Issue 1:

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Lifecycle of food waste

Food loss and waste present serious challenges to global food security and environmental sustainability, as one-third of all food produced is lost or wasted. According to the FAO, approximately 14% of the world's food is lost after it is harvested and before reaching the markets, while an estimated 17% is wasted by retail and consumers (FAO,2024). Food waste accounts for 8 to 10% of global greenhouse gas emissions, driving climate change, in turn, negatively impacting food security (FAO,2024).

This article aims to raise awareness about food loss and waste across the entire food supply chain by examining the phases of the food waste life cycle. In this regard, food waste operates through a life cycle that begins with production and processing, moves through retail, and consumption, and ends with disposal. Each stage contributes to food loss differently, leading to economic and environmental negative impacts. Therefore, understanding these phases is vital to effectively addressing the global food waste issue.

I. Production

The production phase is a critical stage in the food waste life cycle, where major losses occur due to various factors. Globally, approximately 30% of all food produced, around 2.5 billion tons, is lost or wasted each year, with a serious portion of this loss happening during production(Safdie,2024). A major factor in this waste is overproduction, where more food is grown than needed. Additionally, factors like crop pests and diseases, weather conditions, and inefficiencies in harvesting techniques also lead to substantial

losses. In some cases, food that doesn't meet certain standards, or is deemed discarded, even though it is still edible. According to the FAO, these losses represent not only wasted food, but also the loss of valuable resources like water, energy, and labor that that were invested in its production

II. Processing

Studies show that about 38% of food waste happens at the processing stage (Simões & Ribeiro,2021)The journey of food from farm to table often Faces challenges during processing, where inefficiencies and outdated methods lead to a serious amount of waste. Whether it is poor storage practices or clunky, ineffective equipment, too much food is lost before it even has a chance to reach anyone's plate. At this stage, significant biodegradable waste is generated. For example, plant-based waste (Peels, seeds, bran), animal-based waste (Blood, bones, neural tissues), and wastewater (large volumes during processing) (Simões & Ribeiro,2021). Therefore, if these wastes are not properly managed can lead to detrimental repercussions on the environment and economy.

However, we can change that by investing in better technology, improving quality control, and streamlining operations, we can cut down on waste and make our food system not just more efficient, but kinder to the planet.

III. Shipping and Handling

Getting food where it needs to go might seem straightforward, to markets and supermarkets, but a lot can go wrong along the way. According to research, the shipping and handling stage contributes 7 to 15% of total food loss and waste (Jiang, et al.,2024). These losses occur due to many factors; (1) poor employee practices such as mishandling during loading, or food spoils due to bad storage, (2) defective cooling systems during transit or transportation, (3) timing issues in deliveries such as delays or long arrival time due to logistical errors, or inadequate scheduling or traffic subjects the food, particularly

perishable goods, to significant damage, and lastly (4) mismatched supply and demand when delivered goods are more than the recipient can handle or sell, the excess stock may remain unused and eventually go to waste (Jiang, et al.,2024). Imagine a world where every truck is efficient, every warehouse is properly equipped, and every shipment arrives fresh and intact. Better logistics, advanced storage solutions, and smarter handling practices can transform this stage into a critical line of defense against food waste.

IV. Consumbtion

A. Restaurants (food services) & Retail (sales to consumers)

Most individuals encounter food waste in restaurants and grocery stores. According to a global estimate, around 26% of total food waste is from food service and 13% from retail (UNEP,2021). In the food services sector, the waste is usually attributed to consumer behavior, such as big portions, overproduction due to poor planning, and overly dining out (Talwar, et al.,2021). In the retail sector, food loss\ waste happens due to aesthetic standards, strict sell-by dates, and expired, or unsold goods (Ryan, et al., 2018). However, that loss can be reduced as it is associated with a person's behavior and practices. For example, the solution could simply be for restaurants to serve perfectly portioned meals or for grocery stores to donate surplus food instead of throwing it away. By embracing solutions like smarter inventory management, food rescue programs, and sustainable practices, we can ensure that more food is enjoyed, not wasted, and make a meaningful difference in how we feed the world.

B. Households

Household food waste is a major stage in the food waste cycle, as it is estimated that 61% of total food waste from households, retail establishments, and the food service industry happens at the individual household level, around 570 million tonnes per year

(UNEP,2021). For example, across the EU nations, households generate more than half of the union's total food waste (54%) (Eurostat,2024). According to some studies, any household food waste originates in three predictable stages–when shopping, storing, and serving, as poor storage, overpurchasing, and improper handling lead to food spoilage and unnecessary disposal (Szymkowiak, et al., 2022). Simple strategies like meal planning and proper storage can significantly reduce waste.

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