



Evaluating materiality in food waste reduction interventions

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ABSTRACT

This paper assesses how interventions utilising material apparatus can drive food waste reduction in professional kitchens. Using non-participant observation and interviews, this study evaluated work-based experiments to cut waste in luxury hotels. The paper focuses on the impacts of one specific intervention: the introduction of small, transparent food waste bins, positioned at each food preparation station. The findings examine how the material properties of these apparatus, including size, calibration and transparency, coupled with their location, shaped chefs' food waste related practices. Moreover, the findings show how chefs' organisational and occupational norms interact with the influence exerted by utensils to create new meanings and assign value to food, waste and the craft skills used to reduce it.

1. Introduction

Food waste continues to pose significant financial, ecological and moral challenges for the tourism and hospitality sectors (Filimonau & Coteau, 2019). Practitioners and policy makers demand effective food waste reduction strategies, which requires researchers to understand how specific interventions help enact change (Dhir, Talwar, Kaur, & Malibari, 2020). Previous studies have highlighted the influence of materiality in food-waste generation and reduction, but much of this research has focused on consumer practices (e.g. Dolnicar & Juvan, 2019). In contrast, this paper examines intersections of food waste and materiality by focusing on the potential role of work-based utensils within producers' practices. Adopting a practice theory perspective (Shove, Pantzar, & Watson, 2012), this study responds to recent calls to: a) understand the socio-material processes through which waste-related practices become embedded in work routines; b) appreciate how context-specific, socio-material interventions translate into professional practices; and c) focus on kitchen staff (as opposed to customers or managers) (cf. Dhir et al., 2020; Hennchen, 2019). The study thus contributes to knowledge by showing how material apparatus interact with chefs' organisational and occupational routines and knowledge to perpetuate food waste whilst also demonstrating how these interactions can drive change. More specifically, the data help to appreciate the processes through which material properties of an interventional 'device', food-bins, including the size,

calibration, transparency and location, transform the working practices of kitchen professionals.

Focusing on social practices as the 'unit of analysis' (Hennchen, 2019), the study was conducted at three 5-star hotel operations, which were part of an international group: two in the United Kingdom (U.K.) and one in Germany. The sample operational units were purposefully selected because various food waste reduction interventions were trialled in them. This note focuses on one unique intervention at one of the U.K. units.

Analogous to other research on food waste practices and materiality (cf. Hennchen, 2019), the study combined multiple methods to generate context-sensitive insights into hotel kitchen operations. Evaluation of documented procedures and non-participant observation of production areas complemented interviews with 16 purposively selected staff who handled food or influenced food waste behaviours. The practical intervention involved altering a specific material element within the hotel's restaurant operations: the food waste collection bins. In consultation with the sustainability team, the existing large food waste collection bins (Fig. 1) were replaced with small, transparent 20-l tubs (Fig. 2) for three months. The objective was to record and evaluate how this intervention influenced staff practices.

2. Findings

Food waste for the breakfast buffet was initially 500 g/cover, declining 44% by week 2 to 283 g, and by the last week of tracking it was 133 g

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Fig. 1. Food waste collection bins normally used at the case study hotel.

(a reduction of 73% compared to the start). Tracking in the a-la-carte restaurant yielded similar results. Waste was 413 g/cover at the start, initially declining 38% to 258 g, and to 125 g by the end (70% lower compared to the start). Beyond the numbers, it was important for us to understand *how* and *why* these socio-material interventions influenced chefs' practices.

The introduction of the new apparatus evoked immediate reactions. Observations in the kitchens and conversations with chefs conveyed that many 'welcomed' the new bins as they were 'a lot easier to clean', while others rejected them as impractical owing to limited space in the kitchen. Some chefs initially expressed confusion about how these were to be used. At this stage, the influence of the bins was made apparent to and mobilised among the kitchen team by colleagues, i.e. human actors. Staff briefings were used to highlight the importance of waste separation and to reinforce the compulsory use of the new bins. Effective waste separation relied on the actions of practitioners as well as the accessibility and functionality of the bins. The primary data revealed that three physical attributes of the bin: size, material and calibration directly intersected with operational practices. Furthermore, a spatial factor, the bin's location also exerted influence.

2.1. Size

Previously, food waste arising at all the kitchen workstations was disposed in the same large bin and hence waste was collected at an aggregate level. Consequently, it was difficult to identify specific areas, practices or behaviours that contributed to wastage. The large bins implicitly normalised wastage by signalling the quantity of waste that was expected (or even accepted). Respondents argued that they effectively 'hid' food waste. The new bins had the opposite effect.

"Whereas these great big giant bins, you can throw as much in and you can't see it [the amount of food inside]." (Junior Sous Chef).

"That is actually a better idea to have a bin that is small so you can actually see what's in it." (Director of Finance).

The small size of the new bin made discarded food items visible. This represented a direct interaction between two material components of food-waste generation practices: the bin and discarded food products. Interestingly, this material-to-material interaction influenced human actors, sensitising chefs towards the quantities of food disposed as waste. The bin's limited capacity required the contents to be emptied into a larger

bin more frequently. One material apparatus (small bin) relied on another, related one (large bin) for its functionality. Moreover, the qualities of the utensil actively changed chefs' practices. Many respondents resented having to empty new bins regularly. Arguably, their concerns were partly driven by the fact that transferring waste from the small to the large bin was visible to others, amplifying normative pressures to prevent waste.

2.2. Calibration

Sensitivity towards food waste was further amplified by the new bins' calibration. A junior sous chef observed:

"It's different to having a little tub that you can see, it is clearly labelled 20 litres and when it fills up – oh God, I got to get another one and oh my God! I have gone through four of these in a day, yeah it definitely makes people more aware."

With the calibration, the volume of contents inside the bins was clearly discernible. The calibrations thus became an implicit coded signal between human actors and material apparatus: food waste reflected a chef's technical skills and professional capacity to be efficient. The meanings and implications of these signals became meaningful in that particular social context, based on the norms and social practices of the occupational community. The bins thus made food waste subject to surveillance among practitioners who assigned new meanings and value to its significance.

2.3. Material qualities

The new bins were made of transparent plastic. This property of the utensil was perceived differently by respondents. Some expressed concern that they were not as durable as the old ones; others lauded them for being 'dishwasher-safe'. From a food waste perspective, transparent bins helped chefs to identify the amount and the types of food being disposed. This prompted chefs to target specific food products that were more prone to wastage. The bin's material character also altered interactions between practitioners. A sous chef noted:

"...It's useful in that sense because waste is visible. It's allowed them to have the opportunity – if someone is wasting food, it's very visual for them to jump and correct. I like the idea of the clear bins, because you can see what's in it. That's proved evident!"



Fig. 2. Food waste collection bins used during the study.

Moreover, making food waste visible further strengthened normative pressures to minimise it. Respondents sensed that wasting food might result in negative social outcomes, such as disapproval.

2.4. Location

The small size of the bins required one to be placed in each operational section of the kitchen. This ensured easy access to them and minimised disruptions to everyday operations. Many welcomed them because they prompted greater awareness of waste:

“Really it's like an eye opener. Before, we knew there is a lot of wastage. We never realised, we thought always there is a waste, but when we start measuring, we realised, really it's like ...really! This much waste!” (Assistant Head Chef).

“I am certainly more aware of it [need for waste prevention], yeah...before it wasn't there, I would throw away a little bit, but, yeah, consciousness, now there is...consciousness about it.”(Food & Beverage Manager).

Respondents felt that food waste produced in their section became clearly visible, identifiable and easily attributable to their own work practices. Therefore, they could be directly held accountable and questioned about waste arising in their work area:

“There was this one day when I went in there and there was a load of tomato tops that they had been slicing, and I did say to them - you know, you can take another one or two slices off each.” (Sous Chef).

3. Conclusions

This study contributes to knowledge by helping to understand the processes through which materiality-driven interventions intersect with kitchen professionals' practices to support food waste reduction. Specific properties of the intervention 'device', including its small size, explicit calibration, and transparency, coupled with its visible location in the kitchen, were shown to encode and signal value-laden messages regarding chefs' choices and abilities. Moreover, these signals were interpreted and made meaningful through chefs' occupationally defined professional knowledge and notions of identity. These insights respond directly to Dhir et al. (2020) and Hennchen's (2019) calls to understand the processes through which socio-material practices among professional kitchen staff translate into waste reduction initiatives. The data show *how* and *why* sustainable waste reduction interventions can utilise a network of actors, material apparatus and their interactions, while stressing the need to appreciate the organisational and occupational dimensions of practices. Beyond this empirical context, the findings stress the potential of focusing on materiality in studying work(place)-related practices more generally and waste reduction interventions specifically. Existing literature provides limited information about the processes through which materiality exerts influence within production practices in tourism and hospitality. This paper begins to address this knowledge gap by showing how material apparatus are embedded in professionally codified interactions among practitioners.

Future research can examine the functional relationship between material utensils, evaluating how they affirm or transform the capacity of other material, non-human elements' interactions. For example, in this research

the size and positioning of the smaller bins in relation to larger ones reinforced the influence of the former. Moreover, subsequent studies can examine how professional norms are constructed and performed between actors in context. In the present study, this emerged as waste creation was interpreted and evaluated in relation to organisationally and occupationally defined norms and social practices. Future research can evaluate further interactions between practitioners and their workplace materiality, with particular reference to how meanings associated with their shared practices are interpreted and assigned value. Studies of food waste in particular can advance these lines of enquiry by examining the capacity of the material environment and apparatus to shape practices among professional actors by either disrupting existing practices or creating new ones.

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Author contribution statement

Gaurav Chawla: Conceptualization, Methodology, Investigation, Formal analysis, Writing - original draft, Visualization, Project administration. Peter Lugosi: Conceptualization, Methodology, Formal analysis, Writing - original draft, Visualization, Supervision. Rebecca Hawkins: Conceptualization, Methodology, Formal analysis, Writing - review & editing, Supervision.

Declaration of Competing Interest

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