

Quantitative Analysis of Impact of Awareness Raising Activities on Residents' Waste Separation Behavior in Indonesia

May 13, 2016

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Background

- In Indonesia, waste amounts have increased rapidly.
- Capacity of existing final disposal sites are approaching their limits, but securing land is difficult.
- Many cities are under pressure to dispose their waste properly and reduce it.
- Japan International Cooperation Agency (JICA) is implementing the technical cooperation project including Pilot Project (PP) for household waste separation and collection since 2013.
- The Indonesian government is considering expansion of waste separation and recycling activities to other cities using the result of PP.

Research Purpose

To analyze the impact of awareness raising activities on residents' waste separation behavior which is newly introduced in Balikpapan city, Indonesia

Location Map of Balikpapan City

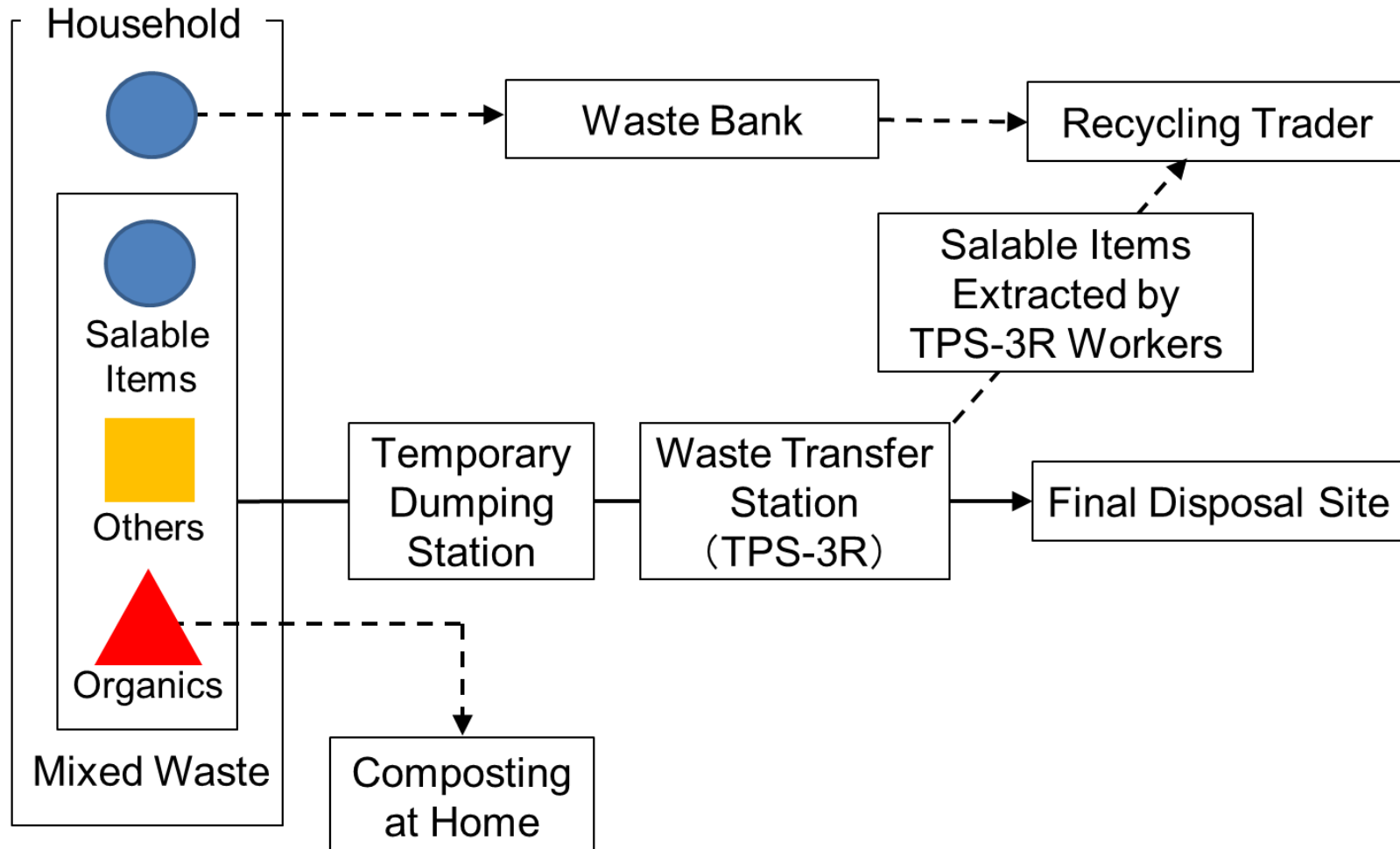


Waste Flow before Pilot Project

Information of Target Area

Population: 3,779, Household(HH): 810,

Neighborhood Community Association (RT): 13, 43~85 HHs/RT



Facilities in Target Area



Temporary Dumping Station



Waste Transfer Station (TPS-3R)



Waste Bank



Final Disposal Site (Out of Target Area)

Waste Separation Pilot Project (PP)

1. Introduction of Waste Separation at Home

- Household waste separation
→ “Organics”, “Salable items”, “Others”
- “Organics” and “Others” are put into each designated plastic bag → “Waste Station”
- Waste disposal time: 7 to 9 a.m.
- Collection of “Organics”: 5 days a week (Mon.-Wed. Fri. Sat.)
Collection of “Others”: once a week (Thu.)
- Residents bring “Salable items” to Waste Banks.

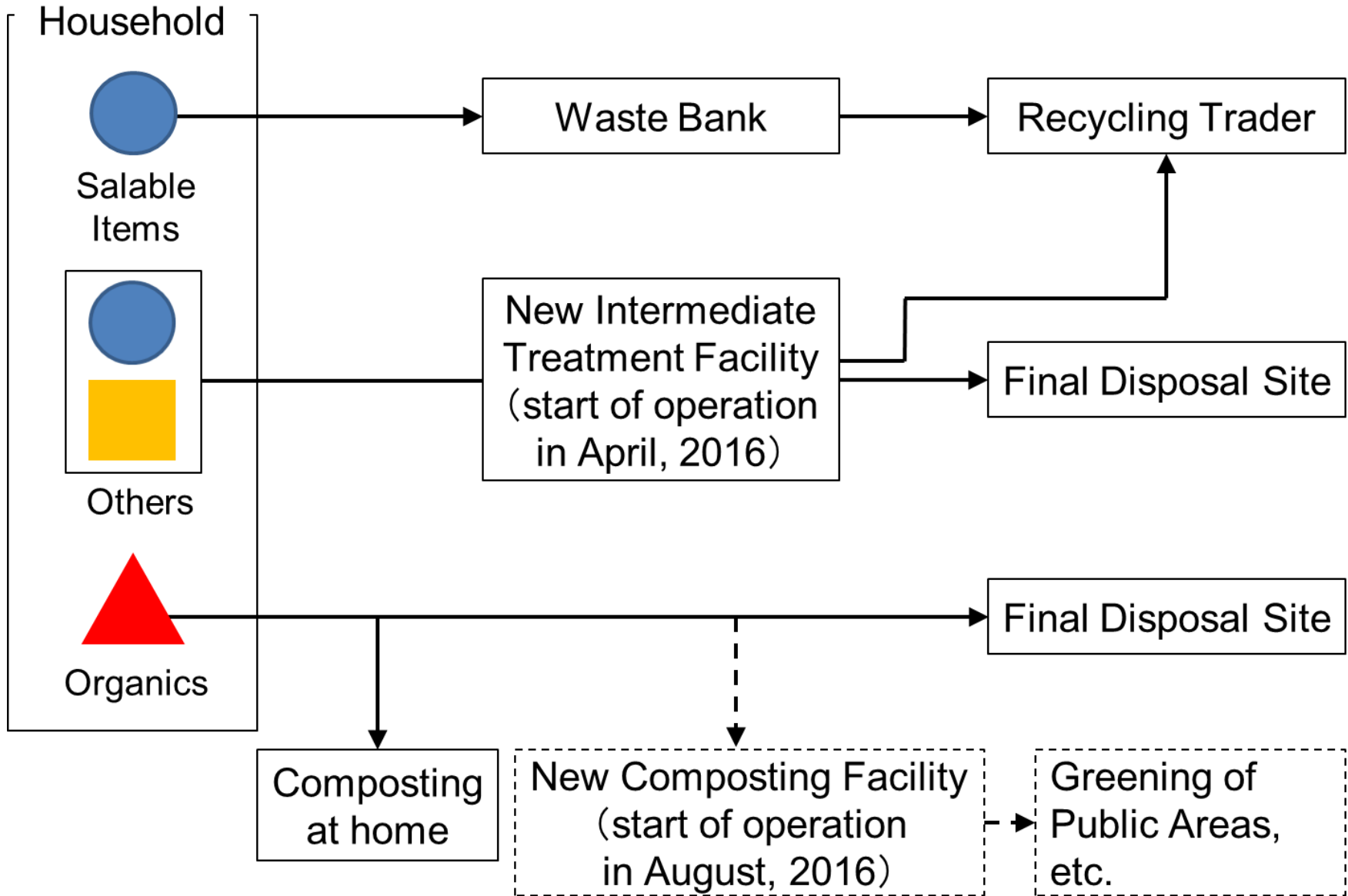


Waste Station

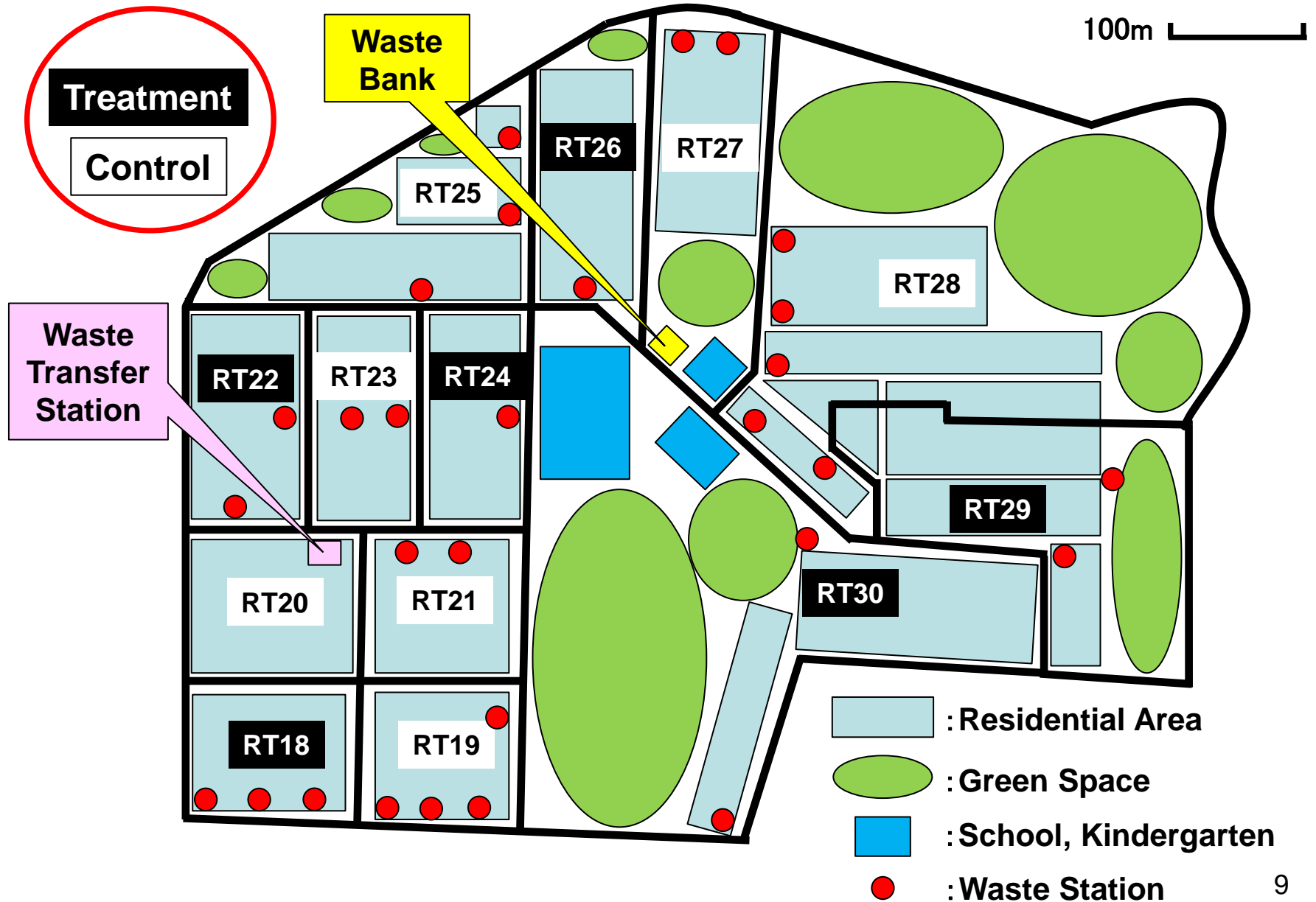
2. Awareness Raising for Waste Separation

- Training in awareness raising skills to Env. Volunteers
- Env. Volunteers explained how to separate waste to residents.

Expected Waste Flow after PP



Outline of Target Area



Awareness Raising Activities in Treatment RTs



Patrol by Env. Volunteers



Guidance to Residents by Env. Volunteers



Meeting with All RTs and City Gov. staffs



Meeting with RT29 residents

Waste Amount and Composition Study (WACS)

- WACS was implemented in both “Control” (No Awareness Raising) and “Treatment” (With Awareness Raising) 1 week and 6 months after PP started.
(period: Apr. 20-25, Oct. 27-Nov. 2, 2015)
- Target households(HHs): 27-38 were selected from each RT.
Control: 247 HHs, Treatment: 210 HHs
- Residents of Target HHs discharged waste during WACS as they did 1 week before, but put the disposal bags in front of their houses.
- Discharged salable items using a common plastic disposal bag
- Surveyors measured weight of each bag and weight of “Organics”, “Salable items”, “Others” in each bag.

Result

Table. 1 Amount of Properly Separated Waste

	No Awareness Raising	With Awareness Raising
1 week after PP started (Organics)	4.852 (3.909)	5.088 (4.419)
Change of 6 months after PP started	-0.553 * (-0.648)	0.630 (3.519)
1 week after PP started (Salable)	0.672 (1.308)	1.081 (2.646)
Change of 6 months after PP started	-0.554 ** (-0.867)	-0.796 ** (1.657)
1 week after PP started (Others)	0.852 (1.372)	1.341 (1.964)
Change of 6 months after PP started	0.608 ** (0.703)	-0.296 * (-0.518)

Amount of Properly Separated Waste:

Amount of waste in the designated disposal bag taken out on the designated day(s) of the week

Unit: kg/week/household, (): Standard Deviation, *: P<0.05, **: P<0.01

Result

Table. 2 Ratio of Properly Separated Waste

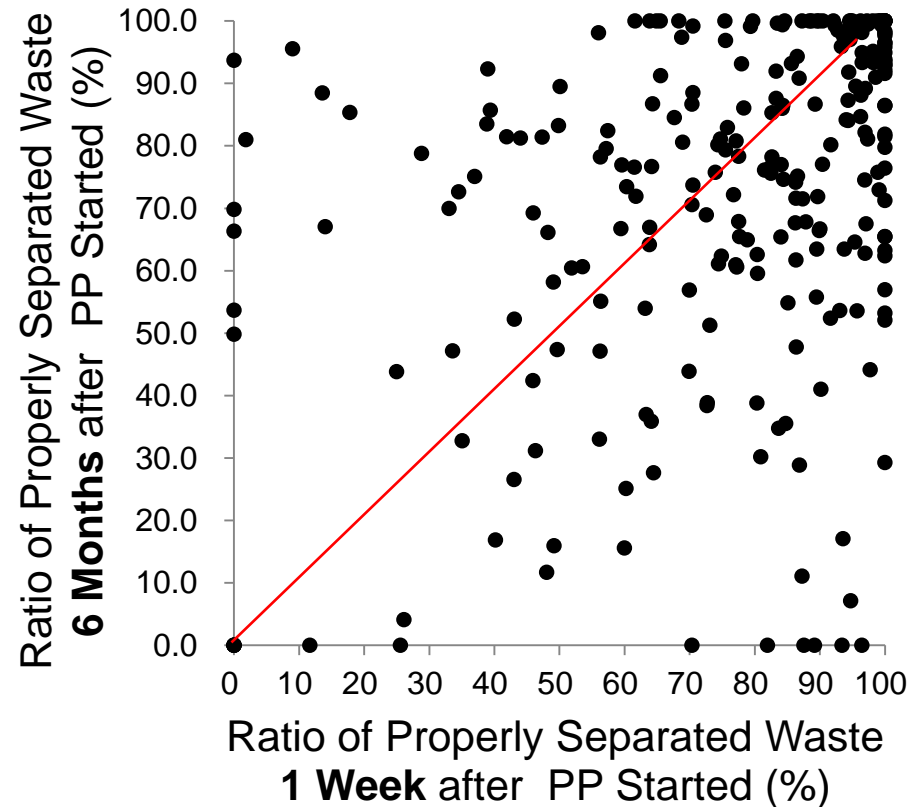
	No Awareness Raising	With Awareness Raising
1 week after PP started (Organics)	78.1	73.3
Change of 6 months after PP started	-4.2	7.3
1 week after PP started (Salable)	20.3	25.1
Change of 6 months after PP started	-15.4	-12.9
1 week after PP started (Others)	37.3	48.6
Change of 6 months after PP started	14.3	10.4

Ratio of Properly Separated Waste: (Amount of waste in the designated disposal bag taken out on the designated day(s) of the week) / (Total amount of waste in the designated disposal bag)

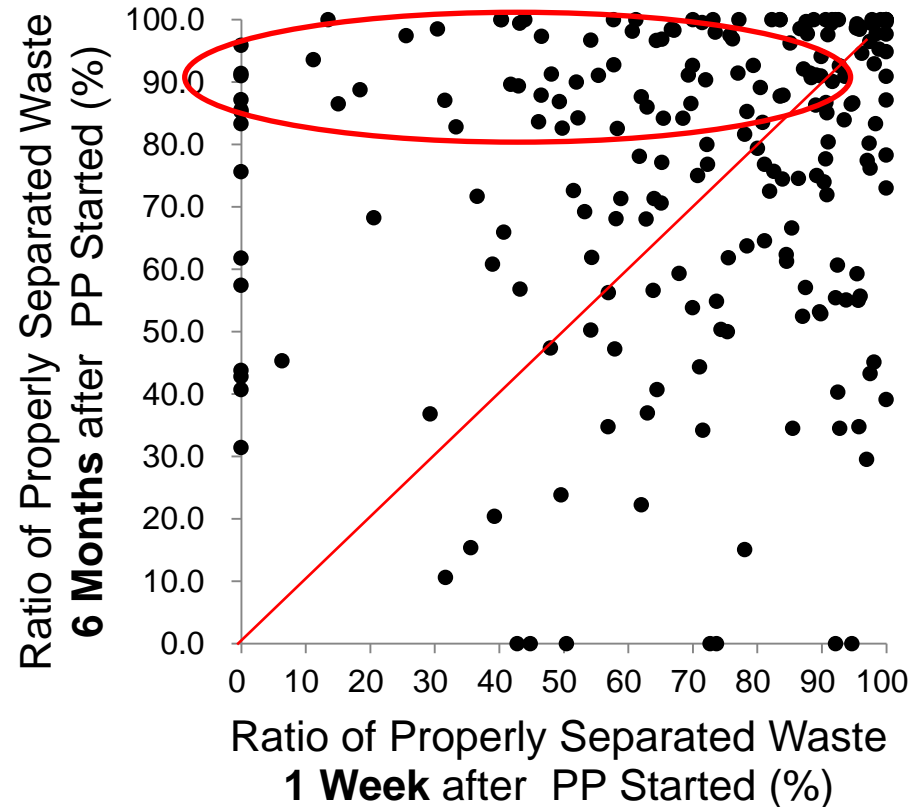
The data of "Salable" show the percentage of total salable items in general disposal bags.

Unit: %

Result



Control
(No Awareness Raising)



Treatment
(With Awareness Raising)

Fig.1 Ratio of Properly Separated **Organic Waste
for Each Household (all RT)**

Result

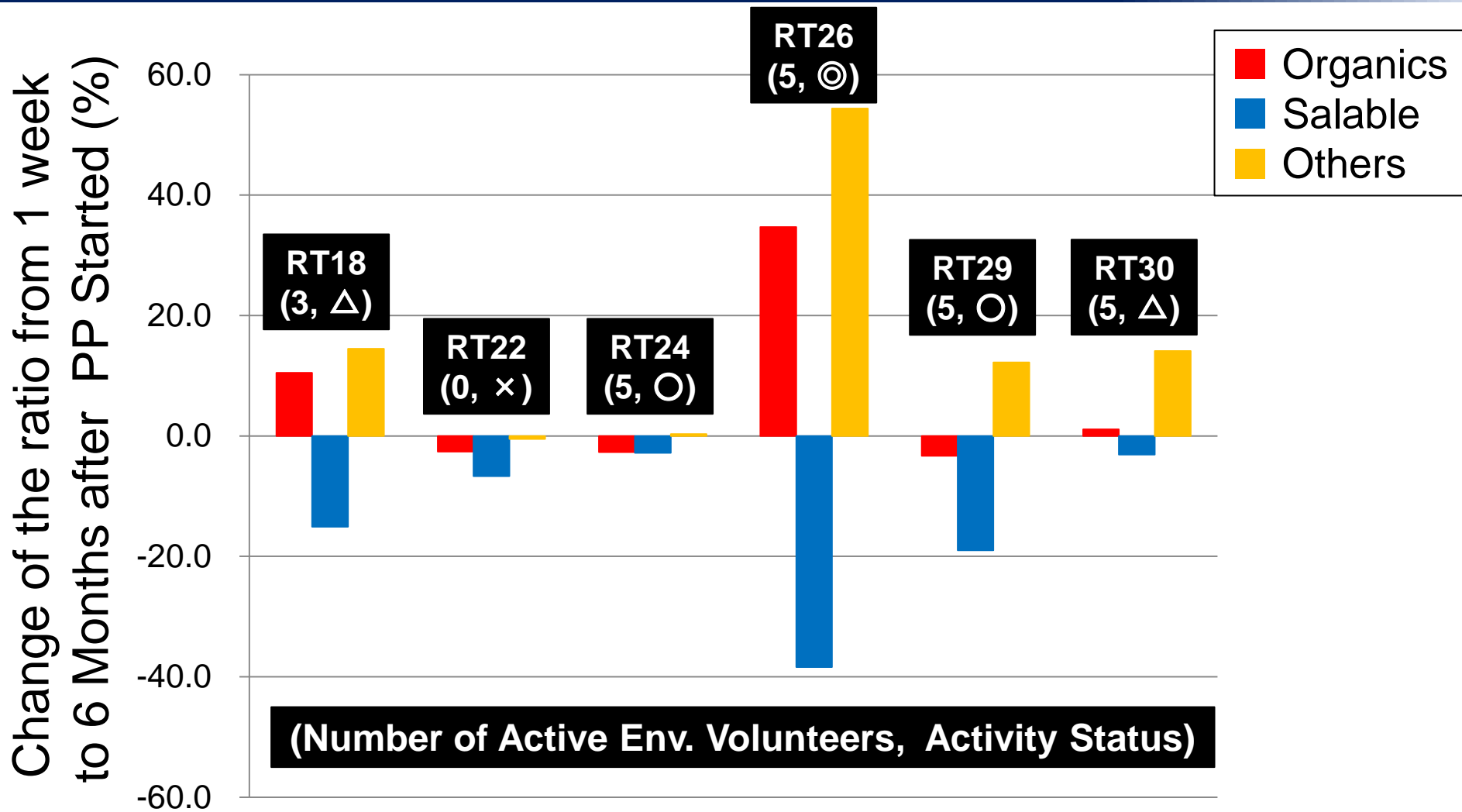


Fig.2 Change of Properly Separated Waste Ratio for Each RT in Treatment Group

Conclusion

1. Impact of New Introduction of Household Waste Separation

- Ratio of properly separated waste 6 months after PP started was increased comparing with WACS result before PP.

Organics: Control 73.9%, Treatment 80.6%

> 62.1% (WACS result before PP)

Salable: Control 4.9%, Treatment 12.2%

> 9.8% (WACS result before PP)

Conclusion

2. Impact of Awareness Raising on Household Waste Separation
(comparison between “Control” and “Treatment”)
 - Positive impact of awareness raising on “Organic” waste separation
 - Limited impact on “Salable” and “Others”

Conclusion

3. Impact of Awareness Raising on Household Organic Waste Separation
(comparison between Treatment RTs)
 - Difference of impact between Treatment RTs
 - Active Env. Volunteers was confirmed in RTs which have significant impact on organic waste separation.
- Necessary to analyze factors of the difference of the impact by reviewing residents' awareness and behavior in details.

**Thank you very much
for your attention.**