case study competition winner—second place

Food Waste Management: Does information technology matter in food waste?

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Introduction

The increasing and alarming scale of global food waste requires greater attention due to its social and environmental impact (Papargyropoulou et al., 2014). According to a food waste report from Statista (2017), in 2017 the largest global contributor of food waste was the United States, accounting for more than 90,767.6 million kilograms [200,108.3 million lb] per year. The National Resource Defense Council states that more than 40% of all food produced in the U.S. goes to waste, and food production uses about one quarter of the country's fresh water, not to mention all other types of energy used in this process (Palmer, 2017). Other countries included in the top five based on the amount of food waste are India (67,693 million kilograms [149,237.5 million lb] per year), China (61,107 million kilograms [149,237.5 million lb] per year), Japan (19,874 million kilograms [43,814.7 million lb] per year), and Mexico (18,427 million kilograms [40,624.6 million lb] per year) (Statista, 2017).

In 2017, Mexico wasted about 57% of all produced and/or purchased cows' milk (4590.19 tons [10,119,636.7 lb]), 54% of mangos and avocados (468.57 ton [1,033,020 lb] and 312.81 ton [689,628 lb] respectively), and 47% of rice (249.37 ton [549,766.7 lb]) (Lucas, 2018). Until recently, the Mexican government's Ministry of Environment and Natural Resources (SEMARNAT) has collaborated with a work group of world renowned specialists and policymakers, with support from the World Bank and the Waste and Resources Action Programme (WRAP), to design guidelines to counteract this problem (FAO, 2018). Nevertheless, since there is no federal ruling concerning food waste, several cities have implemented some minor administrative measures regarding this issue. Mexico City's government implemented a new policy to separate household waste into three categories: recyclable inorganic waste, unrecyclable inorganic waste, and organic waste. The norm was first announced in 2013, but not slated to come into effect until 2017 (Mexico News Daily, 2017). Other cities have adopted similar or different policies with less impact. It has been calculated that all the food wasted in Mexico could feed up to 7.3 million people; a total of 12.3 million people live under extreme poverty conditions (Lucas, 2018).

The hospitality industry is one of the largest contributors to the food waste problem through its consumption of energy, water, and non-durable products that affect the environment compared to other industries of similar size (Robinot, 2010). In Latin America, the average food waste per capita is about 0.87 kilograms [1.92 lb] per day, more than the worldwide average of 0.74 kilograms [1.63 lb]. In some territories, such as the U.S. Virgin Islands, the average food waste per capita increases to 4.46 kilograms [9.83 lb] per day (Kasa et. al, 2018). Such a high "amount of food waste per capita is due to the fact that many people live in a very small space and due to the existence of commercial activities and tourism" (BBC World, 2018).

Food waste in the hospitality industry is under-researched, with most studies approaching the issue from a sustainable agriculture and environmental approach rather than a managerial approach (Filimonau & De Coteau, 2019). Researchers tend to focus on household and retail food waste to inform national and local waste management policy (Parizeau et al., 2015; WRAP, 2013). Recent available literature highlights the need to move food waste research outside the household context and consider the entire food supply chain (Beretta et al., 2013; Mena et al., 2014), the hospitality sector (Pirani & Arafat, 2015), canteens in workplaces (Goggins & Rau, 2015), employee motivational factors toward food waste (Goh & Jie, 2019), and innovations in food waste management in the food service industry (Martin-Rios et al., 2018). Therefore, it is important to contribute more to the research on food waste in the hospitality industry given the void in the academic literature (Garrone et al., 2014) and the critical importance assigned to this topic by the United Nations Development Goals (Browne, 2017).

While information technology (IT) has been credited with the ability to reduce food waste in several ways (Faucheux & Nicolaï, 2011), many hotels still struggle with the decision on whether to use environmental technologies in their operations. Chen et al. (2018) studied potential barriers to the adoption of environmental technologies used in Hong Kong hotels. Using data collected via in-depth semi structured interviews with senior hotel professionals including general managers, financial controllers, directors of engineering departments, and environmental management system managers, the researchers found that these barriers can be grouped into three categories: (1) product-related barriers, (2) external barriers, and (3) internal barriers. Once the barriers are overcome, several models can be used to explain technology acceptance. The technology acceptance model (TAM) proposed by Davis (1989) includes two main components: perceived ease of use and perceived usefulness. Later, TAM evolved into the unified theory of acceptance and

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use of technology (UTAUT), using four main components: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). The use of any of these models can help to determine the level of technology acceptance.

This case study sheds light on some of the potential questions that should be addressed, and provides solutions, including those involving technology, that can be used in order to address the important issue of food waste in the hospitality industry.

Bckground

Business Introduction

Casa Basalto is an affordable luxury sustainable boutique hotel located in Pachuca in the state of Hidalgo, Mexico. Its main mission is to provide high-quality service with a low ecological footprint, translating savings into affordable prices. The hotel building is owned by a local family. It is the first sustainable hotel in the region, making a unique and groundbreaking point in the hospitality industry of that area. The hotel has 25 suites plus a presidential suite. All rooms are fully furnished with comfortable premium bedding; organic linens, towels and pillows; 32" flat-screen LED TV with satellite channels; coffee and tea maker; refrigerator; in-room safe; and private bathroom.

Dolina, Casa Basalto's restaurant, specializes in Mexican cuisine and serves breakfast, lunch, and dinner daily from 7 am until 10 pm. On Fridays and Saturdays, the restaurant is open until 12 pm. Dolina's menu is season-based; thus, it changes with seasonality and supply of local produce. All dishes are a modern interpretation of traditional and regional recipes. The restaurant has 21 tables and can seat up to 70 people. On average, Dolina serves 120 customers every day, of whom approximately 80% are locals and 20% are hotel guests. The busiest time at the restaurant is during breakfast from 8 am to 11 am, and then during dinner from 7 pm to 10 pm. All the food served in the restaurant follows a strict hygienic process, starting from carefully selecting the suppliers, to the delivery of the ingredients, and the food processing. A children's menu is also available. Happy hour is offered during weekdays from 6 to 8 pm. Dolina Restaurant also offers food services in Casa Basalto's event rooms and rooftop, catering for 5–7 events weekly and serving from 20 to 70 people per event. Finally, they also offer catering services to parties of 50 to 300 people, serving approximately 700 customers per month.

The building is utilized as follows:
- Basement floor: hotel and restaurant parking.
- Ground floor:
  - hotel's multiple spaces – front desk, concierge, transportation services, security, lobby, business center, and management offices;
  - restaurant spaces – bar, dining, kitchen, and public bathrooms.
- 1st–3rd floors: hotel guest suites and presidential suite.
- 4th floor: event rooms and rooftop.

Main sustainable practices

Based on the business mission, which highlights a low ecological footprint, both the hotel and the restaurant exercise several green practices, including those described below.

Energy and emissions
- The hotel produces 90% of its energy consumption with solar panels; this will be 100% after the installation of an Eolic turbine in 2020.
- The entire building has LED lights.
- Occupancy sensors are installed in the entire building.
- The hotel maximizes the use of daylight and minimizes the use of artificial lighting during the day.
- The hotel employs an energy management system that includes keycard master switches that control lights, electronics, and blinds in the hotel rooms.
- Operation of the hotel's heating and cooling systems does not require damaging chemicals. The building is bioclimatic, which means that natural ventilation is enhanced to regulate the temperature. In the case of the cooling system, the rooms have water-based cooling systems that only require electricity consumption.
- The hotel features double shield windows with window film to lower heating and cooling loads and to reduce glare in guest rooms.

Water
- The hotel has low-flow showers, sink aerators, low-flush double toilets, and dry urinals.
- The hotel has a solar panel water heating system.
- The hotel uses water filtering and softening technology in the entire building, so that water can be used for human consumption.
- The hotel captures, treats and recycles rainwater.
- A campaign to reduce water waste in showers and sinks is permanently employed throughout the entire building.
- The hotel has a permanent towel and linen reuse program.
- Waste-water is properly treated through the municipal sewage system.

Hotel purchases
- The hotel has a green, nontoxic and biodegradable purchasing policy for cleaners, sanitizers, paints and office supplies.
- Only low volatile organic compound paint, sealant, primers, and adhesives are used in the property.
- The hotel purchases environmentally friendly paper (copier paper, toilet paper, paper towels) made with 100% recycled content and without the use of toxic chemicals, such as chlorine or mercury; paper is guaranteed to contain no fiber from endangered forests and is lightweight.

- The hotel maintains a strict policy to minimize the amount of paper used by each guest and in the office.
- All guest amenities are organic and biodegradable.
- All furniture is locally produced with environmentally friendly high-quality materials and sources of wood.
- Dry cleaning services use nontoxic, biodegradable dry cleaning substitutes.
- The hotel only buys nontoxic, biodegradable cleaning, laundry and dishwashing products.
- The hotel uses a cloud-based property management system (PMS), allowing for energy savings.

Food services
- All food products sold at the restaurant are organic and locally grown.
- The restaurant follows a strict supplier environmental assessment program that sets the rules to become a supplier.
- The hotel hosts an in-house organic garden to provide fresh produce to the restaurant guests.
- The restaurant uses avocado-seed straws and natural biodegradable take-away containers.
- The restaurant follows a waste separation policy.
- A tablet point of sale (POS) system is used in the restaurant, allowing energy and efficiency gains.

Management of the hotel

The hotel is managed by three main bodies: shareholders' assembly, board of directors, and general manager.

Shareholders' Assembly. The shareholders' assembly is the main body in the organizational structure of the company. This body elects the board of directors and the chief executive officer (CEO). They approve budgets and make important financial decisions.

Board of Directors. The board of directors oversees the activities of the company. It is composed of both family and non-family members. The CEO is the president of the board of directors, which also comprises the general manager of the property, the general accountant, the food and beverage manager, the marketing manager, and at least one non-shareholder family member. The board operates the property and makes daily operational decisions.

General Manager. The general manager is responsible for all employees and operations in the building. In agreement with the CEO, this position is responsible for establishing and implementing goals. A productivity bonus is paid to the general manager if improvement in operational performance generates financial gains.

Problem Statement

Dolina, Casa Basalto's restaurant, has not been using any system to address food waste, but is looking to implement new technology in food waste prevention and management. Currently, the hotel only separates waste into six different categories (organic, inorganic, plastic, glass, paper, and metal), but there is no specific measurement or tracking of waste. Specifically, 60% of the total waste generated by Dolina is food waste (see Figure 1).

How does Dolina currently approach food waste?

Employees receive basic training about sustainability as a part of their introductory training courses. This training has three modules: 1) definitions of the key terms in sustainability, 2) bioclimatic architecture, and 3) green practices. Although some green practices are covered in the course, food waste management is not, since there is no formal approach to this issue. Restaurant employees are only asked to separate waste and are responsible for keeping the trash area clean and organized according to the separation rules. The maintenance representative is responsible for delivering waste to the municipal waste collection system and signs every time they collect trash (twice a week). Then all disposals are sent to either recycling centers or to landfills. The restaurant intends to implement a detailed report book in the near future, since the hotel is trying to obtain a green certification.

Waste reduction has not received top priority at the departmental

Figure 1

Distribution of Waste by Category
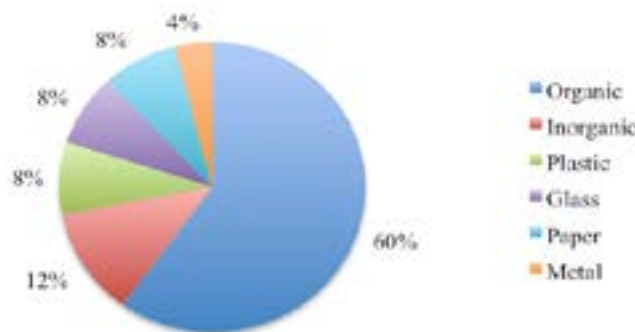
Source: Casa Basalto's Waste Report

meetings. The meetings have only covered the high costs related to waste collection, and some issues regarding employees not separating waste correctly. Recently, the CEO noticed the previous year's food waste trend and expressed his alarm that the biggest contributor of waste was food. The board calculated the value of all food wasted in one year and discovered that it exceeds $1,500,000 USD. At the same time, CEO is worried about the negative effects that the food waste problem might have on the brand image.

The proposed solution

In an effort to solve the food waste problem, the general manager of the property found new technology called Leanpath. This new information technology based system (ITBS) offers food waste prevention solutions for various food service settings. The Leanpath food waste prevention platform is a hardware and software package that allows kitchens to track, analyze and understand their food waste stream as illustrated in Figure 2. The technology tools actually drive behavior change, the only way to ensure lasting food waste prevention. Insights gleaned from the food waste tracking, along with Leanpath's expert training and coaching, allow foodservice staff to make important and informed operational changes that prevent food waste from happening to begin with. (A. Smith, personal communication, July 11, 2019)

It allows users to track food waste in a simple way because of its friendly interface. The main components of this system are a camera, a touchscreen, a user interface and some weights that are all connected to a cloud-based platform that creates estimates and plans to prevent waste and increase savings. The camera captures the food production process in pictures and zooms in on the images to review the amount of waste the restaurant is producing, which helps managers to gain valuable information in order to make decisions before the food is wasted. An alert system also helps users to prevent waste by using food in other ways or dishes. This technology enables employees to be aware of the amount of food that is wasted and helps them to create a no waste culture. Furthermore, the system helps users to track food waste in ways other systems cannot because of its real life photos, its information producing value, and environmental consciousness.

Leanpath achieves these results because it focus on food waste "prevention." Food waste prevention is the only strategy that stops waste from happening to begin with. While diversion to compost or donations have their place, they only deal with food waste after it is created, after users incurred the cost, and after it's had substantial environmental impact. Prevention gives the largest financial and environmental benefit of any solution. (A. Smith, personal communication, July 11, 2019)

Operationally, employees will need to weigh, take a photo, and complete information required by the interface about all the products that arrive at the restaurant. More specifically, after proper hygienic procedures, all received food needs to be weighed and photographed. Every time something is sent to the trashcan, it needs to be photographed and weighed. Whenever a product is about to expire, a notification is sent to the manager in order to act on this event. At the same time, managers and employees can see the amount of waste and products that are about to expire on the interface display in real time.

The general manager, Ms. Soto, approached the board of directors to request approval to purchase this system in order to reduce food waste, and increase savings and profits. However, the board of directors was not convinced by the information provided; they did not believe that implementation of the system would reduce food waste. The board considers the system too expensive and that it will not provide a return on investment, that employees will not use it correctly, and that there are other less expensive ways to achieve food waste reduction. Therefore, they hire you as a consultant to help them decide whether the restaurant should use

Figure 2

Photograph of the Proposed Solution

this new system. They require you to provide in-depth justifications for your solution. You are asked to make a presentation to the board of directors about your findings and submit a brief summary of your research, which will be presented to the shareholders' assembly.

Discussion Questions

- Do you think there is a problem with food waste in the hotel and/or restaurant? Why or why not?
- Do you believe a food waste problem might affect the brand? Why or why not?
- What would you suggest the board of directors do in order to reduce food waste?
- Would you suggest the adoption of an ITBS? Why or why not?
- Why do you think the board of directors is afraid to adopt this technology?
- How would adoption of an ITBS impact the restaurant's operations?
- Are there implications for the customer experience if an ITBS is adopted?
- Give an example of a real life ITBS (other than Leanpath) that helps to prevent waste and explain its main characteristics.
- Describe the pros and cons of using the specific technology that you found to manage food waste.
- Can you suggest another way to reduce the restaurant's food waste?

Additional Readings

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