



Contents lists available at ScienceDirect

Waste Management

journal homepage: www.elsevier.com/locate/wasman

Food waste management innovations in the foodservice industry

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ARTICLE INFO

Article history:

Received 16 March 2018

Revised 26 June 2018

Accepted 16 July 2018

Keywords:

Food waste

Foodservice industry

Food waste management innovation

Management awareness

Incremental innovation

Radical innovation

Process innovation

Technological innovation

ABSTRACT

There is growing evidence that a significant share of global food is thrown away, with concomitant detrimental repercussions for sustainability. Reducing food waste is a key sustainability challenge for the food service industry. Despite the significance of this issue to the global foodservice industry, the link between innovation practices and food waste management has received limited attention in the academic literature. This paper uses innovation management and social constructionism to investigate interrelationships of food service provisions and innovations in waste management. It is based on the evaluation of food waste solutions and innovations that combine strategic dimensions of waste management with practice-driven initiatives, including incremental (processes and technologies) and radical innovations. The paper presents a range of waste management initiatives, showing that their implementation in the foodservice sector varies depending on management's beliefs, knowledge, goals and actions. The concepts discussed here could help practitioners to become more aware of the factors that drive the adoption of food waste innovations.

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1. Introduction

Food waste is an ecological, economic and social problem. Every year some 1.3 billion tons of food are lost or wasted globally (FAO, 2013), representing a considerable share of the overall food produced (Lundqvist et al., 2008; Parfitt et al., 2010). Food wastage appears to be highest in developed countries (Buzby and Hyman, 2012), while on the other hand, there are an estimated 842 million people in poor countries experiencing chronic hunger (FAO, 2013). This raises the question as to whether food wastage could be reduced along food supply chains (Curtis and Slocum, 2016; Martinez-Sanchez et al., 2016; Muriana, 2017; Wilewska-Bien et al., 2016). In this paper, this is discussed for tourism, as a global food service industry, which is implicated in food consumption and waste generation (Betz et al., 2015). Focus is thus on the significant share of global food that is provided through food services in restaurants, fast food chains, cafés, cafeterias, canteens and dining halls, as well as event catering (Gössling et al., 2011; Hall and Gössling, 2013). The foodservice industry now employs more people than any single other retail business, including 14 million in the USA and 8 million in Europe (Euromonitor International, 2016) and

serves billions of meals every year (Gössling et al., 2011). Therefore, the industry has a critical role in the global food waste challenge.

Food providers in gastronomy, catering and hospitality have recently come under increasing scrutiny over their food management practices, and specifically food waste, with evidence that considerable amounts of food are thrown away during preparation, or because they cannot be stored and reused (Betz et al., 2015; Hall and Gössling, 2013; Silvennoinen et al., 2015). Waste management has thus become a key priority, referring to all the activities related to avoiding, reducing or recycling waste, throughout the production and consumption chain (Papargyropoulou et al., 2016).

While there is a plethora of literature examining the antecedents affecting food waste management decisions (Arvanitoyannis, 2010; Bloom, 2010; Demen Meier et al., 2015; Hall and Gössling, 2013; Siorak et al., 2015), there have been limited investigations into the various practices and stages of waste innovation adoption by food service providers. This paper aims to examine two established theoretical paradigms jointly, facilitating an understanding of not only the several food waste innovations but also managers' propensity to adopt innovation. It is becoming increasingly evident that a waste management program, and especially a waste treatment innovation, that ignores social aspects of management and professional skills, is prone to failure (Heikkilä et al., 2016). This can be a barrier to the effective implementation of food waste innovations. As such, the overall aim of this paper is

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to determine innovative practices for food waste management in the food service sector, as there is limited empirical studies as to how food service firms address innovative management approaches to food waste (for an exception see Heikkilä et al., 2016). The study aims to reach its goal through the following two objectives:

1. Identification of innovative food management practices that contribute to the avoidance (reducing and rethinking), reuse or recycling of food waste in food service establishments.
2. Evaluation of food service manager's perspectives regarding the benefits of various food waste innovations.

In order to explore the innovative management practices for mitigating food waste, a qualitative method was employed in the study. Based on interviews with food service providers in Switzerland, the study offers a discussion of possible management practices in food waste and the range of incremental to radical innovations that can be found in the food sector. Such research is critical to better understanding how waste mitigation can be improved in the food service industry, in the sense that food waste is avoided, and a greater share of food reused or recycled.

2. Theory

2.1. Food waste management

Food waste epitomizes an unsustainable system of food production and consumption. Although food waste is a major global problem, there is not a consistent definition of food waste in the research literature. For the purpose of this study, food waste is defined according to the Food and Agriculture Organization of the United Nations (FAO) as the amount of food wasted in foodservice chains, with 'food' referring to "edible products going to human consumption" (Gustavsson et al., 2011). In food value chains, food can be lost or wasted during acquisition and storage, preparation, during and after serving (plate waste) (Betz et al., 2015). There is little agreement concerning the different categories of food wastage. Silvennoinen et al. (2015) divide food waste between originally edible and originally inedible, the latter referring to for example vegetable peelings, bones and coffee grounds. Beretta et al. (2013), divide food losses in avoidable, partially avoidable and unavoidable. Eriksson et al. (2017) distinguish source reduction (at the production level) and handling or management of "unplanned" food wastes.

Food loss and waste occur at each stage of the global food value chain, from agricultural production to final consumption, or what Papargyropoulou et al. (2014) define as the food waste hierarchy. Food production is linked to land conversion and biodiversity loss, energy consumption and greenhouse gas emissions, water and pesticide use (Cardinale et al., 2012; Tilman et al., 2001). At the post-harvest and processing stages, there is also waste in each step of the transport, storage, processing and distribution stages. Retail represents a considerable amount of waste in the food supply chain (Aiello et al., 2014). Yet, as Filimonau and Gherbin (2017) observe it is not seen as being of critical importance for grocery retailers. At the end of the food supply chain, final consumption including commercial and household accounts for as much as 40% of total food losses (Beretta et al., 2013). Current research on commercial activities focuses on the drivers of food waste generation and management (Betz et al., 2015; Eriksson et al., 2017; Silvennoinen et al., 2015). Finally, recent studies show that in the developed countries food is mainly wasted in the final consumer stage of the supply chain. Hence, extensive research has also addressed the relative importance of consumers' attitudes and

behaviors toward food waste generation (for example Gaiani et al., 2018).

The fact that food waste is perceived as a mounting yet avoidable challenge has driven the United Nations to adopt target 12.3 as part of the 17 Sustainable Development Goals to "by 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses" (UN, 2017). There is some evidence that such goals may be feasible (Beretta et al., 2013), though waste avoidance will be closely interlinked with management and consumption practices. To date, the research has discussed the importance of quantification—measuring food waste in the food supply chain, in order to grasp the real dimension of the problem, to identify the various sources of food waste and to define a baseline to monitor reduction over time (Beretta et al., 2013; Betz et al., 2015; Papargyropoulou et al., 2016; Silvennoinen et al., 2015). Further research is necessary to better define effective managerial solutions for food waste mitigation in foodservice.

2.2. Food waste in the food service industry: Incremental and radical innovations

As a subsector of the food and beverage industry, the foodservice industry includes companies that serve meals for out-of-home consumption. Euromonitor International (2016) considers this to include full-service providers (offer full table service, focus on food rather than beverages), cafés/bars (focus on beverages, offer a variety of snacks), take-away & delivery (eating on site is not possible), fast food (offer quick, standardized food which is ordered, paid for and often served at the counter), self-service cafeterias (located in corporate or school environments and offering a varied menu at a low price point), street stalls and kiosks (small and potentially mobile outdoor or indoor outlets with a limited offer and a low price point), and event catering (temporary off-site catering). Food retailers are not included in the foodservice sector, even though they are increasingly infringing on this segment by offering ready-to-eat meals in addition to food products whose preparation must be finalized by the consumer (Xerfi, 2012).

Food waste management in the foodservice industry is a complex phenomenon and spans a wide range of factors and activities. Yet, studies of food service waste management have not used consistent definitions, with for instance food waste calculations in Switzerland measuring calories (Beretta et al., 2013), while in Sweden, focus has been on weight (e.g. Gustavsson et al., 2011). One comprehensive typology is offered by Papargyropoulou et al. (2014) who grouped food waste into three categories: avoidable food waste, unavoidable food waste and possibly avoidable food waste. Avoidable waste refers to food that could have been eaten at some point prior to being thrown away. Unavoidable food waste refers to the fraction of food that is not usually eaten (for example, banana peels and chicken bones). Possibly avoidable food waste refers to food that is eaten in some situations but not others (for example, potato skins).

While there is good evidence about food waste quantification in foodservice (Betz et al., 2015; Papargyropoulou et al., 2016; Pirani and Arafat, 2016), the literature to date provides little information on how foodservice professionals – rather than academics – define waste and how they approach food waste management practices (Heikkilä et al., 2016). There is limited available data on managerial attitudes to food waste and existing mitigation practices in food service contexts, and existing research often includes other sectors of the food and beverage industry, such as food producers, manufacturers and retailers (see for example Cicatiello et al., 2016; Hyde et al., 2001; Beretta et al., 2013). For example, Filimonau and Gherbin (2017) have clustered managerial approaches to food

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