

Scoping Key Opportunities for Systemic Food Waste Prevention in Collaboration with System Stakeholders - an Applied Methodology

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Abstract

Globally, around 14% of the world's food continues to be lost after harvest (FAO, 2019), whilst a further 17% of our food ends up being wasted in retail, food service and particularly in households (UNEP, 2021). This makes reduction of food waste and losses a crucial sustainability challenge. Food waste can be understood as a symptom of an unsustainable food system. In addition to symptom control, e.g. reducing or reusing food waste streams, interventions to reduce or prevent food waste should also be directed towards the underlying system structures, behaviours and the paradigm that make food waste happen again and again. This means a systems approach is needed. Several types of systems approaches and frameworks can be found in literature, both general (e.g. Bagherzadeh, 2019) or used in national cases (e.g. Muth et al, 2019). In this project, an 'iceberg model' was used as framework for a systems approach. This iceberg model is based on the leverage points theory of Meadows (2008) and Maani&Cavana (2007). It has 4 layers: symptoms (the tip of the iceberg) with underlying system behavior, structures and the mental model or paradigm that shapes the system. In the project "Reduction of Food Waste in the Dutch food industry", the potential of this framework to identify leverage points to reduce food waste and losses was explored in a number of fresh food supply chains in the Netherlands, including dairy, meat and fresh produce. Through a participatory approach, entire food chains were mapped in a simplified version of 4 chain segments: (1) primary production- e.g. the farm, (2) secondary food production- e.g. the milk factory, (3) retail and (4) food service. In this project food waste at the consumer/household level was excluded. With this work we present the necessary steps in scoping opportunities for systemic change. Methods used are qualitative interviews,

participatory creation of iceberg models, validation in cocreation sessions, finding solutions through future backcasting, iteration of iceberg models and engaging stakeholders. Across multiple food chains (dairy, meat, fresh produce) the most important food waste leverage points (so called food waste hotspots) within the 4 chain segments were defined and iceberg models were created. During the cocreation sessions, several potential interventions were discussed such as valuing wasted food products during the innovation process for future human consumption instead of going to feed. Central outcome of this work are the steps required in order to scope key opportunities for systemic food waste prevention in collaboration with stakeholders. In the oral presentation we will present the most important food waste hotspots in each food chain.

Keywords: food systems approach, food waste hotspots, food chain, leverage points, future backcasting

References

Bagherzadeh, M., 2019 'A FOOD SYSTEMS' APPROACH TO FOOD LOSS AND WASTE Open Forum on Resilience in Agriculture'.

FAO, 2019, 'The State of Food Security and Nutrition in the World 2019'. Available at: www.fao.org/publications (Accessed: 30 May 2023). doi: 10.4060/CA5162EN.

Maani, K. and Cavana, R. Y., 2007 'Systems thinking, system dynamics: managing change and complexity', p. 278. Available at: <https://www.worldcat.org/title/174088785> (Accessed: 30 May 2023).

Muth, M. K. et al. , 2019 'A systems approach to assessing environmental and economic effects of food loss and waste interventions in the United States', *Science of The Total Environment*, 685, pp. 1240-1254. doi: 10.1016/J.SCITOTENV.2019.06.230.

Meadows, D. , 2008 Leverage Points: Places to Intervene in a System - The Donella Meadows Project. Available at: <https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/> (Accessed: 30 May 2023).

UNEP, 2021, 'UNEP Food Waste Index Report 2021'. Available at: <https://www.unep.org/resources/report/unep-food-waste-index-report-2021> (Accessed: 10 November 2022).

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