

The concept of Food Waste and Food Losses Prevention and Measuring Tools

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Abstract

According to the U.N. Environment Program's 2021 Food Waste Index Report, approximately 931 million metric tons of food end up in the garbage. According to Swannel (2021) this quantities are enough to fill 23 million annual to 40 ton trucks 'bumper to bumper, to circle the Earth seven times'. At the same time, FAO estimates that one-third of food producers worldwide is wasted, which contributes more than 820 million people who are hungry annually with the result, food waste (FW) and food losses (FL) are one of the main issues worldwide. It is not only an ethical and economic issue but is also depletes the environment of limited natural resources. In addition, FW accounts for 25% of the annual freshwater supply and approximately 300 million barrels of oil annually (Danible et al., 2021). Greenhouse gas emissions from the production of food are ultimately wasted account for 7.2 billion tones came from within the farm gate, 3.5 from land use change, and 5.8 billion from supply chain processes, according the last analysis (FAO, 2019).

SDG 12.3 aims to halve FW at the retail and consumer level and reduce FL along the food value chain. FW reduction is gaining interest as one aspect in making the food system more sustainable and merits specific mention in the UN SDG's (FAO, 2022). To reduce FW, is important to introduce four fields of action: politics, business, changing behavior of all actors involved, and potential of research and digitalization (Strotmann et al., 2021). Although all actors in the food chain have a role to play in preventing and reducing FW, from producers and processors of food to retailers and consumers. It should also be recognized, that loss reduction is not only a policy objective but can be conducive to improving the efficiency of the supply chain, use of natural resources, or food security.

An integrated and efficient tool for the management of FW could help address several of the most significant problem challenges, such as climate change, and economic, environmental, and social security. As an example among the tendencies, active packaging and intelligent packaging system offer a huge potential to reduce FW (Racionero et al.,2018).

This paper attempts to partly fill the research gap of measuring tools and approaches/methods in all the supply chains based on a literature review. Also is important to investigate the current methodologies (tools, quantify-quantity methods, mapping) to find the advantages and disadvantages and suggest optimal solutions. The research and international community have actively engaged on the conceptual frameworks underpinning Food Losses and Waste (FLW) on the measurements approaches and the policy interventions to reduce FLW. Critical information gaps and data (imported quantities, detailed production steps, produced quantities, edible or inedible quantities, quantities that can be used or not) needs are evident in order to correlate reduction methods and quantification methods.

The proposed research focuses on the assessment of the existing FW and/or FL methodologies as well as on the existing applications that are been used from different geographical scales (e.g. Sweden, Norway, Spain, Cyprus, Greece) on the supply chain (e.g. industries, hospitality, packaging, consumers, local authorities, restaurant, retailing). A literature review has been performed using PRISMA Statement (Voukkali and Zorpas 2022; Pappas et al., 2022) using the bibliometric database Scopus. Preliminarily, a screening of the documents including the keywords 'FL' AND 'FW' AND 'supply chain' AND 'measurement methods' AND 'tools', 'quantitative' OR 'qualitative'. The first screening of publications, on one hand, led to identifying several studies presenting technological solutions (e.g. improved different sectors, temperature, storage facilities) to increase the efficiency of reduction of FW/FL. On the other hand, studies were identified that concerned the creation of tools (visual mapping, automatic tools, packaging tools, collating and analyzing FLW tools, mobile/web tools), for measuring FW or/and FL. The search was bound to papers published or available in the database from 2002 until 2022 focused on primary production, manufacturing, distribution, and consumption.

A part of the research was found that only 61% of all waste- quantifying aspects had reduced their FW, indicating that quantification in itself is not a guarantee of waste reduction (Eriksson et al., 2019) and that's the main reason that it' important to engage with prevention methods.

As a preliminary result it can be said that considering the advantages and weaknesses of the existing tools and methodologies a new hybrid approach must be developed in order to cover the demand of the European Directive 2008/98 which requires that members states should have a common methodology to measure and assess FW and FL form the entire value chain.

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