

Untangling the Complexities of Decision-making in Food Loss and Waste Valorisation

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Abstract

Approximately one-third of food produced for human consumption is lost or wasted annually, resulting in an estimated carbon footprint of 3.3 GT of CO₂ equivalents per year. Food loss and waste (FLW), generally downcycled, also results in other environmental issues such as water eutrophication, arable land depletion, and biodiversity loss. Food Waste Valorisation (FWV) is an emerging solution inspired by the generic concept of Circular Economy to address FLW. However, the lack of structured frameworks for orchestrating the valorisation of food towards higher-valued applications, coupled with divergent goals and approaches, hampers the implementation of FWV. To address these challenges, we conducted a comprehensive literature review to identify the key building blocks necessary for decision-making in FWV. The objective is to provide clarity on the decisions that need to be made and the methods that can be employed to support effective decision-making. Based on the results of our review, we will present the existing frameworks, criteria, and decision-support tools, as well as identify missing criteria specific to food-to-food pathways. By bridging these gaps, we aim to overcome barriers hindering the integration of decision-making and facilitate the successful implementation of FWV. This research contributes to untangling the complexities of sustainable food waste management and propels the transition towards more circular and resource-efficient food systems. Based on the review, we generalized a four-phase decision-making framework for FWV, comprising: i) context analysis, ii) scope selection, iii) identification of FWV options, and iv) evaluation and implementation of the delineated roadmap. Within this framework, we elucidated the specific decisions required at each phase and identified suitable decision-support approaches for each decision. Furthermore, we conducted a review of indicators and criteria applicable to assessing FWV performance. Ultimately, this study aims to facilitate more efficient decision-making, thereby promoting the implementation of FWV initiatives.

Keywords: food loss and waste, food waste valorisation, decision-making, sustainable

food system

Acknowledgments: We would like to acknowledge the valuable contributions and support received from all the co-authors. This study was supported by China Scholarship Council (No. 201913043).

ACCEPTED