by retailers worldwide, and in some situations, it is difficult to stop their distribution, particularly at convenience stores in Japan. We believe that this will also be a factor influencing the approval or disapproval of abolition of plastic straws, which has also become a global topic.

Many private groups have been considering reduction of plastic bag use in Japan. All municipalities conduct waste collection and disposal, and involvement in plastic bag reduction by prefectural and city-level governments has already been seen in many areas. On October 4, 2018, the Minister of the Environment said in a press interview that it would become obligatory to charge for plastic shopping bags [6]. If Japan intends to work seriously

on global environmental issues, we must actively engage with this issue at the national level, like other countries, by introducing legal regulations and taxes [4].

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**Table 1 Methods of plastic bag reduction**

| Method | Overview | Establishment of toll collection | Credibility of amount |
|---|---|---|---|
| Stamps/points | Issue stamps and points to people who do not need plastic bags, redeemable for future discounts on shopping | ○ | ○ |
| Donation box | Call for donations by people using plastic bags; accept any amount of money into the donation box | × | × |
| Price box | Put money for plastic bags into a payment box (however, the clerk does not confirm the presence or amount of payment) | △ (Depending on where the box is located) | × |
| Charge | Settle a charge for plastic bags at the cash register | ○ | ○ |

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Symbols: ○, True; △, Somewhat; ×, False.

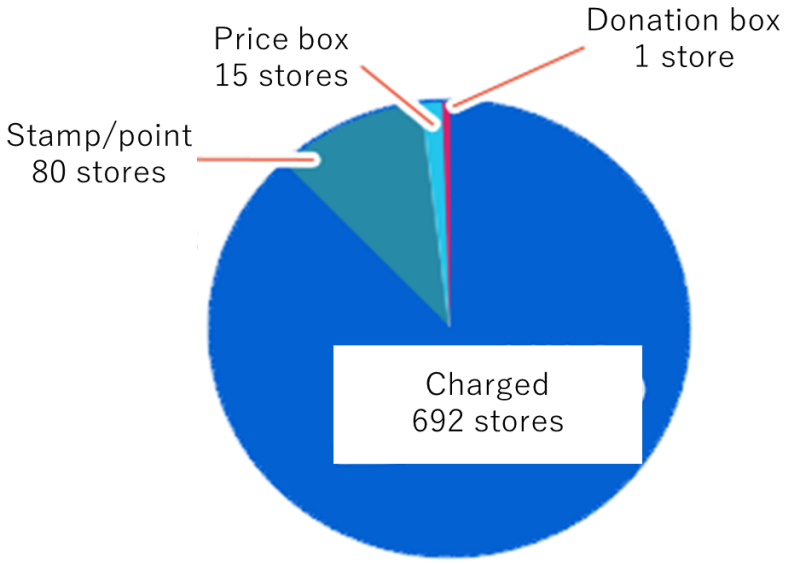


**Fig. 1 Frequencies of stores implementing plastic bag reduction methods in 2015**

Total sample size of survey: 788 stores

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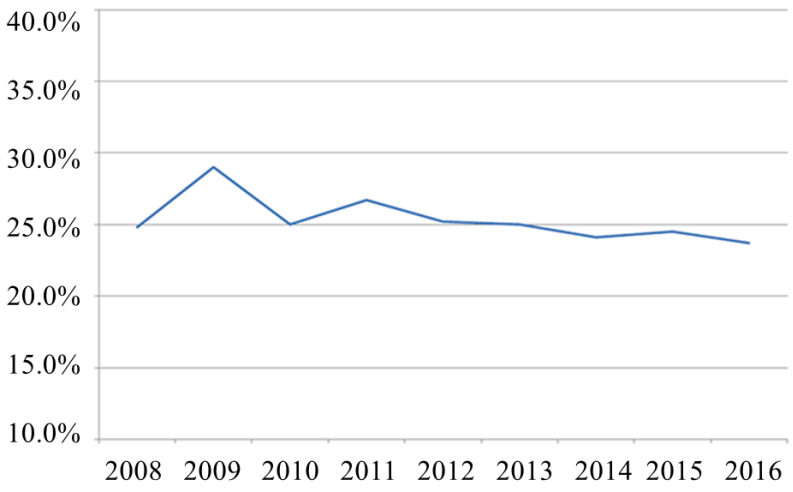


**Fig. 2 Rate of decline in shopping bag use at convenience stores**

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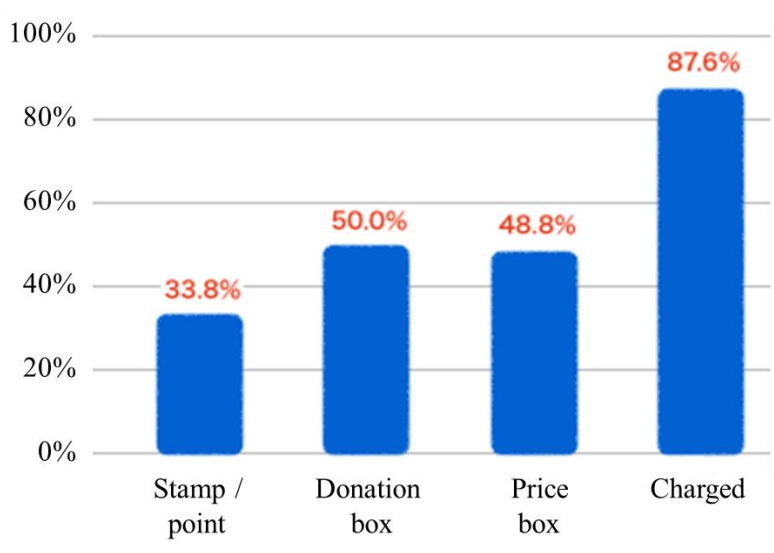


**Fig. 3 Reduction rate of plastic bags in 2015 by reduction method**

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