Mitigating the use of disposable cutlery with bring-your-own-cutlery discounts

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Introduction and Objectives

In recent years, the impact of waste disposal on global warming has been attracting attention, and Japan's total waste output in fiscal year 2022 was 40.34 million tons. The production and disposal of single-use chopsticks and plastic cutlery contribute to carbon dioxide emissions, and wooden chopsticks are further linked to deforestation. Given this background, **consumer behavior change** is essential to reduce the consumption of disposable cutlery.

In this study, we analyze **the effects of a discount policy for those who bring their own cutlery** to Soka University, Japan, during the spring and fall semesters in 2024.

Methodology

Policy A discount was offered to **customers who brought their own cutlery** during lunchtime (12:00-1:00 PM).

- Place: the Student Hall (treatment group) and Gran Cafe (control group)
- Spring semester : the discount amount is 53 yen.
- Fall semester : the discount amount is 100 yen.

We advertised this policy through social media. The data cover an eight-week period (pre-implementation, implementation, and post-implementation phases for each semester).

Analysis We evaluated the **difference-in-differences (DID) method**. The regression model evaluated using the "**proportion of people bringing their own cutlery**," defined as the number of discount users divided by the total number of disposable cutlery items used plus the number of discount users, was specified as

$$Y_i = \beta_0 + \beta_1 DT_i + \beta_{2i} + \beta_3 t_2 + \beta_4 (DT_i \times t_{1i}) + \beta_5 (DT_i \times t_{2i}) + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \epsilon_i$$

Yi : Rate of bringing own cutlery, DTi : Treatment group dummy,
t_1i&t_2i : Implementation period dummy, X_1i&X_2i : Day of week/Semester variable, εi : Error term

β_4 and β_5 represent the DID interaction effects of the discount intervention across spring and fall semesters.

Results

1. Regression results

Based on Table 1 and Figure 1, both the 53-yen discount in the spring semester (β_4) and the 100-yen discount in the fall semester (β_5) had a positive effect. However, only β_5 was statistically significant.

Table 1. Regression Results

Treatment Group	0.003(0.61)
Spring Treatment Period	0.001(0.89)
Fall Treatment Period	-0.001(0.92)
Treatment × Spring Treatment Period	0.012(0.22)
Treatment × Fall Treatment Period	0.049(0.000012)***
Monday	-0.014(0.009)***
Thursday	-0.002(0.70)
Tuesday	-0.013(0.02)**
Wednesday	-0.003(0.58)
Semester (Spring)	-0.003(0.58)
Constant	0.008(0.25)
Number of Observations	75
R-squared	0.697
Adjusted R-squared	0.650
Residual Standard Error	0.120, df = 64

Values in parentheses represent p-values
*p<0.1, **p<0.05, ***p<0.01
Source: Authors' own analysis

The larger coefficient or the fall semester discount indicates that it was a more effective economic incentive than the spring semester discount.

Figure 1. Rate of bringing own cutlery

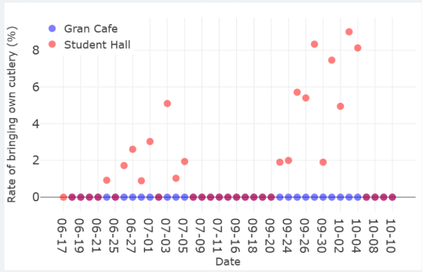
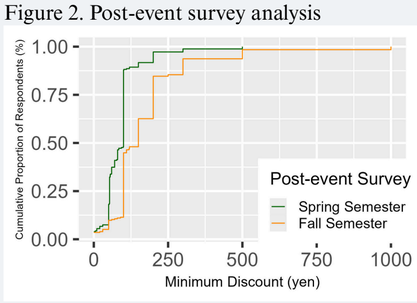


Figure 2. Post-event survey analysis



2. Willingness to accept

According to Figure 2, the most desired discount for bringing one's own cutlery was **100 yen** in both the spring and fall semesters. However, the percentage of people willing to participate for a discount of less than 100 yen dropped significantly from 87.5% in the spring to 44.9% in the fall, indicating that a higher incentive was needed over time.

3. Rate of bringing own cutlery

Figure 1 shows the percentage of people who brought their own cutlery in the treatment and control groups. In the treatment group, there is an increase in the rate of bringing my cutlery within the policy implementation period for both the spring and fall semesters.

In addition, there is an increase in the percentage of students who bring their own cutlery during the fall semester compared to the spring semester policy period.

Conclusion

Effect on reducing disposable cutlery use	Rate of bringing own cutlery
Treatment × Spring semester: the discount amount is 53 yen.	0.012
Treatment × Fall semester: the discount amount is 100 yen.	0.049

This study analyzed the effects and limitations of discount measures to reduce disposable cutlery use. By increasing the discount amount, DID analysis confirmed the effectiveness of the discount measures.

We propose **three policy recommendations** based on our study's findings and post-event survey:

1. **Encourage the use of personal cutlery** by selling affordable options on campus.
2. **Launch a rental service** with collection and washing points.
3. **Apply a full-scale fee for disposable chopsticks** to leverage behavioral economics and promote sustainable choices as the norm.

Future Research

Default choice ("no cutlery unless requested")

Would a default of "no disposable cutlery unless requested" outperform price-only policies in effectiveness and acceptance?

Discounts vs. fees

In this study we offered a discount to students who brought their own cutlery to reduce disposable use. Going forward, should we continue with a discount-based approach, or switch to charging for disposable cutlery? Why?

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