Quality of containers and packaging plastics and its impact on recycling

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Introduction

➢ The establishment of a circular economy through recycling, in addition to reducing the use of plastics, is an urgent issue for the transition to resource conservation through a carbon neutrality.

➢ Recycling of plastics requires attention to the <u>quality of plastic</u> waste that can be recycled. High-quality plastic waste can be recycled horizontally; however, if the quality declines, it must be cascade-recycled or it becomes non-recyclable.

➢ This study focused on the disposal and collection stages of containers and packaging plastics (plastic waste) and empirically analyzed the actual situation of sorting and cleaning by residents.

Quality of plastic waste

<Circular economy diagram for plastic>

<Factors affecting the quality of plastic waste in the disposal and collection stages>
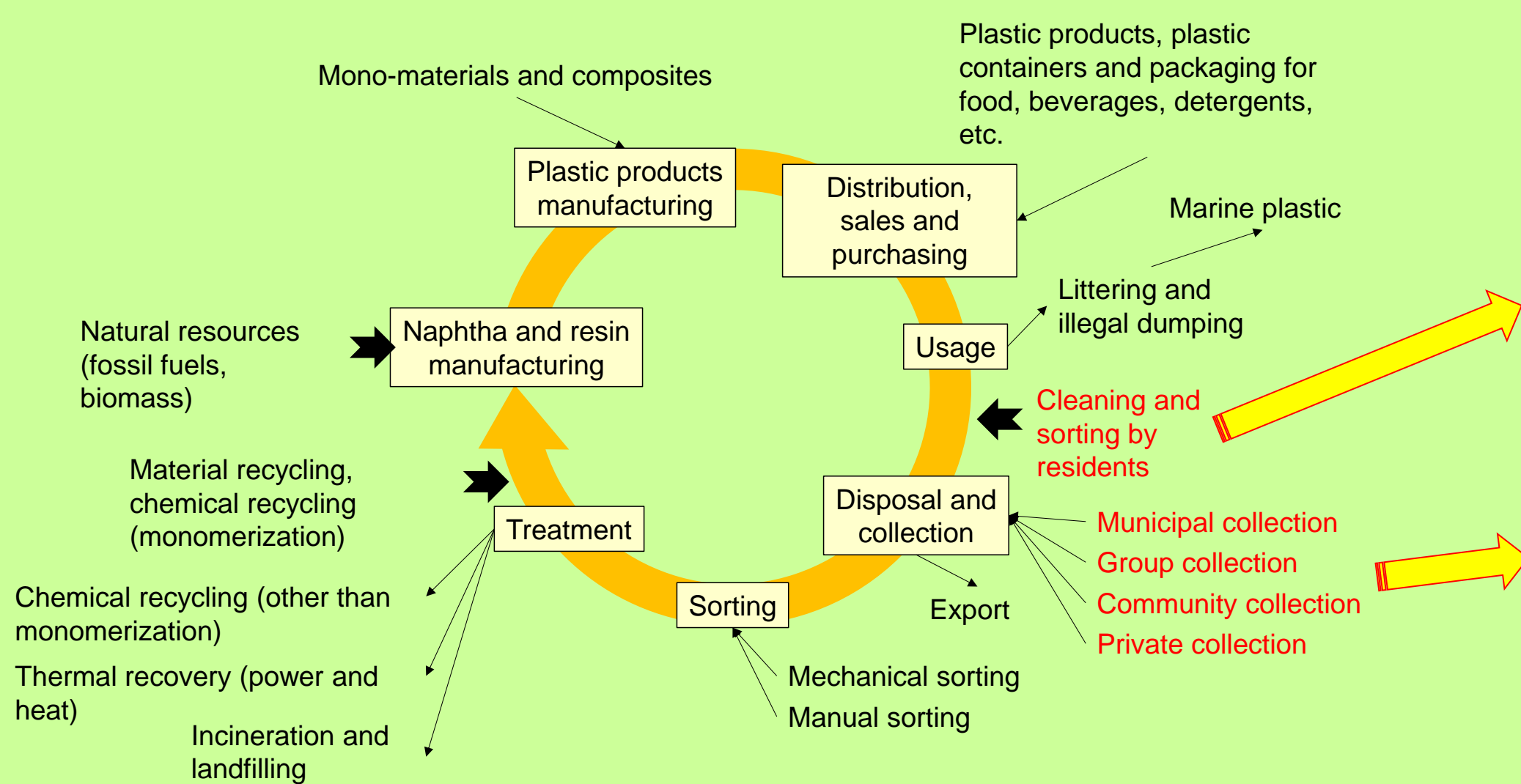
Disposal stage

• Whether residents are properly <u>cleaning plastic waste</u>.

➡ If residents do not clean the plastic waste sufficiently, the quality of the plastic waste may not be ensured, making it unsuitable for closed-loop recycling, and may be treated as open-loop recycling.

Collection stage

• Residents choose the following <u>sorting route</u> when discarding plastic waste: municipal collection, group collection, community collection, and private collection.

• The degree of washing might vary depending on which sorting route is used.

Empirical analysis of the actual situation of sorting and cleaning by residents

<Questionnaire survey>

• Target population comprised 1,652 men and women aged 20 years or older residing in Kobe, Japan.
• The survey period was from January 19 to 31, 2024.
• The main questions are about their sorting route, the selection of <u>six types of plastic waste</u> and the degree of washing.
  ↳ Beverage bottle caps, non-plastic bottle caps, frozen food trays, used Tupperware containers, tofu containers, and jelly containers
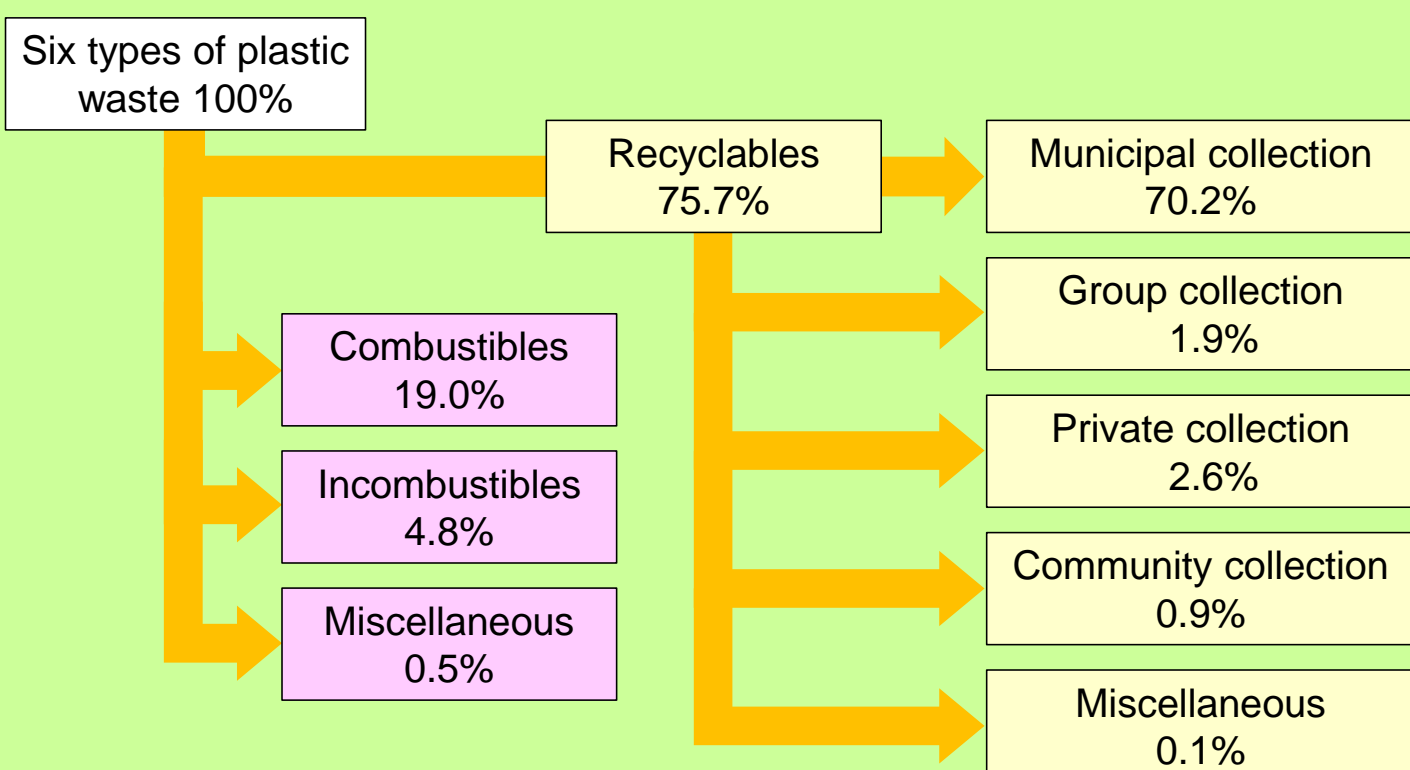

<Degree of washing>
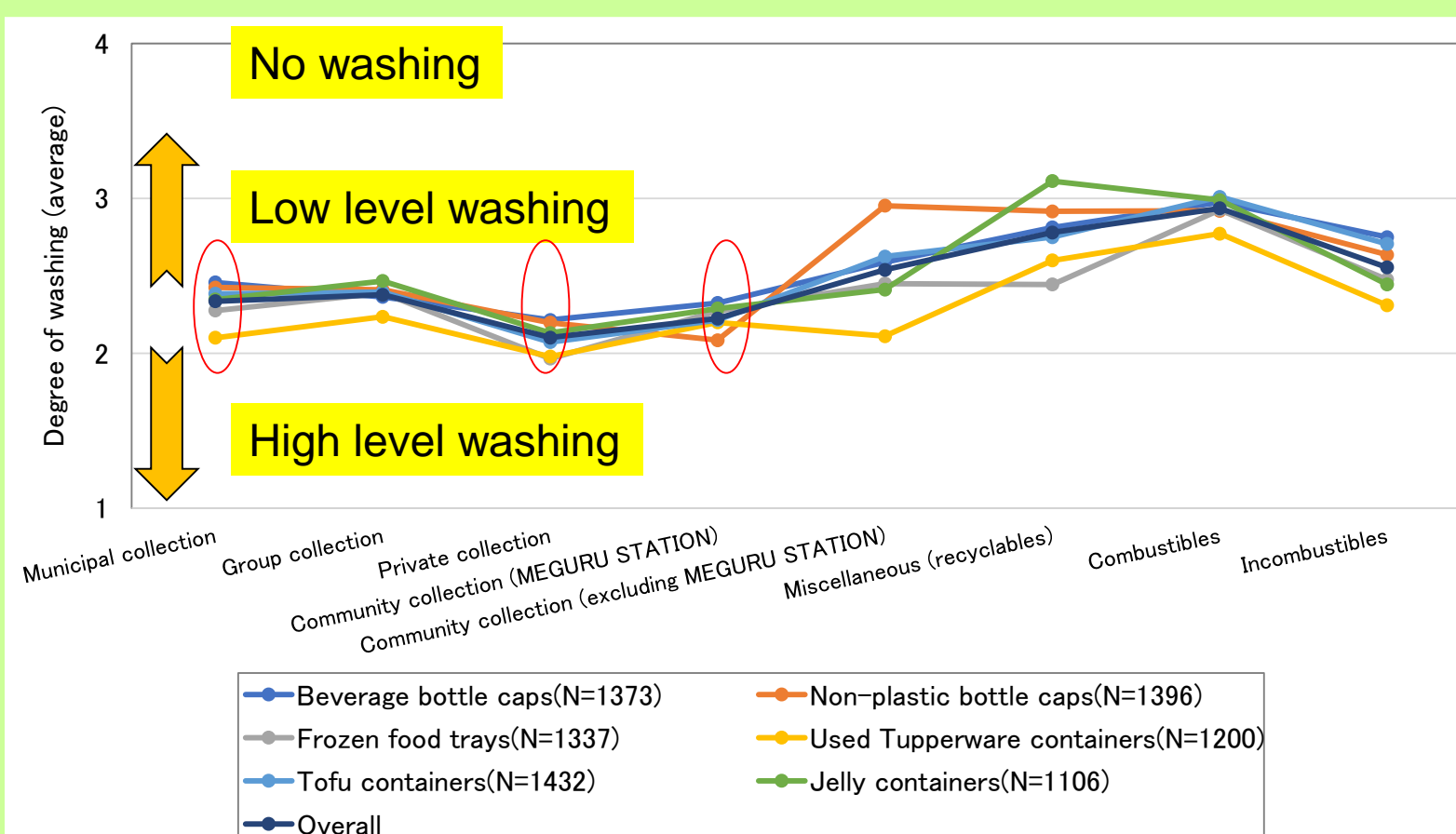
Explanation of options for degree of washing
1: I would wash off all stains using detergent
2: I would wash them with water roughly until all the stains were removed
3: I do not care if there are still stains
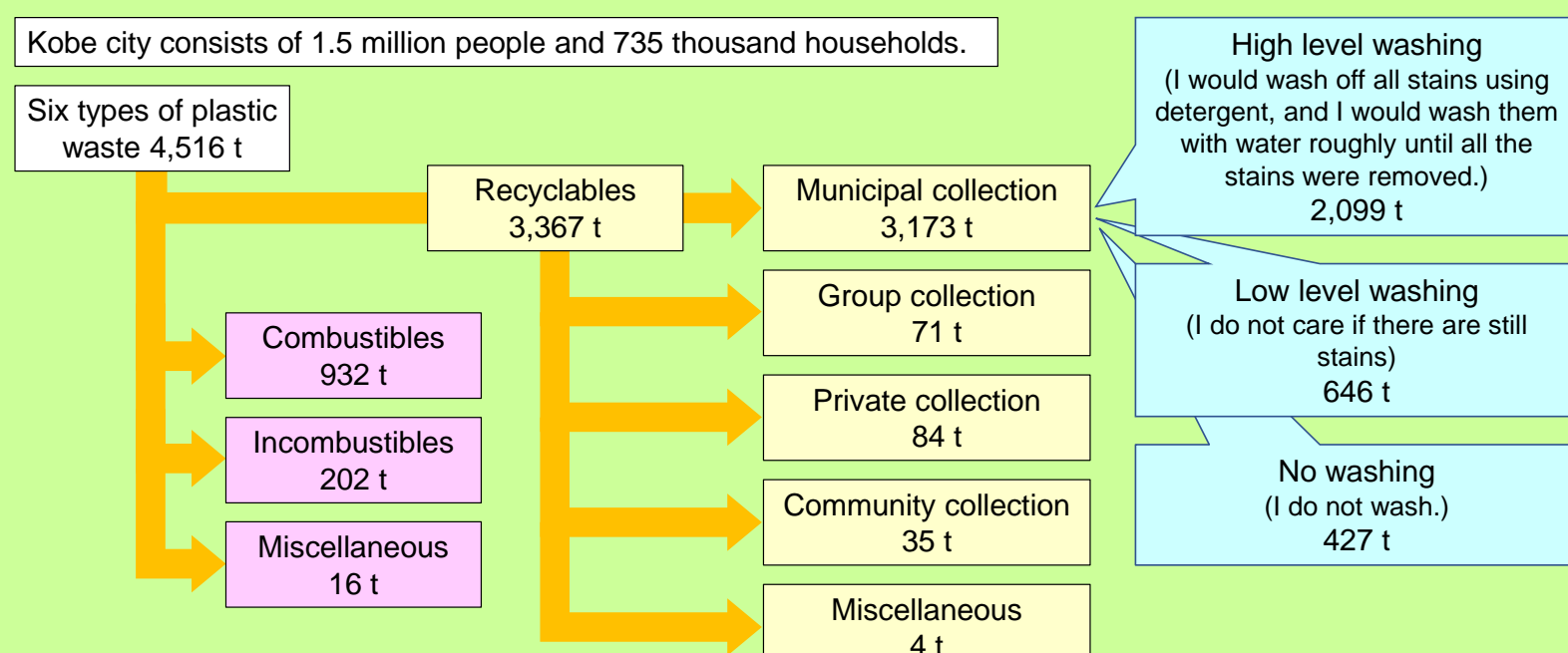4: I do not wash.

• Private and community collections tend to have a higher degree of washing than municipal collections. But no significant difference.

<Percentage of plastic waste sorted>

Six types of plastic waste 100%
- Recyclables 75.7% → Municipal collection 70.2%
  - Group collection 1.9%
  - Private collection 2.6%
  - Community collection 0.9%
  - Miscellaneous 0.1%
- Combustibles 19.0%
- Incombustibles 4.8%
- Miscellaneous 0.5%

• Most of the recyclables was sent to municipal collection routes.
• The amount of waste recycled could be increased by separating combustibles as recyclables.

<Material flow of plastic waste in Kobe City>

Kobe city consists of 1.5 million people and 735 thousand households.

Six types of plastic waste 4,516 t
- Recyclables 3,367 t → Municipal collection 3,173 t
  - Group collection 71 t
  - Private collection 84 t
  - Community collection 35 t
  - Miscellaneous 4 t
- Combustibles 932 t
- Incombustibles 202 t
- Miscellaneous 16 t

High level washing (I would wash off all stains using detergent, and I would wash them with water roughly until all the stains were removed.) 2,099 t
Low level washing (I do not care if there are still stains.) 646 t
No washing (I do not wash.) 427 t

• 4,516 t of plastic waste may be discarded annually.
• 13.5% of municipality-collected plastic waste cannot be recycled.

Conclusions

➢ The questionnaire survey allowed us to perform a quantitative analysis of the factors that affect the quality of plastic waste at the disposal stage.

➢ By analyzing the impact of the collection route and degree of cleaning on the carbon footprint of plastic products circular structure, the quality of plastic waste can be evaluated from multiple perspectives.

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