


Chapter 12

Salvaging Responsible Consumption and Production of Food in the Hospitality Industry: Harnessing Machine Learning and Deep Learning for Zero Food Waste

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ABSTRACT

The hospitality industry stands at the forefront of addressing critical challenges in responsible consumption and production of food, and this research endeavors to spearhead transformative solutions by harnessing the power of machine learning (ML) and deep learning (DL) technologies. In the contemporary context, where issues like global hunger, malnutrition, and the intricate dynamics of food adulteration significantly impact the industry's demand-supply mechanism, the integration of advanced technological strategies becomes paramount. This chapter strategically examines the role of ML and DL in achieving zero waste within the hospitality sector, offering a nuanced exploration of challenges and presenting innovative strategies to thwart food loss-waste management.

1. INTRODUCTION

The hospitality industry has long been synonymous with the pleasures of dining and culinary indulgence. It caters to an array of tastes, preferences, and cultural diversities, providing a rich tapestry of gastronomic experiences. However, this very industry is also grappling with an alarming predicament - food

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waste. In the course of delivering exquisite meals, substantial quantities of food are discarded daily, and this not only represents a colossal economic loss but, more critically, an environmental crisis. In an era where sustainable practices and responsible consumption are increasingly pivotal, addressing food waste within the hospitality industry is of paramount importance (Font et al., 2023).

The food waste is a multifaceted issue that extends far beyond the confines of a restaurant's kitchen or a hotel's banquet hall. It reverberates across the globe, affecting ecosystems, economies, and societies at large. When food is discarded, it not only squanders resources and monetary investments but also generates greenhouse gases, exacerbating climate change. This wasteful practice compounds the ethical dilemma of food scarcity and insecurity experienced by millions worldwide. As the hospitality industry is a significant contributor to this dilemma, it bears the moral and ethical responsibility to act as a catalyst for change (Delgado et al., 2023).

The urgency to combat food waste cannot be overstated. The United Nations' Sustainable Development Goals (SDGs) explicitly highlight the need for responsible consumption and production. SDG 12, in particular, calls for sustainable management and efficient use of natural resources, with the sub-target 12.3 focusing specifically on halving per capita global food waste at the retail and consumer levels and reducing food losses along production and supply chains. The hospitality industry is intricately tied to these goals, as it is a nexus where both production and consumption coalesce.

This paper acknowledges the severity of the problem, encompassing the environmental, economic, and ethical dimensions of food waste. As a response to this challenge, the paper looks to the realm of machine learning and deep learning as promising tools for optimizing food management. This paper represents a call to action, a quest for solutions, and a commitment to a more sustainable future in the hospitality industry.

1.1 Hospitality Industry's Impact on Food Waste and Environment

The hospitality industry, encompassing hotels, restaurants, catering services, and more, exerts a significant impact on food waste and the environment. It stands as a sector where food waste is conspicuous, owing to the vast volumes of food prepared, served, and often discarded. This overview delves into the complex interplay between the hospitality industry and food waste, shedding light on the environmental consequences of its practices (Jones et al., 2017; Kalenjuk Pivarski et al., 2022).

1. **Scale of Food Production and Consumption:** The hospitality industry is a colossal engine of food production and consumption. Millions of meals are prepared daily in restaurants, hotels, and catering services worldwide. This scale alone places it at the forefront of the food waste challenge. Large quantities of raw materials and ingredients are procured, processed, and then, regrettably, discarded, contributing to food waste along the entire supply chain.
2. **Inefficient meals Preparation:** The hospitality industry frequently overprepares meals in an effort to achieve culinary perfection and client pleasure. This excess results in enormous food waste while assuring that no customer is dissatisfied. Additionally, operational shortcomings like incorrect portion measurement or insufficient meal preparation may contribute to excessive waste.
3. **Waste from consumers and plates:** Unfinished meals are frequently left on guests' plates at restaurants to be thrown away after the meal. This consumer waste is a noteworthy issue since it causes a significant loss of resources and has an adverse effect on the environment. This problem might be made worse by the industry's emphasis on buffets and large quantities.

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