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## Reduction of food waste generation in the hospitality industry

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## ABSTRACT

In this study, we examined the current status of food waste management in the hospitality sector, taking the United Arab Emirates, in general, and Abu Dhabi, in particular, as examples. We specifically studied the for-profit subdivision of the hospitality sector, comprising primarily of hotels and restaurants. First, we surveyed the management staff of 45 hotels/restaurants, in order to understand how much food waste is generated and how food service operations can impact food waste production within these establishments. Then, we carried out materials flow analyses to investigate how the amounts of food waste generated varied at the different steps of the food service chain, and what factors contributed most significantly to these amounts. Water and carbon footprints of the disposed food waste at some of the events monitored were also calculated for benchmarking. We found that the factors contributing most significantly to food waste generation include serving style and timing, type of food served, and the prediction accuracy of the number of expected customers. To account for the interplay of these various parameters, a performance indicator, named the *FRESH* number, was introduced to rate the sustainability of food service within the hospitality sector. Finally, based on our findings, we recommended a number of minimization strategies for food waste in the hospitality sector. Simple but effective strategies, which involve the cooperation of the hotel/restaurant staff and the guests, can lead to a drastic decrease in global food waste generation.

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## 1. Introduction

The hospitality sector in many parts of the world is expected to see significant rates of growth in the next few years. This is true for the United States (Berman, 2014), European countries (Milburn and Hall, 2014), and the countries of the Gulf Cooperation Council (MeetMiddleEast, 2013). This expansion in hospitality sector operations would lead to an increase in waste generated by the sector. In the hospitality sector, the cost of solid waste includes various factors such as the disposal and transport of waste as well as labor costs (Todd and Hawkins, 2003). Better waste management may therefore lead to significant savings for businesses, with the extent of savings varying depending on the location of the business and the waste management policies in the region where it is located. Other benefits of ecofriendly waste management include an improved business image, reduced carbon emissions from the decreased transportation of waste, and health and safety benefits (Ball and Abou Taleb, 2010).

If current waste management operations are not improved, the increasing amounts of waste generated by the hospitality sector would

lead to a significant increase in the hospitality industry's environmental footprint. In fact, waste generation is considered by some to be the most noticeable effect which the hospitality sector has on the environment (Bohdanowicz, 2005). This, combined with the large amount of food served in the global hospitality sector (e.g. up to one third of all food consumed in Denmark is served within the hospitality sector (Marthinsen et al., 2012)), leads to food waste being a very significant component of hospitality waste, and possibly accounting for more than 50% of it (Curry, 2012). As an example, in the UK alone, 920,000 tons of food is wasted at hospitality and food service sector outlets annually, 75% of which is avoidable (Parfitt et al., 2013).

Food waste is defined as "any by-product or waste product from the production, processing, distribution, and consumption of food" (Okazaki et al., 2008). For the purpose of this study, food waste is characterized as any food discarded as part of the food service process in the hospitality sector. This could be food preparation/processing waste or waste from serving dishes or the guests' plates. In addition, the hospitality sector may be divided into for-profit and not-for-profit establishments. The not-for-profit subsection would typically consist of establishments such as staff canteens and cafeterias at schools and hospitals (Parfitt et al., 2013).

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There are not many scholarly publications available on food waste management in the hospitality sector. Quite a bit of research has been done on food losses in the global food supply but not in global food demand (Bender, 1994). Post-harvest losses should be considered more carefully. For example, a 2013 review paper which accounted for publications from all over the world on food waste prevention in the food supply chain mentioned only one publication about cafeterias in Brazil, two publications about the hospitality sector in general (one with reference to the UK and the other with reference to the Nordic countries), and one publication about hotel restaurants in Norway (Schneider, 2013). However, more literature is available on this topic in the form of reports published by various entities around the world, describing the food waste generated at hospitality sector establishments in certain countries or regions. Some of these studies describe the composition of the food waste in terms of the types of food it consists of (Parfitt et al., 2013) though many of the reports available do not mention the quantities of avoidable food waste (Marthinsen et al., 2012). A recent review which we published on waste management in the hospitality industry in general, and food waste management in that sector in particular, revealed that substantial change in the way food is produced and consumed in the hospitality sector is necessary if the generation of this waste is to be substantially minimized (Pirani and Arafat, 2014). Moreover, effective food waste minimization strategies would mean more lean, cost-effective operations and therefore smaller consumption of food resources.

When considering the current status of food waste management in the United Arab Emirates (UAE) hospitality sector, especially with regards to the Abu Dhabi emirate, it is imperative to discuss the policies which have recently been put into place to minimize this waste generation. The Abu Dhabi Tourism and Cultural Authority (TCA Abu Dhabi) had aimed to reduce the amount of hospitality waste going to landfills by 20% by the end of 2010 as a first step in its environmental program (Bundhun, 2010; Green Hotelier, 2010). Moreover, recently Abu Dhabi's Centre of Waste Management (CWM) implemented an initiative called the Nadafa Program (which means "cleanliness" in Arabic) which was established to monitor and control all waste-related activities for the commercial, industrial, and construction sectors (Ramos, 2011). As part of this program, a tariff system that charges per ton of waste generated in these sectors has been launched, which applies to the hospitality sector as well. In addition, the top 5% of waste producers (each of which generates more than 250 tons of waste per year) have been asked by the CWM to provide a standardized audit report. Most of the hotels we have interacted with as part of this study are in this top 5% category. These establishments may or may not need to pay a penalty in addition to the tariff, and this, along with the amount of the penalty, depends on the performance of the hotel as documented in the audit report (Radan, 2013).

One of the ways to utilize untouched leftover food is to donate it, usually through charities. In the case of the UAE, the Red Crescent Society (RCS) operates the "Hefth Al Ne'ma" program (which means "looking after blessings" in Arabic (Aburawa, 2012)) as a result of which the public can call the Society and schedule a free pick up of untouched leftover food at the conclusion of any large event, such as a wedding. As per the RCS rules, the projected food leftover quantity must be enough to feed at least 50 persons for this service to be requested. The Society then distributes this food to needy families (Todorova, 2010).

## 2. Methodology

This research utilizes multiple qualitative and quantitative tools, including materials flow analysis (MFA), to understand the main

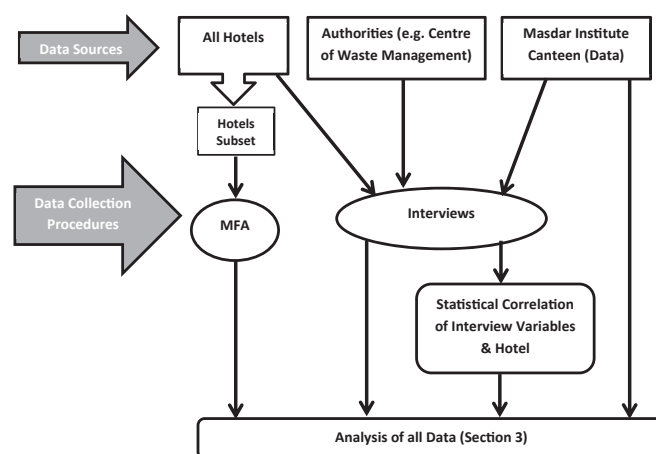


Fig. 1. Methodology for this paper: defining the status quo of the UAE hospitality sector both qualitatively and quantitatively.

drives and pathways for food waste generation in the hospitality sector and to quantify this waste through the food service chain. The methodology for this paper is summarized in Fig. 1. For the sake of this study, by hospitality sector, the establishments being referred to are the hotels, restaurants, and cafeterias which operate on a for-profit basis. We have also included in our study other organizations such as the local waste management authority which, though not a part of the hospitality sector *per se*, influence the food waste management decisions made by the hospitality sector. As a result, all relevant stakeholders in the issue of food waste management for the hospitality sector have been considered.

Although the data presented in this work has been collected in the UAE, the data collection procedures and the research methodology, especially with regards to the quantitative data, were designed with global applicability in mind. Moreover, this study reflects on the particular attributes of certain events, therefore making the relevant connections between those attributes and the waste generated. This helped in the realization of the strategies to be implemented to minimize the food waste generated in the hospitality sector. These strategies are also mentioned as part of this work and are currently being tested as part of the next phase of this research.

The hotels which we worked with as part of this study were chosen to represent a spectrum of hospitality sector properties

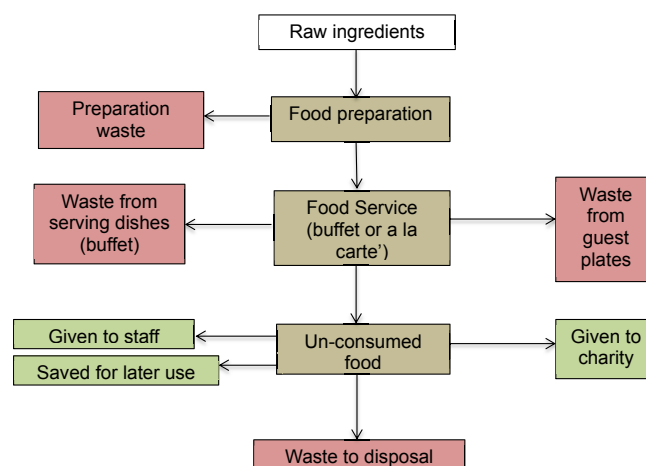


Fig. 2. Depiction of material flow in food service process.

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