

Investigating Households Attitudes and Behaviors Toward Dealing with the Single-use Plastic Products in Japan

Peii Tsai¹, Akio Onishi², Tomohiro Tabata³

¹ *Institute of Liberal Arts Department of Humanities and Social Sciences, Kyushu Institute of Technology, 1-1 Sensuicho, Tobata-ku, Kitakyushu, 804-8550, Japan*

² *School of Data Science, Yokohama City University, 22-2 Seto, Kanazawa-ku, 236-0027, Yokohama, Japan*

³ *Graduate School of Human Development and Environment, Kobe University, 1-1 Rokkodai-cho, 657-8501, Nada-ku, Kobe, Japan*

1. Introduction

In recent years, microplastic pollution or marine debris is one of the most pressing global environmental issues and has attracted considerable attention and public concern worldwide (Barrett et al., 2020; Peixoto et al., 2019; Sharma and Chatterjee, 2017). Plastic waste has become one of the most prevalent ocean pollution problems, with plastic waste constituting over 60% of marine debris. Several initiatives have been conducted worldwide to prevent plastic pollution and over 70 countries in the world have a full or partial ban on single-use plastic bags (UNEP, 2018). Japan has also implemented a series of policies to reduce single-use plastic products since 2020. However, the impacts of COVID-19 pandemic on plastic waste, this was further increased by the usage of plastic for packing in e-commerce shopping and food takeaways (Parashar and Hait, 2021).

In Japan, the amount of plastic waste handed over from municipalities to recycling businesses from April to November 2020 increased by 4.7% compared to the same period in the previous year, reaching the highest level in the past decade (JCPRA, 2021). In USA, an increase in online shopping and food services due to the COVID-19 pandemic was 78% in 2020, while many countries such as South Korea, China, Singapore have seen similar trend with more than 50% increase (Shams et al, 2021; Parashar and Hait, 2021). In addition, it was found that approximately 3.4 billion single-use facemasks or face shields worldwide are discarded daily because of COVID-19 pandemic (Benson et al., 2021). Hence, developing and implementing relevant policies and measurements is vital to combat plastic pollution issues during and after COVID-19 pandemic (Costa, 2021).

This study aimed to investigate household current awareness and behaviors regarding the reduction of disposable plastics and to reveal the factors influencing citizens' behaviors in reducing plastic usage. Findings from this study can be applicable to authorities on how institutional and sociopolitical support is necessary to improve public awareness in reducing plastic waste.

2. Materials and Methods

Firstly, we reviewed the strategies and regulatory measures for managing plastic waste in Japan. Then, An online survey was conducted in March 2022 to assess citizens' awareness and behaviors regarding the reduction of disposable plastic products. We gathered a sample of 1200 respondents, considering the influence of each municipality's waste management policies. This included 300 respondents in areas where household waste and plastic waste were subject to charges (e.g. Sendai City), 300 respondents in areas where household waste and recyclable waste were subject to charges (e.g. Kyoto City), 300 respondents in areas where only household waste was subject to charges (e.g. Kumamoto City), and 300 respondents in areas where household waste was not subject to charges (e.g. Yokohama City).

The analysis methodology involved conducting factor analysis to extract factors influencing plastic waste reduction behaviors. Subsequently, a theoretical model was constructed and analyzed using covariance structure analysis. Additionally, regional disparities in reduction behaviors regarding plastic usage and each factor were examined through one-way analysis of variance and non-parametric Kruskal-Wallis tests. Factor analysis and hypothesis testing were executed utilizing SPSS, while Amos was employed for covariance structure analysis.

3. Results and Discussion

Factor analysis was conducted using a maximum likelihood estimation, to ascertain the underlying structure of attitudes related to the acceptance of disaster waste for local processing. This analysis revealed that six factors accounted for 50.7% of the total variance in the survey. The results of the analysis revealed the following six attitude dimensions: "Awareness of Excessive Use of Disposable Plastic Products"

(Cronbach's $\alpha > .92, N = 10$), "Evaluation of Government and Business Efforts to Reduce Plastic Waste" (Cronbach's $\alpha > .88, N = 8$), "Awareness of the Impact of Plastic Waste Issues" (Cronbach's $\alpha > .88, N = 8$), "Feasibility of Reduction Actions" (Cronbach's $\alpha > .84, N = 7$), "Effectiveness of Plastic Waste Issues and Reduction Actions" (Cronbach's $\alpha > .81, N = 7$), and "Knowledge of Waste Management" (Cronbach's $\alpha > .79, N = 4$).

Following the result of the factor analysis, the non-parametric Kruskal-Wallis test was conducted to examine regional differences. Results showed statistically significant in the "Evaluation of Government and Business Efforts to Reduce Plastic Waste" ($p < .01$) and the "Feasibility of Reduction Actions" ($p < .05$). In both cases, respondents living in areas where household and plastic waste were subject to charges scored higher. However, no regional differences were observed concerning respondents' waste and plastic waste reduction behaviors and environmental considerations. Based on these results, it can be inferred that the impact of municipal waste policies on residents' plastic waste reduction behaviors was minimal.

The estimated results of covariance structure analysis showed that the factor of "Feasibility of Reduction Actions", the factor of "Effectiveness of Reduction Actions and Measures" and the factor of "Knowledge of Waste Management" were statistically significant in respondents' disposable plastic reduction behaviors at the 0.1% level. Additionally, the factor of "Awareness of Excessive Use of Disposable Plastic Products" are statistically significant at 1% level. The factor of "Evaluation of Government Efforts to Reduce Plastic Waste" significantly predicted opinions at the 5% level.

The research findings indicate that for initiatives to be accepted by consumers, it is essential for them to be perceived as effective and relatively feasible. This necessitates the sharing of information regarding the effectiveness of measures and the promotion of actions that are perceived as relatively practical.

4. Conclusion

This study investigated household awareness and behaviors regarding the reduction of single-use plastics through a survey, and to identify factors influencing their behaviors in reducing single-use plastic productions. The results showed that the influence of current municipal waste policies on residents' plastic waste reduction behaviors was minimal. In contrast, the influence of the "Feasibility of Reduction Actions" and "Effectiveness of Reduction Actions and Measures" factors was most pronounced. This highlights the necessity for initiatives to be perceived as both effective and practically achievable in order to garner acceptance from residents.

Acknowledgements

This research was supported by the Asahi Group Foundation and JSPS KAKENHI Grant Number 23K11546.

References

- Barrett, J., Chase, Z., Zhang, J., et al. (2020) Microplastic pollution in deep-sea sediments from the Great Australian Bight. *Frontiers in Marine Science*, 7: 576170.
- Benson, N. U., Bassey, D. E., & Palanisami, T. (2021). COVID pollution: impact of COVID-19 pandemic on global plastic waste footprint. *Heliyon*, 7(2), e06343.
- Chen, Y. C. (2018) Effects of urbanization on municipal solid waste composition. *Waste management*, 79: 828-836.
- da Costa, J. P. (2021). The 2019 global pandemic and plastic pollution prevention measures: Playing catch-up. *Science of The Total Environment*, 774, 145806.
- Parashar, N., & Hait, S. (2021) Plastics in the time of COVID-19 pandemic: Protector or polluter?. *Science of the Total Environment*, 759, 144274.
- Shams, M., Alam, I., & Mahbub, M. S. (2021). Plastic pollution during COVID-19: Plastic waste directives and its long-term impact on the environment. *Environmental advances*, 5, 100119.
- Sharma S and Chatterjee S, (2017) Microplastic pollution, a threat to marine ecosystem and human health: A short review. *Environmental Science & Pollution Research* 24: 21530–21547.
- The Japan Containers and Packaging Recycling Association (JCPRA) (2021). Annual Report 2021 <https://www.jcpa.or.jp/Portals/0/resource/association/report/pdf/report2021.Pd> (Accessed 5 January 2024)
- UNEP (2018) Single-use Plastics: a roadmap for sustainability. (Accessed 1 October 2023) https://wedocs.unep.org/bitstream/handle/20.500.11822/25496/singleUsePlastic_sustainability.pdf