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## **PSS facilitating a circular transitions: Insights on the adaptation of green regulations through a reusable packaging case study at an airport.**

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The upcoming EU Packaging and Packaging Waste Regulations (PPWR), aligned with the Sustainable Development Goals and the European Green Deal, aim to ensure all packaging is reusable or recyclable by 2030. This policy challenges the current paradigm of takeaway culture, requiring not only behavioural shifts but participation and engagement from diverse system actors - employees, consumers, and businesses themselves.

This case study explores the development and implementation of a product-service system (PSS) that uses reusable bowls to facilitate a transition from linear to circular packaging solutions at a Norwegian airport.

The complex system of an airport offers a promising environment to explore the advancement of circular economy (CE) through holistic design interventions. A systemic design approach, which integrates systems thinking and design thinking, is viewed as a matching method for developing these interventions. This interdisciplinary approach provides the necessary theories and tools to foster positive change within complex systems.

### **Methodology**

Over two years and in close collaboration with airport representatives, an analysis was conducted to strategically prioritize waste streams and identify their root causes. The Baseline Circular Airports Method (BCAM) was applied. This method considers various vantage points including waste composition, key stakeholders, treatment processes, and environmental impacts. The activities included multiple co-creation workshops focusing on waste streams and stakeholders. These sessions were complemented by a detailed analysis of resource stream composition, mapping material flows, and conducting contextual observations and mappings of the airport system. Leverage points have been identified through this holistic approach, particularly the prevalence of single-use items, which are the main waste produced by airport passengers and prevent any material circulation as they are limited to incineration.

Addressing this requires diverse interventions on both consumer and business levels. This study outlines an intervention developed over six months, resulting in a PSS solution designed to replace single-use packaging by the airport to retain ownership of packaging through a take-back approach. The intervention included a dishwashing service solution, emerging payment technologies, return machines, and circular packaging materials. A one-month pilot tested the PSS at the airport's international D-Gate in collaboration with two restaurants.

Insights were gathered through interviews with employees, users, managers, project partners, and industry experts (n=10). Additionally, surveys assessed customer awareness (n=53) of the reusable takeaway bowl. Additional epistemological approaches such as observations and note-taking further highlighted multiple perspectives and realities of implementing a circular PSS in a complex environment like an airport.

## **Results**

Results reveal significant challenges, particularly technological scalability, and behavioural obstacles, such as insufficient consumer awareness, employee motivation, and communication strategies. Further, relying solely on reusable takeaway solutions cannot address the root causes of the takeaway culture. A systemic approach is needed to design diverse interventions addressing pricing strategies, logistical processes, and alternative user journeys.

These insights offer valuable lessons on the involvement and engagement of various actors within a transitioning system aimed at complying with sustainable regulations. Additionally, important learnings for businesses navigating regulatory compliance have been highlighted, such as how early-stage interventions can assist preparations to meet sustainability regulations and shift from a linear to a circular economy.