

Application of reusable cup service at Lithuanian summer festivals: different reuse models, and best practices for circular economy

Keywords

Main results

Circular economy, reusable beverage cups, deposit-refund system, packaging waste reduction, reuse systems.

Introduction

Festivals generate huge amounts of waste during a short period of time (Zelenika, I., 2018), usually in 3-4 days. Packaging waste makes up a large part of the festivals total waste amount (Martinho, G. et. al, 2018; Zelenika, I., 2018).

3 alternative reusable beverage cup models were tested in 7 Lithuanian music festivals during 2019 summer season in order to eliminate single use plastic cups. One size reusable plastic "CupCup" cups were used. Instead of a single use "take-make-use-dispose" model, "CupCup" provided a service for "take-make-use-reuse" models for each festival, which varied in size, style, and attendees behaviour.

Summarizing all reusable strategies at seven festivals, 3 models were analysed:
Model A: only reusable cups, non-refundable;
Model B: only reusable cups with deposit-refund;
Model C: a mixed system of reusable cups with deposit-refund, and of single use cups.

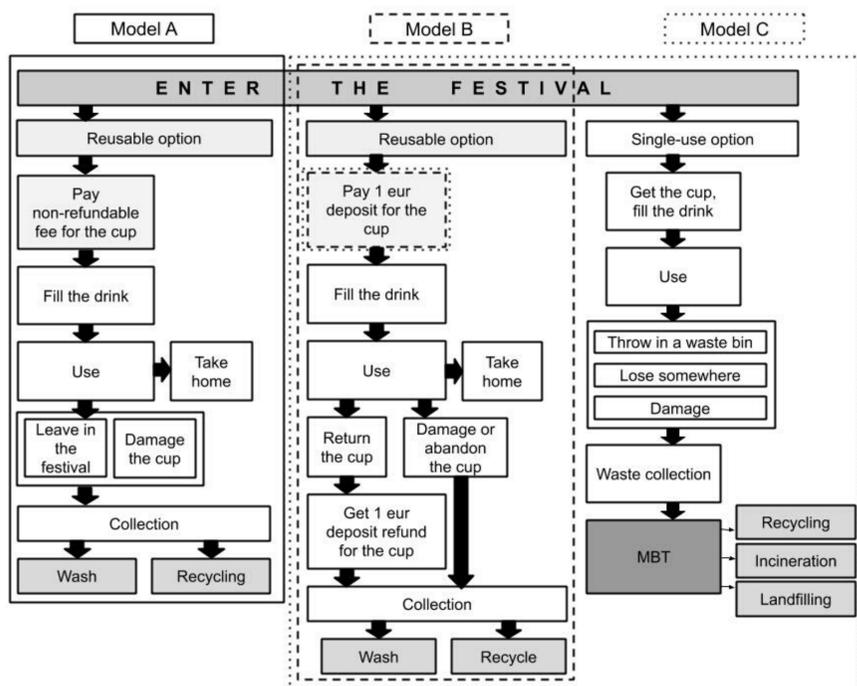


Figure 1. Three tested models for usage of reusable cups.

Research questions

3 research questions were examined (RQ1, RQ2, RQ3):
RQ1: How many cups will be used, lost, and damaged during the festivals, festivals, when different models for the usage of reusable cups are applied?
RQ2: What impact do reusable cup models make on material circularity compared to the use of single use beverage cups at the festivals?
RQ3: How many single use plastic cups were avoided by applying reusable beverage cup models at the festivals?

Main Methods

In order to answer 3 research questions, 7 case studies in festivals were conducted (RQ1), materials flow analysis (MFA) was performed (RQ1, RQ3), and materials circularity indicator (MCI) developed by Ellen MacArthur Foundation (Ellen MacArthur Foundation, 2015) was applied (RQ2).



Figure 2. A simplified scheme of reusable and single use cups flows.

Taken as a whole for all festivals, the loss of reusable cups was 12%, of which 7% were damaged and 5% were lost (not returned) (see figure 3). Deposit-refund models (B,C) had lower rates of damaged, and lost cups compared to the model when no refund was applied (A) (see figure 4). The lowest loss percentages for the C model are explained by the fact that the choice of reusable cups was a deliberate action by motivated participants.

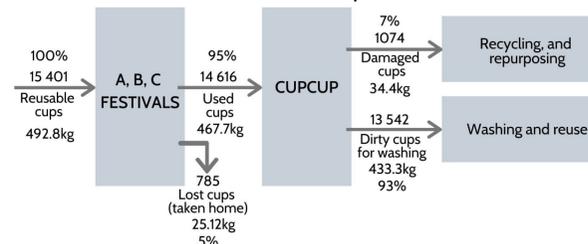


Figure 3. Material flow diagram of reusable cups in 7 festivals.

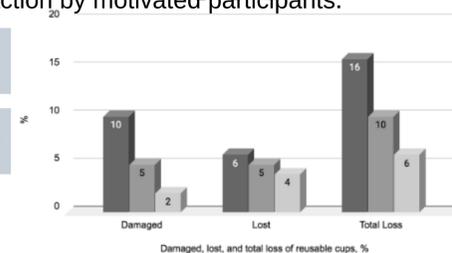


Figure 4. Damaged, lost, and total loss of reusable cups for different tested models.

300 cups per 100 participants per festival day are being avoided in case of models with the use of reusable cups only (models A and B); while a mixed model with the usage of both reusable and single use cups resulted in avoided 108,25 cups per 100 participants per festival day (model C) (see figure 6).

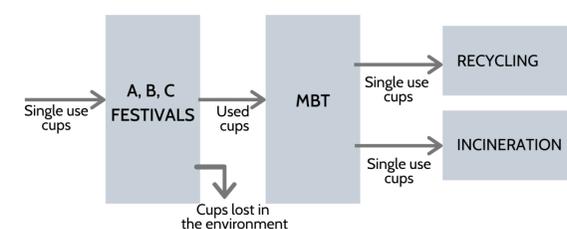


Figure 5. Material flow diagram of single use cups from the festivals.

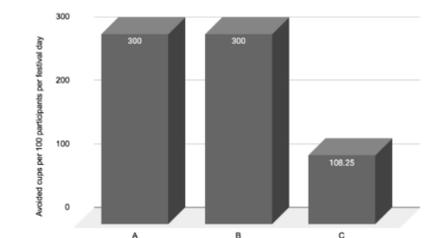


Figure 6. Avoided single use cups per 100 participants per festival day when different models (A, B, C) applied.

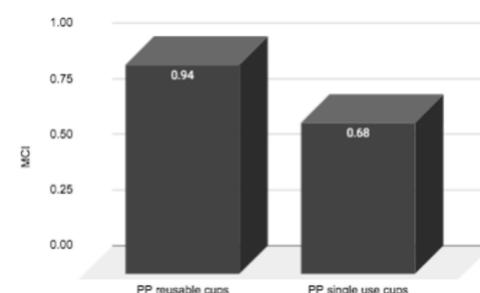


Figure 7. Material circularity indicator (MCI) of reusable PP cups reuse, and single use PP cups recycling.

Single use PP cup material circularity indicator (MCI) is 0.68; MCI of PP reusable cup equals to 0.94 (see figure 7).

The calculations show that PP cup reuse has higher MCI (material circularity indicator) than single use PP cup recycling.

Main conclusions

1. Economic measures have positive impact on the return rates and preservation of reusable packaging - higher return rates, and lower damage rates (B, C models).
2. Consumers motivation and awareness are key elements that have a significant impact on the circularity of the packaging.
3. There is a need of deeper understanding of single use PP cups recycling and waste treatment technologies and methods in Baltic state region in order to compare single use and reusable cups system more precisely.

Authors

Valdonė Šuškevičė is PhD student at Kaunas University of Technology, Institute of Environmental Engineering, Lithuania, valdone.daugelaite@ktu.lt. Her major field of interest is packaging materials management in circular economy.

Daina Kliugaite is a researcher at Kaunas University of Technology, Institute of Environmental Engineering, Lithuania, daina.kliugaite@ktu.lt. Her major field of interest is life cycle assessment and life cycle sustainability assessment.

Jolita Kruopienė is a professor and senior researcher at Kaunas University of Technology, Institute of Environmental Engineering, Lithuania, jolita.kruopiene@ktu.lt. Her major fields of interest are chemicals management, waste management, and environmental impact assessment.

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