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Throwing it out: Introducing a nexus perspective in examining citizen perceptions of organizational food waste in the U.S.

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ABSTRACT

While advocacy groups and environmentalists have sought to highlight the issue of food waste, relatively little is known about individual citizen concern about food wasted by organizations in the U.S. This paper examines the extent to which individuals are concerned about organizational food waste, and to what extent they would support policies intended to reduce food waste. We also address how food waste reduces efficiencies in the water-energy-food nexus. We use a nationally representative sample of survey respondents to identify the personal characteristics that relate to concern about food waste and to corrective public policies. We expand the use of water-energy-food awareness indexes and examine if nexus awareness influences opinions and policies regarding food waste. Results show that nexus awareness, or awareness of the interconnections between food-water and food-energy, is significantly related to food waste concern and policy preferences to reduce food waste. We conclude with some strategies and policy recommendations on increasing awareness and action to reduce food waste.

In recent decades, the issue of food loss and waste has received increased attention from managers, policymakers, and academics who state that food waste is a serious social, environmental, and nutritional problem (Sobal and Kay Nelson, 2003). This has encouraged researchers and academics to identify strategies to reduce or repurpose post-harvest losses (Buzby and Hyman, 2012; Fehr et al., 2002). Studies on food consumption estimate that nearly 40% of food in the United States is wasted, with significant amounts of daily food waste coming from restaurants, grocery stores, and convenience stores (Bloom, 2011; Buzby et al., 2014; Hall et al., 2009). Globally, the UN's Food and Agriculture Organization (FAO) estimates that 1.3 billion tons of edible foods prepared for human consumption are wasted each year (Gustavsson et al., 2011).

The existing literature on food waste is broadly construed and examines topics such as waste levels, antecedents of waste, the culture of waste and has been criticized as lacking a coherent direction (Evans et al., 2013; Porpino, 2016; Porpino et al., 2015). Recent developments to raise citizen awareness have sought to quantify food waste as well as to increase the prevalence of information about the positive impact of reducing food waste (Kantor et al., 1997; Munro, 1995; Qi and Brian, 2016; Quested et al., 2013). Several studies have examined, for example, consumer attitudes and concerns, the relationships between demographic characteristics and waste patterns, and behavioral patterns and values in relation to levels of food waste (Cox and Downing, 2007; Evans, 2011b; Evans et al., 2013; Graham-Rowe et al., 2014; Hebrok and Boks, 2017; Koivupuro and Kaisa, 2012; Neff et al., 2015; Porpino et al., 2015; Qi and Brian, 2016; Stancu et al., 2016; Stefan et al., 2013; Visschers et al., 2016). These studies focus primarily on individuals and consumers about their own waste habits and omit individual concerns about food waste at the organizational level. Additionally, few studies evaluate individual policy preferences or levels of support for policies aiming to reduce food waste directly.

The purposes of this paper are twofold. First, we examine individual levels of concern about the amount of food wasted by organizations such as restaurants, cafeterias, and grocery stores, among the U.S. public. We define this as organizational food waste, or discarded foods, i.e., produce, packaged and prepared foods, from organizations such as restaurants, grocery stores, and cafeterias. We then examine individual policy preferences about efforts to reduce food waste.

This paper provides an important addition to food waste studies in the U.S. Although a considerable effort to understand food related waste has been underway in other countries (Aschemann-Witzel et al., 2015; Graham-Rowe et al., 2014; Halloran et al., 2014; Lee et al., 2017; Parizeau et al., 2015; Quested et al., 2013; Rispo et al., 2015; Secondi et al., 2015; Stancu et al., 2016), studies on concern about food waste have not received sufficient focus in the U.S. Indeed, ours is one of very few studies using nationally representative data to assess citizen policy opinions and concerns about food waste in the U.S. With studies

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addressing organizational food waste even less common in nationally representative samples.

In addition to identifying concern and policy preferences aimed at reducing food waste, we also introduce a food-water-energy nexus perspective into food waste studies. Food waste is a central factor that highlights the inefficiencies and mismanagement of nexus resources. To illustrate, when food is wasted, the resources used to grow the food (including fertilizers, herbicides, pesticides, and water), harvest, treat, process and transport it, and the money used to purchase the excess food are also wasted. As food is wasted along all stages of the supply chain process (Griffin et al., 2009; Parfitt et al., 2010; Sheahan and Barrett, 2016) this results in significant losses in energy and water resources. Thus, this research augments literature on the nexus and food waste by examining the food waste within the nexus perspective. By so doing we contribute to both camps of literature on resource misuse and waste.

1. Organizational food waste

In recent years, the culture of waste has been addressed in the media highlighting some practices about organizational food waste. A number of documentaries have highlighted these practices in creative and entertaining ways. It is unclear, however, if individuals recognize the amounts of food wasted by organizations, express any concern about that waste, and what they prefer to have done about the issue. Individuals may experience or interact with organizational food waste very differently. For example, a professional chef may observe much waste in the kitchen and from consumers at the establishment, while someone who cooks infrequently may personally experience very little post-harvest food waste. Their differing experiences with food may influence their individual perceptions and concerns about levels of waste.

Many previous food waste studies focus on individual or family waste behaviors and attitudes and omit important aspects of organizational waste. It is important to address this omission as retail outlets, corporations and other organizations generate a considerable amount of waste (Edjabou et al., 2015; Richter and Bokelmann, 2016). Organizations discard foods for several reasons[1] such as cosmetic imperfections, overstocking, over-purchasing, damaged packaging or containers, removing potentially toxic or unsafe foods, or past "sell-by" dates (Gunders, 2012; Sheahan and Barrett, 2016). In the U.S., approximately $47 billion worth of food was wasted by grocery stores and other retail outlets in 2008 (Buzby and Hyman, 2012). The USDA further estimates that 12.6 percent of fresh fruit, 11.6 percent of fresh vegetables, and 12.7 percent of fresh meat, poultry, and seafood is discarded from retail outlets and supermarkets (Buzby et al., 2016) and each of these estimates increased from the previous USDA report in 2006 (Buzby et al., 2009).

Some retail industry executives and managers view food waste as a sign that the store is meeting quality control and full-shelf standards, suggesting that visually imperfect and potentially hazardous foods are removed and shelves are fully stocked (Alvarez and Johnson, 2011). Additionally, produce with cosmetic imperfections may go unpurchased even when the items are otherwise indistinguishable from items without the visual imperfections. One study in particular finds that consumers show little tolerance for visual imperfections in organic produce which frequently is discarded due to visual imperfections in shape, size, and color (Yue et al., 2009). Retail outlets will also discard foods when the date label or best-by date is approaching, although studies show that many consumers do not accurately understand use-by or best-by labels (Van Boxstael et al., 2014).

Restaurants also contribute significantly to food waste at the organizational level. There are two primary types of food waste that occurs at a restaurant: kitchen waste and consumer waste (Bloom, 2011). Kitchen waste includes inventory losses, prep wastes, food scraps not suitable for serving, and foods prepared but not served. Kitchen waste is avoidable or reducible through increased efficiency in management practices or donations to food banks or shelters.

Consumer or "plate" waste consists of foods that are produced and served but not consumed after purchase. Several factors contribute to plate waste such as undesired accompaniments and increased portion size (Thyberg and Tonjes, 2016). Strasser (2000) suggests that there is also a "distance effect" from preparation labor that contributes to plate waste at restaurants. When an individual, or a loved one, prepares food, they are intimately connected to the labor required to prepare the food. This labor is potentially valued more by the consumer who is less likely to waste the prepared foods. Thus, "as food preparation and consumption is increasingly done in restaurants, factories, or supermarkets, there is likely to be shifts in the types and quantities of food waste generated by residences, industry, and commercial establishments" (Thyberg and Tonjes, 2016:116). Organizations may mitigate food wasted by individuals through more sustainable decisions or practices, such as package design and packing materials, from organizational managers.

2. Food waste: the nexus perspective

Food waste is a central contributing factor to losses and inefficiencies in the food-water-energy nexus as the wasted or lost food inevitably wastes energy and water. Currently, there is much focus and emphasis in the physical sciences about sustainable practices and management of the food-water-energy nexus. Studies of nexus issues highlight the numerous interactions or connections between food, water, and energy or a subset of that natural resource triad, i.e., water and energy, energy and food, food and water (Gleick, 1994; Kurian, 2016; Macknick et al., 2012; Scott et al., 2015; Spang et al., 2014). One of the central premises of the nexus is that decisions and actions that affect any one of these natural resources may likely have an effect on the other two (Portney et al., 2017). In regards to food waste, the National Resources Defense Council has stated that significant amounts of freshwater resources, U.S. energy expenditures, and vast amounts of land are used or expended in getting the food from farm to fork (Gunders, 2012).

As stated above, the importance of food waste within a nexus perspective is that when food is wasted, the water and energy used in the process to grow, produce, transport, treat, and dispose of the food is also wasted. These resources are, therefore, better utilized elsewhere. To illustrate, in agriculture, farmers rely on water being pumped to their farms to water crops. Pumping the water requires significant energy resources which necessitates that energy and water be available for use. Farmers also use fertilizers, pesticides and herbicides which require significant amounts of energy to manufacture, transport and disperse on the crops. Inefficiencies with water or energy management may result in inefficient production of food or harvest. Similarly, inefficiencies in the food production process may result in water waste and a surplus of fertilizers, pesticides, and herbicides.

Extant research in nexus and food waste has focused particularly on the relationship between energy losses and food waste. Recent estimates state that 11.9 percent of the National energy budget was spent in the food production process and that an increase of food waste increases energy losses (Canning et al., 2017). In a similar study, Cuéllar and Webber (2010) find that 2030 ± 160 trillion BTU of potential energy were embedded in wasted foods in 2007. Cuéllar and Webber (2010: 6468) further state that the "energy discarded in wasted food is more than the energy available from many popular efficiency and

[1] We recognize, and it is important to note, that we do not imply that organizations waste food without purpose. Instead, retail outlets discard foods as a response to business' perception of consumer demands and preferences. Some of these preferences create an incentive to discard certain foods that will not likely be sold. Similarly, some waste from restaurants comes directly from the consumers in the form of unwanted or unfinished edibles and paper packaging wastes.