

COMPLETION REPORT

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【Subject of Research Project】

Reverse Vending Machine (RVM) Implementation Unaccompanied By Container Deposit Legislation (CDL) Policy: Model Comparison between Malaysia and Japan to Improve Pet Bottle Recycling

The aim of this project is to examine the Reverse Vending Machine (RVM) model to enhance PET bottle recycling in Malaysia and Japan, two countries where Container Deposit Legislation (CDL) is not implemented. To investigate this model in Japan, an in-depth discussion was held with Dr. Premakumara and Ms. Tasuno from the Institute for Global Environmental Strategies (IGES) in Tokyo. From this discussion, IGES highlighted two main strategies to boost plastic recycling: a structured collection system, as implemented in Japan, and income-generating recycling initiatives suited for low-income countries. Due to Japan's structured collection system and high public awareness of recycling, the RVM has proven to be an effective tool for recycling. It was also emphasized that recycling awareness should be instilled in the younger generation as early as possible, as it becomes increasingly challenging to cultivate such habits in adults. One suggestion was to arrange visits for students to recycling centre to observe what happens to recycled PET bottles. In support of this, IGES organized a visit to the chemical recycling plant JEPLAN Inc., located in Kawasaki Ward, to demonstrate how PET bottles can be recycled back into drinkable bottles. Additionally, a discussion was held with a research group at Saitama University to gain academic perspectives on the RVM initiative in Japan. Interviews with students revealed that, although most were aware of the need for recycling and actively participated, many were unfamiliar with RVMs. Notably, there were no RVMs installed near Saitama University, with the nearest one located at Omiya Station. To explore the RVM model implementation in Malaysia, RVMs were installed at two events: at the SWM Pura Kencana office (a waste management company) and at a university event. The installation at the SWM office aimed to study public acceptance of the model and its effectiveness in encouraging recycling among community members and SWM staff. During the 30-day trial, the system collected approximately 21 kilograms of PET bottles and one kilogram of aluminum cans. These results indicate that PET bottles were the dominant item collected, aligning with the goal of reducing plastic waste sent to landfills. When implemented at a university showcase event, the RVM successfully attracted users, with some participants bringing multiple recyclable items. Primary school students were especially eager to use the system, depositing most of their plastic bottles into the bin. This event demonstrated that the RVM can engage first-time users to fully utilize the system. Based on a comprehensive analysis of the models in Japan and Malaysia, it was concluded that where recycling awareness is high, recycling rates remain high regardless of RVM presence. However, in cases where awareness is low, RVMs can assist authorities in increasing recycling rates, provided that ongoing campaigns are conducted to install a recycling culture among both young people and adults. The outcomes of this project have been documented in a research article published in an international journal.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)
Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.) Razali Tomari, Aeslina Abdul Kadir, Wan Nurshazwani Wan Zakaria, Dipankar Das and Muhamad Bakhtiar Azni, “Deep Learning Model for Enhancing Automated Recycling Machine with Incentive Mechanisms” International Journal of Advanced Computer Science and Applications (IJACSA), 15(8), 2024
Book (Publisher and Date of the Book, Title and Author of the Book, etc.)