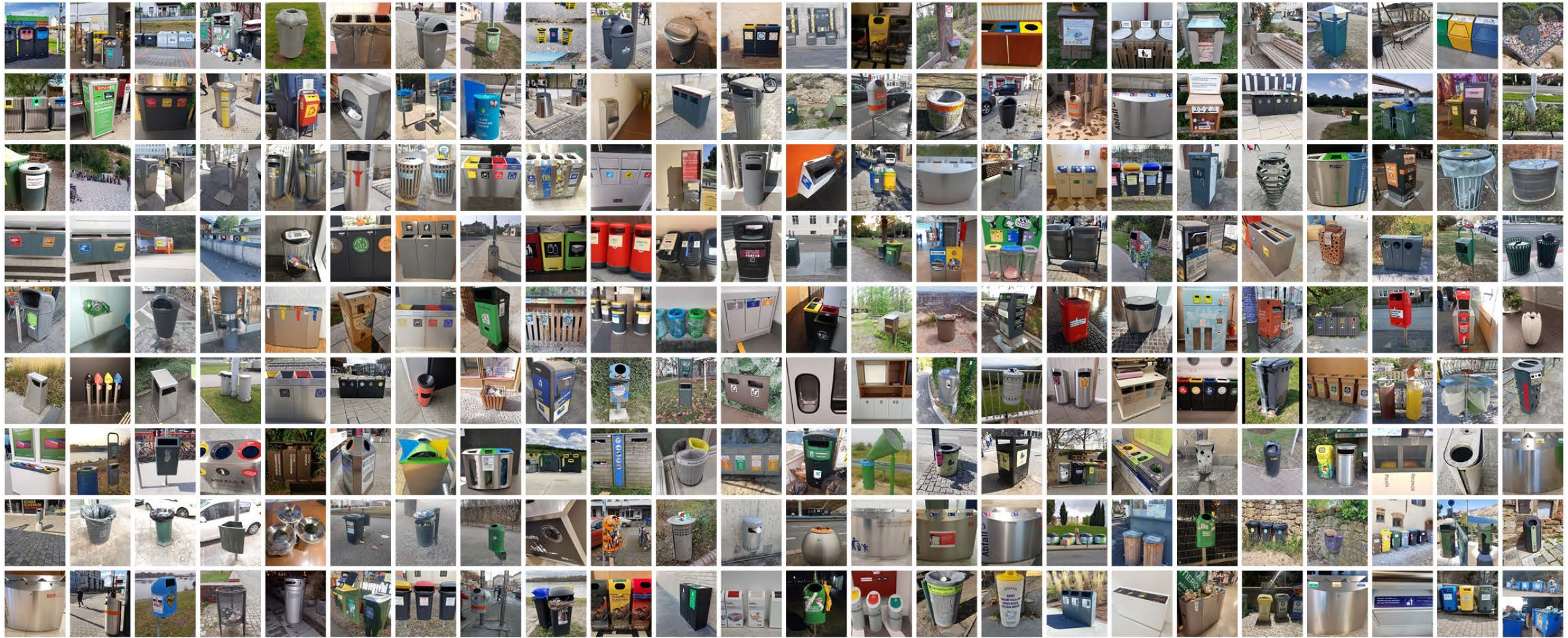




Waste separation in private versus public spaces – the view of consumers

Betül Gök, 13.11.24



(Kladnik,2024)

Agenda

UrbanWaste

Background

Brief summary

Waste separation behaviour

- Lack of separate collection leads to **loss of recyclable materials**
- **Increasing consumption** of packaging materials, especially in “on-the-go” consumption, e.g. take-away food and beverages
- **Recycling targets** of the European Union (EU)*:
 - By 2030: 60% of municipal waste and 70% of packaging waste, including 55% of plastic packaging
- **Poor data availability** on waste and waste separation behaviour in public spaces

*EC, 2018A, 2018B

Brief summary

- **Interdisciplinary Team:** Experts in waste management, social psychology and industrial design
- **Objective:** Improvement of separate waste collection in public spaces.
- **Data Variety:**
 - Waste analyses in Vienna and Krems
 - Material Flow Analysis (MFA)
 - Life Cycle Assessment (LCA)
 - Interviews and observations
 - Design initiatives
 - ...



Waste separation behaviour

- Literature **focuses on private households***. In public spaces, studies concentrate on littering**.
- **Influencing factors** in private households:
 - Socio-demographic characteristics
 - **Social norms:** If separate collection is socially accepted, then this behaviour is pursued (Cialdini, 2003)
 - Psychological factors (comfort and convenience)
 - Distances and location of collection bins
 - Availability of kerbside collection
 - Storage space in households
 - Economic factors and political context

* (TIMLETT & WILLIAMS, 2008)

** (AL-MOSA ET AL., 2017; BATOR ET AL., 2011; LIU & SIBLEY, 2004; SCHULTZ ET AL., 2013).

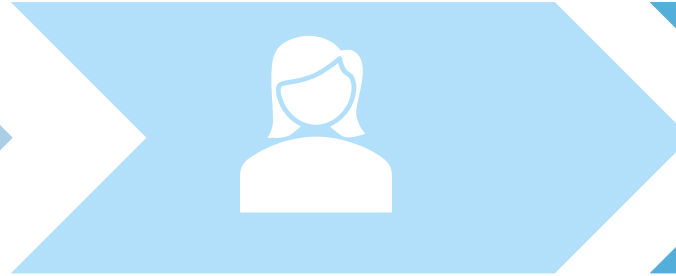
Objectives

1. **Motivations and obstacles:** What factors drive or hinder separate waste collection in private versus public spaces?
2. **Differences in social norms:** Are there distinctions between private and public spaces in terms of social norms affecting waste collection practices?
3. **Littering vs. separate collection:** What is the significance of littering in relation to separate waste collection in public areas?



Literature research

- Google Scholar
- BOKU:LITsearch
- Scopus



Qualitative interviews

- Interviews, n = 12
- Open-ended questions
- Broad thematic areas
- Analysis: Qualitative content analysis



Quantitative survey

- Online survey, n = 238
- Closed-ended questions
- Four thematic areas aligned with four hypotheses
- Hypothesis testing: Wilcoxon test, additional t-tests

Results (qualitative): interviews



Private space (PRI)

Separate collection is considered important and is often practised.

- Use of waste collection bins, most frequently for residual waste, paper, lightweight packaging and glass

Barriers:

- **Overfilled** and/or **missing collection bins**
- **Collection method**, e.g. drop-off system for organic waste

Notable points:

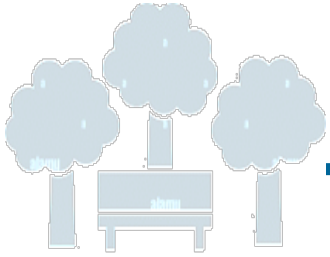
- **Location** and **distance to collection bins** important
- Knowledge of the separation system is influenced by **presence/offering of different bins**
- Time aspect: Ambivalent relationship to time investment

Quotes

Waste separation means for me [...] **environmental protection, saving resources**. [...] if you separate waste correctly, it can be reused. – IP1

I find the waste system in Vienna to be quite clear. [...] The **waste bins show what belongs in them**, which makes the whole process not so difficult in the end. IP4

Well, I perceive [waste separation] positively overall. [...] because a lot is reused. So if I do, then I **do it properly or not at all**. – IP12



Public space (PUB)

Separate collection is not practiced.

- Use of waste bins (for mixed collection)

Barriers:

- **Lack of collection bins**
- **Time-related issues**

Notable points :

- **Littering is strongly rejected** and preventing it is the primary focus

Quotes

I'm not going to bother looking for a glass recycling bin for another 10 minutes. – IP4

That's interesting. Funnily enough, I never thought about it. [...]. It's now that you've asked that I've realised it. It was all quite automated, so to speak. [...], I **never questioned it**, actually. Or I **didn't** even **notice** that it was so different. – IP5

I **don't throw it on the ground**. [...]. That's just the Austrian 'shlwainer' compromise in me. - IP7

Results (quantitative): Online survey

Online survey – Overview of hypotheses

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H1: People feel more obliged to separate their waste in private spaces than in public spaces.
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H2: In public spaces, mainly residual waste accumulates, while in private spaces, other waste fractions are also relevant.
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H3: Separating waste in public spaces requires more effort than in private spaces.
- 

H4: People in public spaces prioritize not leaving waste in the environment over separating waste.

Online survey – Separation and social norms

H1: People feel more obliged to separate their waste in private spaces than in public spaces.



A1: My family thinks I should separate my waste.
 A2: My friends think that separating waste is a good thing.
 A3: My acquaintances believe I should separate my waste.
 A4: It is socially expected that people separate waste.
 A5: I have the feeling that people in Vienna should separate their waste.



Cronbachs alpha fulfilled
 Wilcoxon Test: PRI (Median = 4.40), PUB (Median = 4.00;
 asymptotic Wilcoxon test: $z = -9.138$, $p < 0.001$)
 Additional t-test: $(237) = 9.499$, $p < 0.05$

Online survey – Separation and waste fractions

H2: In public spaces, mainly residual waste accumulates, while in private spaces, other waste fractions are also relevant.



B1: What waste was produced last week?
B2: What waste did you actively separate last week?



Data analysis

Online survey – Separation and waste fractions

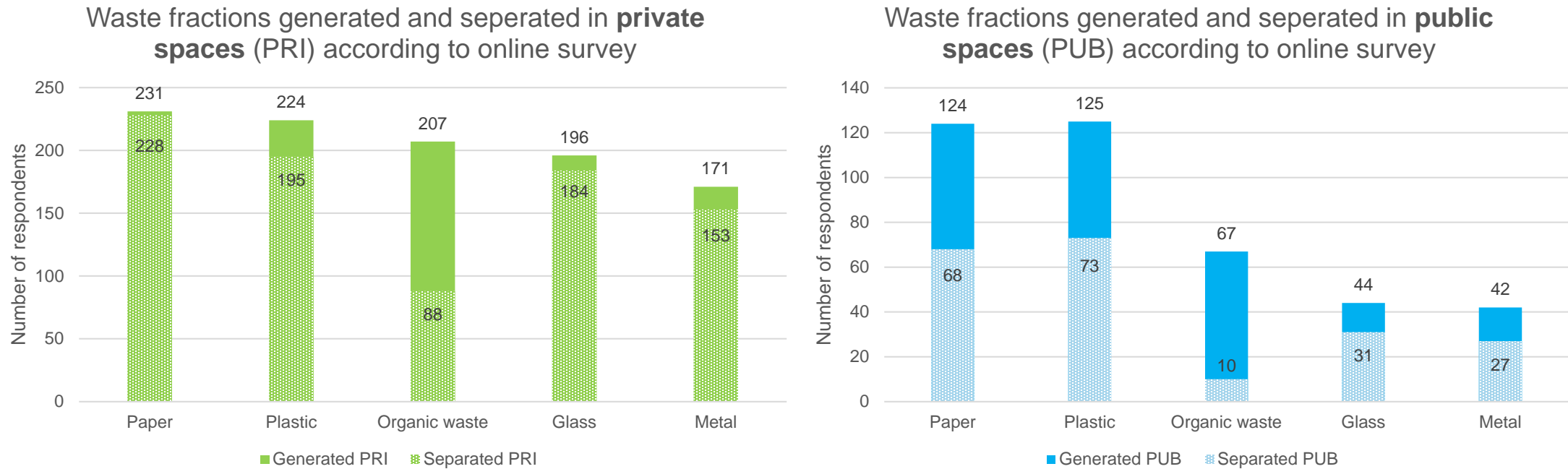


Figure 1: Comparison of generated and separated waste in PRI and PUB according to online survey (n=238). The data reflects self-reported responses with multiple answers per week.

Online survey – Separation and waste fractions

Waste fractions generated in PUB according to online survey

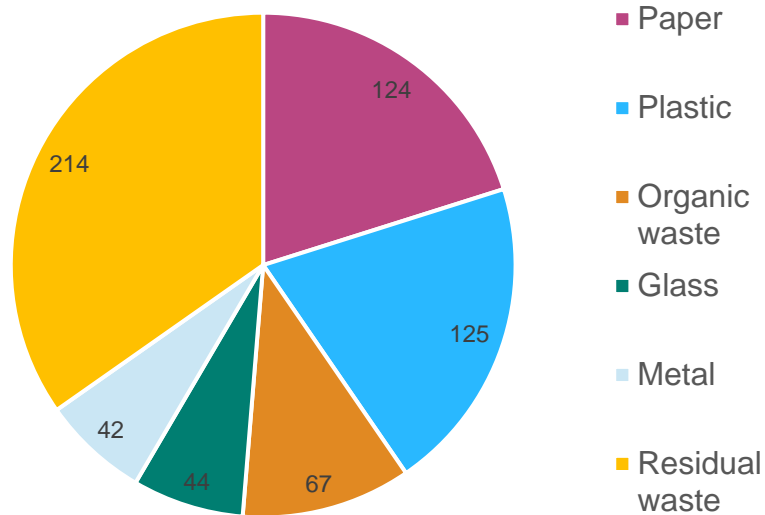


Figure 2: Generated waste in public spaces according to the online survey, based on self-reported multiple responses per week.

Waste fractions generated and separated in PUB according to online survey

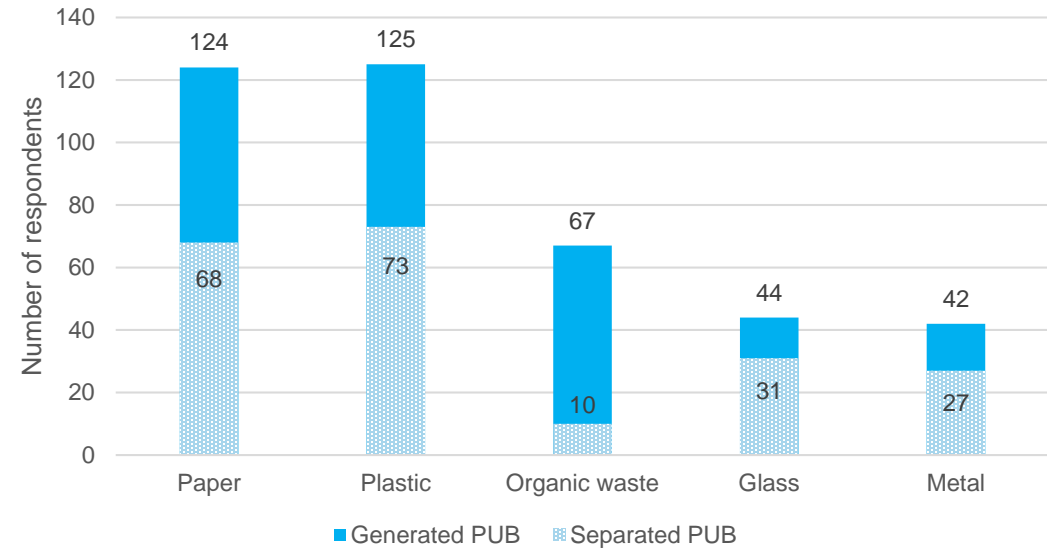


Figure 3: Generated and separated waste in the PUB according to the online survey. The data reflects self-reported responses with multiple answers per week.

Online survey – Separation and waste fractions

- Furthermore, it can be observed that the overall **collection rate* in public spaces is lower** than in the private spaces.
- This suggests that separate collection in public spaces requires a greater degree of effort.

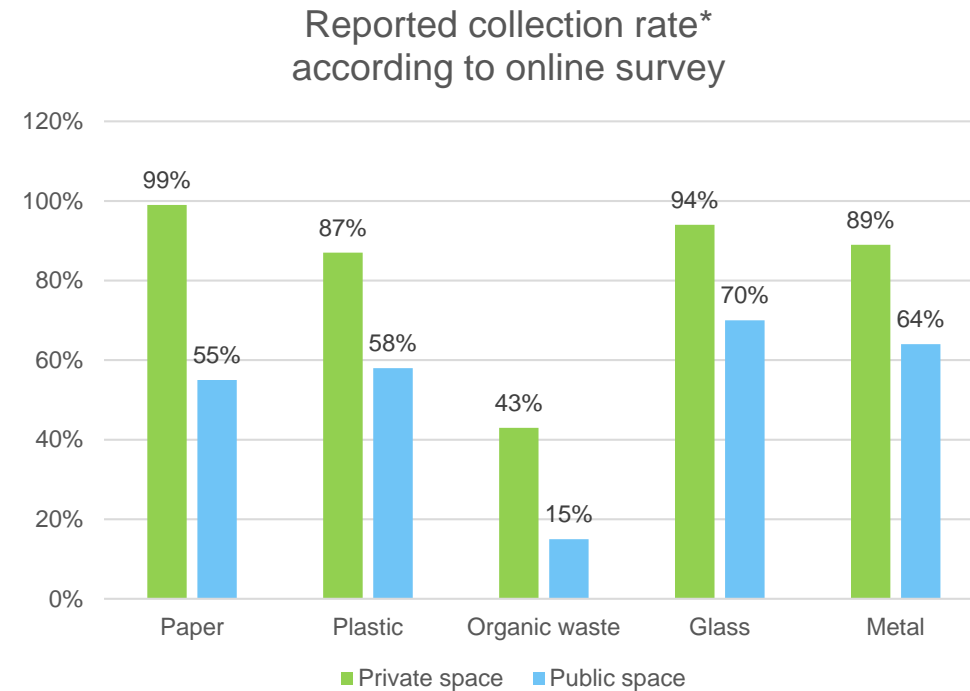


Figure 4: Reported collection rate* according to the online survey. The data is based on self-reported responses with multiple answers per week.

*The reported collection rate reflects the ratio of separated to generated waste.

Online survey – Separation and challenges

H3: Separating waste in public spaces requires more effort than in private spaces.



C1: I don't have time to separate my waste.
 C2: I don't worry about waste separation and dispose of my waste in the residual waste.
 C3: There are enough separation options to separate my waste.
 C4: The available separation options cover all types of waste (e.g. glass, paper, organic waste etc.) that I could separate.
 C5: It takes a long time to find the next separation option (e.g. paper, yellow bin, organic waste etc.).



Cronbachs alpha fulfilled
 Wilcoxon test (time): PRI (Md = 1.00), PUB (Md = 2.50; asymptotic Wilcoxon test: $z = -11.357$, $p < 0.001$)
 Wilcoxon test (bins): PRI (Md = 3.67) , PUB (Md = 2.33; asymptotic Wilcoxon test: $z = -10.972$, $p < 0.001$)
 Additional t-test (time): $t(237) = -17.657$, $p < 0,05$
 Additional t-test (bins): $t(237) = -14.930$, $p < 0,05$

Online survey – Separation vs. littering

H4: People in public spaces prioritize not leaving waste in the environment over separating waste.



D1: It bothers me when rubbish lies on the ground or in the environment.
 D2: It is important to me that my surroundings are tidy and clean.
 D3: If I can't find a rubbish bin, I take my rubbish home with me if necessary.
 D5: I keep recyclables (paper, glass, etc.) with me until I find a way to separate them.
 D6: If I can't find a separation option in public, I take recyclables (paper, glass, etc.) home and separate them there.



Cronbachs alpha fulfilled (D4 removed)
 wilcoxon-test: Littering (Md = 4.47), separation (Md = 3.00; asymptotic Wilcoxon test: $z = -12.356$, $p < 0.001$)
 Additional t-test: $t(237) = 19.374$, $p < 0,05$

Online survey – Overview of hypotheses

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H1: People feel more obliged to separate their waste in private spaces than in public spaces.
- 

H2: In public spaces, mainly residual waste accumulates, while in private spaces, other waste fractions are also relevant.
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H3: Separating waste in public spaces requires more effort than in private spaces.
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H4: People in public spaces prioritize not leaving waste in the environment over separating waste.

Waste separation behaviour - Summary

- Waste separation behaviour varies by location and is **not uniform**
- Separate collection is **more strongly embedded as a social norm in private households** than in public spaces
- Participation in separate collection in public spaces is **faces greater barriers** (e.g., lack of infrastructure, time constraints)
- **Preventing littering** is considered more important than separate collection in public spaces

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