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Tackling the issue of food waste in restaurants: Options for measurement method, reduction and behavioral change

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ABSTRACT

Reducing food waste has many positive environmental and socio-economic ramifications. Even though many programs exist to reduce the amount of food waste, the attitudes and the behaviors driving food waste as well as the strategies to reduce it remain poorly understood. In this paper, we investigate how restaurateurs in Berkeley, California, USA perceive food waste given current financial incentives and policies. We found that 65% of the restaurants are measuring amounts of food waste and more than three-quarters of them (84%) use compost bins to dispose inedible food waste. Our survey results also show that the most common method employed to dispose of food waste (72%) was giving edible leftovers to restaurant's employees. However, three-quarters of restaurants avoided food donation because of unfounded fear of the legal liability. Finally, 14% of surveyed restaurants dumped their food waste into landfill bins. We suggest that further studies explore ways to target specific attitudes and behavioral changes, but also to quantify the impact of these changes.

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1. Introduction

Humanity faces a grand challenge in the 21st century in determining how to best feed the world's population on a warmer and more crowded planet. Increasing food production is one possible solution. However, increasing competition for the use of land, water, and energy, in combination with increased consumption of animal products, may limit how much more food can be produced (Godfray et al., 2010). In addition, actions taken to meet increasing food demand must account for ongoing climate change (Kosseva and Webb, 2013). Another promising solution is to reduce the amount of food wasted.

Globally, the amount of food waste is estimated to be about 1.3 billion metric tons per year (FAO, 2011). The environmental impacts of food waste are substantial (FAO, 2013a). In 2013, the Food and Agriculture Organization of the United Nations determined that the amount of greenhouse gas emitted annually due to food waste in landfills is almost equivalent to the total emissions of Cuba (about 3.3 billion tons of CO2e/yr) and that food waste accounts for the annual global loss of water of about 250 Km^3 which is equivalent to three times the volume of Lake Geneva in Switzerland (FAO, 2013a; Papargyropoulou et al., 2014).

Beyond the environmental benefits, addressing food waste helps to tackle issues regarding food availability and self-sufficiency, particularly in developing countries (Scialabba, 2011). In developing countries, the reduction of quantitative losses (losses of fresh fruits and vegetables which are due to product spoilage) is of higher priority than addressing the qualitative losses (such as consumer preference) (Kader, 2005). The opposite is true in developed countries, where consumer dissatisfaction with produce quality results in a greater percentage of the total post-harvest losses (Kader, 2005). Thus, developed countries tend to have more food waste than developing countries. For example, in North America and Europe, the amount of food wasted by consumers is 209–254 pounds per year, while in Sub-Saharan Africa and South/Southeast Asia it is 13–24 pounds per year (Buzby et al., 2014).

Moreover, in the United States (US) alone, it is estimated that 40% of edible food is not consumed, leading to about 37 million metric tons of food being wasted per year (Gunders, 2015; Hall et al., 2009). According to the Food Waste Reduction Alliance (FWRA), about 37% of food waste occurs in retail stores and food services (FWRA, 2014). Dining places like cafeterias of educational institutions, hospitality, and private companies which offer buffet style foods (especially with an all-you-can-eat system) are

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particularly wasteful (Gunders, 2012). The restaurant service sector typically wastes 4–10% of purchased food before it reaches the customer in the United States (Baldwin et al., 2011). A US Department of Agriculture (USDA) study in 2014 showed that 21% of food available in restaurants was not being eaten (Buzby et al., 2014). From a financial perspective, anywhere between 9 and 23 billion USD worth of food is wasted annually (LeanPath, 2016). However, if a foodservice business is tracking the food waste generated, this can often catalyze up to a 7% reduction of food waste as compared to businesses that do not track food waste (LeanPath, 2016). If widely implemented, this could save $1.3 billion each year for food businesses (ReFED, 2016).

However, according to Waste and Resources Action Programme (WRAP), restaurant service operators do not believe that food waste lies in their area of responsibility, and as a result are not incentivized to operate differently and move towards more sustainable practices (WRAP, 2013). The most common causes of wasted food in the restaurant service sector include: incorrect storage, preparation residues such as improper handling of food products and over-preparation, excessive portions and leftovers on plates, difficulty in forecasting number of clients, forgotten and spoiled food, lack of awareness due to poor food waste data and its economic and environmental costs, and lastly, difficulty in meeting dietary preferences of clients (Ofei and Mikkelsen, 2011).

Given these financial and environmental impacts especially in industrialized countries with the capacity to implement economic policies and environmental incentives, the amount of food being wasted remains a challenge. In this paper, we explore what factors influence behaviors and attitudes among restaurateurs regarding the policies and incentives to reduce food waste. Specifically, we report the results of a survey of food service providers in Berkeley, California, USA and discuss the relationship between restaurants and their food waste prevention practices.

The survey explored the "food waste landscape" by assessing the (i) types of restaurants, (ii) the current food waste prevention practices at restaurants, and (iii) how restaurants consider food donation and liability. Our results suggest that there are knowledge gaps rather than inefficacious policies or financial incentives, and that social and economic objectives of a restaurant can help understand the attitudes and behaviors towards food waste.

2. Background and possible solutions

Food waste research is an emerging subdiscipline of waste research. It is motivated by environmental concerns which include climate change, loss of biodiversity, pollution of air and water, fossil fuel consumption, overharvesting, and many others (FAO, 2013a). The complexity of the problem arises from the diverse food production economy, which has a multitude of interactions among suppliers, consumers, managers, and waste management operators. However, collaboration among different stakeholders is not yet sufficient and more effort is needed to decrease the impacts of food waste (Lipinski et al., 2013).

2.1. Incentives and the low hanging fruit

Wasted food may be described as a low hanging fruit, since the ways of making positive impact on the reduction of food waste are applicable to a majority of the global population, especially in industrialized countries where a surplus of food is available (Strickland, 2016). The incentives and ways of behaving more environmentally friendly are quite simple to implement in a home setting and involve behavioral changes that can be adopted quickly and lead to direct and positive impact. Some of the more environmentally friendly behaviors suggested by the United States Environmental Protection Agency to reduce the food waste (EPA, 2016a) include storing bananas, apples, and tomatoes by themselves, storing fruits and vegetables in different bins, freezing any food that one cannot eat in time, and understanding expiration dates (EPA, 2016a).

While encouraging environmentally friendly behavior is imperative for reducing food waste, tax incentives and policies can facilitate sustainable behaviors. In the beginning of 2016, the US Congress signed a provision, the Protecting Americans from Tax Hikes (PATH) Act, that enables food businesses to receive tax benefits when donating food to charitable organizations. Before the PATH Act, it was only possible for larger corporations to obtain tax benefits. With this legislation, it is now possible for businesses to claim potential profits for the inventory, if sold at a fair market value (ReFED, 2016).

2.2. Awareness of food waste

Awareness about food waste has been rising in recent years, which is reflected in data from online search engines. The Google web search trend analytics show a steady increase for the term "food waste" from 2004 to 2016 (Google, 2016). It shows a peak in search for food waste during the 2015 Conference of the Parties held by the United Nations (UN) general assembly in Paris during which the Sustainable Development Goals (SDG) on food waste were introduced. Target 3 of the 12th SDG for sustainable consumption and production, introduced by the UN in 2015, has a similar objective to the USDA goal: to cut the amount of food waste per capita by 50% on the retail and consumer levels by the year 2030 and to reduce food losses occurring along the entire supply-chain and more specifically during production and post-harvesting (United Nations, 2015).

On the national level in the US, the first legislation directed at food waste reduction was introduced at the end of 2015, mainly due to the effort of House of Representatives Congresswoman, Chellie Pingree. It aimed to reduce food waste in the framework of the Food Recovery Act (Pingree, 2015). The bill included several provisions, directed at reducing food waste at the federal level (Pingree, 2015). Due to these regulatory changes, federal governments including Congress and the military will need to establish new partnerships with charity and faith-based organizations and stakeholders in the private sector in order to provide a sustainable basis for reducing food waste (USDA, 2015). Incentives, linked to the regulatory legal provisions by the US government, are expected to impact overall economy-wide food waste reduction and add momentum among policy makers and stakeholders across industries to address food waste (EPA, 2016b).

2.3. Possible solutions to address food waste

2.3.1. Efficiency

Implementing a detailed system, such as a weight-based system, to quantify the amounts of food waste has been shown to be highly effective in reducing food waste especially for catering businesses (Shakman et al., 2008; NRA, 2016). However, the current tools for assessing food waste are highly complex or lack accuracy. Weight-based systems are highly accurate, but necessitate laborious effort and space for dining facilities (Hanks et al., 2014). In contrast, visual analysis of waste made at regular intervals are easy to implement but can only determine patterns of leftover food or overbought foods (Hanks et al., 2014). Overall, food waste tracking is not widely done by foodservice operators. Foodservice operators often do not believe they have the time to add such tracking tools to their business operations (FAO, 2013b).

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