How Behavioral Economics affects Plastic Bottle Separation

Abstract

This project looks at which Behavioral Economics method is the best way to enhance the plastic bottles separation rate.
Several tests were conducted in a school and the effects of each method were observed. The experimental results showed that if the same posters continued to be posted, their effectiveness would gradually diminish. A message using Psychological Reactance and suggesting prohibition had the effect of especially promoting plastic bottle separation behavior.

Introduction

Plastic bottles are commonly purchased as convenient containers for beverages. However, throwing away plastic bottles with bottle caps or its labels still on is frequently seen in many trash cans. This practice has a possibility of increasing the burden on waste management workers as they must manually remove each label. Additionally, improperly disposed bottles may end up in oceans, contributing to environmental pollution.

Recently, to solve a range of environmental issues in the world, behavioral economics based on internal factors is beginning to be used. A preliminary study by Osaka Senboku High School shows that the theory of behavioral economics has increased the garbage “Separation Rate” in their school.

(To compare the ratio of separated plastic bottles out of all plastic bottles,)
In this research, the Separation Rate is defined as the proportion of plastic bottles that have been correctly separated from the total number of discarded plastic bottles. Separation Rate can be calculated using the following equation(1)

Separation Rate = the number of separated plastic bottles / total number of plastic bottles -(1)

This research aims to examine which behavioral economics can influence the improvement of the Separation Rate, and to evaluate the effectiveness of its theoretical approaches through multiple interventions. By knowing and using methods that focus on the tendency of behavior based on psychological thoughts, rather than forcing action by external factors such as prohibition and suppression, it may be possible to have a different impact from conventional methods.Based on the context mentioned above, this research was guided by two hypotheses.

This research also connects to the goals of the SDGs. Improper disposal of plastic bottles such as being not separated correctly, can cause serious problems in both cities and nature. This issue relates to SDG 11: Sustainable Cities and Communities.
Not being recycled properly leads to more waste and overuse of materials, which connects to SDG 12: Responsible Consumption and Production.
In addition, many plastic bottles that are not thrown away properly end up in rivers and oceans. This pollutes the sea and harms marine life, linking to SDG 14: Life Below Water.
This study tries to solve the problem of low separation rates of plastic bottles. By using behavioral economics, this showed a new way to encourage people to separate bottles correctly. If more places use this idea, it could help protect the environment in cities, reduce waste, and keep oceans clean. In this way, the results of the experiment may help support the SDGs and improve global environmental efforts.

Hypothesis

First, it was hypothesized that the application of behavioral economics can contribute significantly to increasing the Separation Rate. By using insights into human behavior, rather than relying on external enforcement or regulations, it is possible to properly encourage disposal practices.

Second, it was hypothesized that strategic posters such as informative or motivational ones can increase the Separation Rate. These prompts are created to raise awareness and guide individuals toward correctly separating plastic bottles, and this can connect to enhancing the Separation Rate.

Material

Device used for poster creation

1 Apple iPad

Software used:

Google Slides

Posters:

4 printed posters

Size: A4

Included short behavioral messages and simple illustrations

Used principles of behavioral economics

Plastic bottles (for observation):

Approximately 1000 used plastic drink bottles

Sizes varied

Collected from the school’s plastic bottle trash bins.

Procedure

1. To investigate the effect of behavioral economics on plastic bottle separation, intervention by posters was implemented.

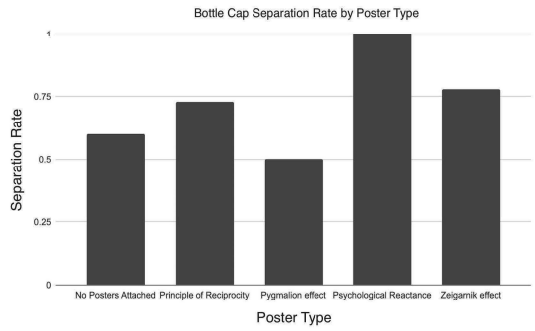
2. Two original posters were created, incorporating the following four principles of behavioral economics: Principle of Reciprocity, Psychological Reactance, Pygmalion effect, Zeigarnik effect

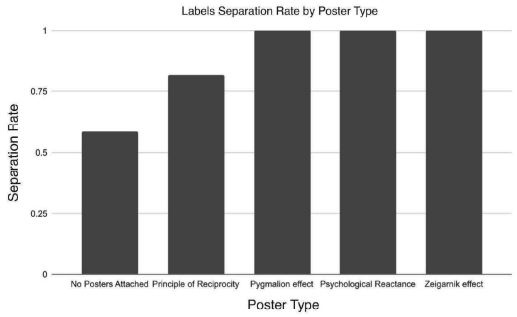
3. These posters were placed on the wall behind a designated trash bin for plastic bottles.

4. Over a one-week period, plastic bottles were collected from the trash bin, and the number of bottles which had been correctly separated was recorded.

5. The Separation Rate was calculated.

Results





According to the experiment on labels, all of these 4 posters showed higher Separation Rate than when the posters were not put up. Especially, in the Pygmalion effect, Psychological Reactance, and Zeigarnik, the Separation Rate had reached 100%.

According to the experiment on bottle caps, Only the Pygmalion effect poster showed a lower Separation Rate than when no posters were displayed. In only the Psychological Reactance poster, the Separation Rate reached 100%

Discussion

It can be seen that the posters have the power to promote plastic bottle separation.

When the poster based on psychological reactance was put on, the highest Separation Rate was recorded.

Overall, the labels and bottle cap experiments suggest that psychological reactance is the most effective way to sort plastic bottles compared to the other three principles of behavioral economics.

Additionally, there is a possibility that the effect diminishes when the same poster is continuously displayed; however, the effect may be regained by replacing it with a different poster.

Conclusion

In conclusion, it was found that posters based on Nudge theory were valid to encourage the action of separating plastic bottles. Especially, under the four tests conducted, the test using Psychological Reactance was the most effective method for promoting separation.

By puttin up a new poster each week, it was possible to prevent a decline in the Separation Rate.

Reference

Yomiuri Shinbun 読売新聞(2024), *Nōberu shou gakusya ga teisyou no “nazzi riron”, ouyou sita “Bunbetsu sitakunaru gomibako” wo koukousei ga kousatsu*, ノーベル賞学者が提唱の「ナッジ理論」、応用した「分別したくなるゴミ箱」を高校生が考案, Retrieved from https://www.yomiuri.co.jp/national/20240420-OYT1T50092/