

## **From Food Waste to Business Efficiency: Investigating the Causes and Reduction of Cooked Food Waste in Indian Restaurants**

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### **ABSTRACT**

*The waste from cooked food is one of the least visible costs of running a restaurant. When we discard food at the end of a meal, we are wasting much more than losing something of value. This is because, unlike raw stock, prepared food has been bought, made and heated using ingredients, labour and energy. This second research examines why cooked food is wasted in restaurants and what does the evidence show about reducing it and in particular Indian restaurants. It compiles peer-reviewed studies, institutional reports and case documentation, it uses the IKEA Food programme with Leanpath, including IKEA Lyssach case in Switzerland, as an applied example. The causes have been grouped into one of six categories: production planning, menu/portion design, service format, customer behaviour, staff practice, measurement absent. Reported reductions in case material range from about thirty percent to fifty percent. A study of 114 restaurants found an average saving of seven dollars per dollar invested. Due to a scarcity of compelling evidence from Indian restaurants, the paper sets out practical steps and proposes. The main position is that measuring cooked food waste converts cooked food waste into an operating variable that is controllable by management.*

**Keywords:** Cooked Food Waste; Restaurant Management; Indian Restaurants; Operational Efficiency; Leanpath; IKEA Food; Food Waste Prevention

### **1. Introduction**

Food waste, once seen as a matter for environmental agencies, has become a management issue with a financial dimension. In 2022, the world wasted 1.05 billion tonnes of food, approximately 19 percent of the food available to consumers, a UN agency estimated. In 2024, UNEP reporting showed that the household accounted for 631 million tonnes, food service for 290 million tonnes and retail for 131 million tonnes. The UNEP Food Waste Index 2024 provides India with a solid estimate for waste at home. As for national-level food-service waste estimates, comparable estimates are rather limited (UNEP, 2024) Food service, which consists of restaurants, therefore,

accounts for just over a quarter of the total globally, and it is the part which a business rather than a household chooses how much food to make.

Food waste of the cooked variety must be considered separately in this sector. Unused raw ingredients can often be stored or returned or incorporated into other dishes. There is some in the cooking. Food safety rules restrict how long food can be held, after preparation, at serving temperature. Thus, anything left at the end of service is usually thrown away. The expense also extends past what's inside. Not only that, but the time spent using fuel, electricity, and maintaining the kitchen is also wasted. A restaurant operating on tight margins throws away a kilogram of cooked food paying a cost for which they earn nothing.

The situation within India's restaurant industry makes it urgent. For the past ten years, I've been eating Indian food. One roadside dhaba has been my go-to stop. Numerous establishments have extensive menus, and many operate within a cultural context where generous servings are regarded as hospitable. These circumstances may promote creating more than will be sold. At the same time, there are few studies on food waste in Indian restaurants. According to Bharucha (2018), managers of restaurants in Mumbai encountered real issues in reducing and managing waste. However, this aspect of the literature on hospitality food waste has been generated mostly on other settings (Dhir et al., 2020; Filimonau & De Coteau, 2019).

This paper aims to fill the gap through secondary research. This company asks three questions. What leads to the wastage of cooked food in restaurants, and which causes are likely to matter in India? What types of interventions reduce the effects of witnesses and victims, and what do they do for cost and efficiency? What does the IKEA possible case discuss about IKEA food supported by Leanpath IKEA Lyssach, and how does reduction work in practice, and can it be transferred to Indian restaurants?

## **2. Research Method**

This study is a secondary research paper and does not collect any new data. The logic of the integrative literature review is followed. This review is sensible for topics where studies use quite different methods and where the wish is not to pool statistics but build a framework (Snyder, 2019). Likewise borrowing from evidence-informed management, review asks that sources be openly chosen and weighed for strength (Tranfield et al., 2003).

Three types of sources were used: peer-reviewed studies on hospitality and food service published in academic journals; institutional reports from bodies such as the United Nations Environment Programme and Champions 12.3; and published case documentation from IKEA, the Food Loss and Waste Protocol and Leanpath. If a source dealt with one of these settings or reported a measured result from a prevention programme it was included. The groupings of

categories of causes; intervention versus causes; and case results with one another. Allegations about India are classified as inference when there is no direct evidence.

The involved companies provided material that relates to Leanpath and IKEA. According to the Food Loss and Waste Protocol case notes, IKEA's data were prepared with the assistance of two leading quantification firms, although they were not audited by independent third party (Food Loss and Waste Protocol, n.d.). As a result, the findings are considered credible indications of what is achievable, rather than verified averages.

### **3. Conceptual Background**

#### **3.1 Defining cooked food waste**

Variations in definitions of food waste affect measurements of food waste. Food and agriculture organization work separates food loss, primarily occurring during production and post-harvest, from food waste happening at retail and consumption stages (Gustavsson et al., 2011). Scholarly investigations also diverge regarding the classification of inedible components, such as bones and peels were they brought as waste. UNEP Index includes both (UNEP, 2024). A useful definition for restaurants is that any food that was bought or prepared for a guest, and not eaten due to being thrown away in the kitchen or on the plate is wastage.

Within the restaurant, waste is usually categorized by stage. The authors Papargyropoulou et al. (2016) differentiate between pre-consumption waste, from storage, preparation and cooking, and post-consumption waste at table or buffet. Waste categorized as 'cooked food' includes surplus food made but not served, food that is served but not eaten, and food held too long to sell safely. The reasons and solutions vary among these phases.

#### **3.2 The food waste hierarchy and lean thinking**

The analysis is guided by two frameworks. The food waste hierarchy ranks responses from outcome prevention through reuse and redistribution to recycling and energy recovery with disposal at the bottom (Papargyropoulou et al., 2014). Making compost out of food, or converting the food into biogas is better than sending it to the landfill. But the food was made, and not eaten, and that, it is the article here. Preventing damage saves the materials and the work that goes into them.

Management logic is provided by Lean thinking. It identifies as waste any activity or material that does not add value to the customer and recommends measuring the process before improving it (Womack & Jones, 2003). Food that is cooked and not consumed is a straightforward case, as it generates no income owing to its cost. When viewed in this manner,

food waste becomes an operational inefficiency, and the methods used for inventory and defects can also be used for food waste.

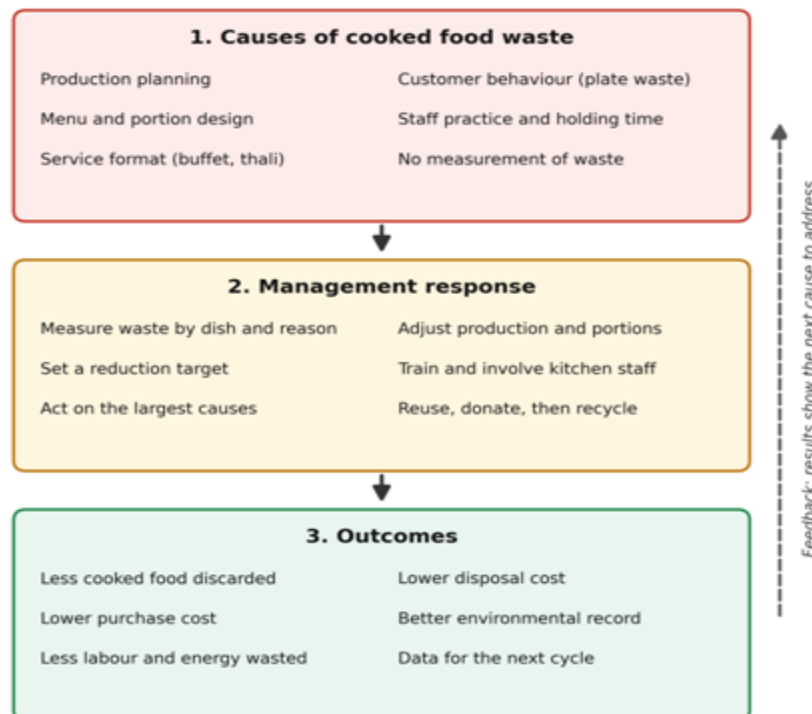
### 3.3 Evidence from hospitality research

The hospitality literature reviews indicate that it is a growing field but not even. Dhir et al. (2020) proposed a framework for further work. On the other hand, Filimonau and De Coteau (2020) stressed management practice and staff behaviour as well as technology. Pirani and Arafat (2016) found that waste is produced at every level from purchasing through to consumption thus the reduction must tackle several levels together. As per Martin-Rios et al. (2018), technical tools work best if kitchens also change their routines.

### 3.4 Framework for the analysis

Figure 1 brings together the two frameworks and hospitality evidence. The causes of waste in the kitchen and dining room lead to a management response (measure, target, act) which feeds into the next cycle as a result. The following sections are structured as follows: Section 4 investigates the causes, Section 5 the response and its financial return, Section 6 the IKEA outcomes.

**Figure 1 Conceptual framework linking causes of cooked food waste, management response and outcomes**



#### 4. Causes of Cooked Food Waste in Restaurants

Various countries studies suggest similar broad causes, though their weight varies by restaurant type. According to Table 1, they are grouped into six categories. The categories interact; a large menu, for instance, makes forecasting harder and so increases overproduction.

**Table 1 Causes of cooked food waste in restaurants and supporting evidence**

| Cause category                  | How it leads to cooked food waste                                                                 | Supporting sources                                      |
|---------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Production planning             | Food is cooked in larger quantities or earlier than demand requires, and leftovers are discarded. | Heikkilä et al. (2016); Betz et al. (2015)              |
| Menu and portion design         | Large menus increase unsold dishes; large default portions increase food left on the plate.       | Kallbekken & Sælen (2013); Pirani & Arafat (2016)       |
| Service format                  | Buffets and banquets must show full trays throughout service, so surplus is built in.             | Papargyropoulou et al. (2016)                           |
| Customer behaviour              | Guests over-order, over-serve or leave disliked items, producing plate waste.                     | Peters (2017); Kallbekken & Sælen (2013)                |
| Staff practice and holding time | Untrained staff over-batch; safety limits on holding time turn early batches into waste.          | Filimonau & De Coteau (2020); Martin-Rios et al. (2018) |
| Absence of measurement          | Waste is not weighed or recorded, so size, source and progress are unknown.                       | Leanpath (n.d.); Leanpath (2018); Bharucha (2018)       |

##### 4.1 Production planning and overproduction

When restaurants prepare more food than what customers order, it directly leads to food wastage. Heikkilä et al. (2016) noted that production planning along with serving and customer-related factors determined the amount of food leftover in food service, while Betz et al. (2015) documented the amount of waste as well as the potential for reduction of waste in Swiss food service. There is a valid reason for overproduction. A kitchen runs the risk of missing out on valuable sales if they run out of a dish. As such, the cook will keep extras prepared. Without clear records of what's left, the habit continues.

#### **4.2 Menu and portion design**

The larger the menu, the higher the number of items prepared in advance and possibly wasted. Guests tend to leave more food if there is a large default portion. For this reason, the portion reduction and the use of smaller plates are among the most widely tested interventions (Kallbekken & Sælen, 2013). In India, the meal is often accompanied by a number of things which are served together. Therefore, the portion decisions apply to everything on the plate or the tray.

#### **4.3 Service format**

It is difficult to manage buffets and banquets as the food must be visible in quantity throughout the service, and a half-empty tray is often viewed as a service failure. According to Papargyropoulou et al. (2016), buffet-style service is one of the contexts where surplus and plate waste is expected to be high. Indian thali, buffet; and banquet formats fit the bill, although not measured directly.

#### **4.4 Customer behaviour**

The tendency of guests to order more than they can eat and take large helpings from the buffet and leave aside whatever does not suit their taste. The share of post-consumption waste can be very large in a self-service setting, as IKEA estimated that plate waste generated approx. half of their total food waste (Peters, 2017).

#### **4.5 Staff practice and holding time**

Inside the world of a commercial kitchen, many decisions are made - how much to cook per batch, when to refill a tray, how long to hold a dish, etc. When employees lack training in regard to their decisions, or are informed on how much waste is produced, they default to being conservative. Food safety regulations restrict how long cooked food can be held, so a batch made too early can become waste even if never served. If the kitchen is not aware of what it will discard, training and clear production sheets help none.

#### **4.6 Absence of measurement**

The sixth cause underlies those five. If waste is not weighed or while it is not recorded, no one can say how big it is, which dishes generated it and whether any change has helped. According to Leanpath (n.d.), the food waste in high-producing kitchens has traditionally been invisible. It is thrown away like nothing throughout the day, and no one sees the weight and cost that is accumulating. According to some expert, systematic waste records are almost non-existent in

Indian restaurants and this is perhaps the key gap, although this is inference from limited evidence (Bharucha, 2018).

## **5. Reduction Strategies and Business Efficiency**

### **5.1 Interventions matched to causes**

The causes give rise to interventions. All changes depend on measurement. Measurement provides a baseline. Production planning is better if kitchens have records of past sales and waste to set prep quantities, plus if they cook smaller batches nearer to demand. By shortening menus, cross-using items and eliminating regular no-shows, menu engineering reduces waste. When implementing menu portion changes, test by offering a half size portion or let guests choose the size. When staff is trained and involved, the numbers become daily habits.

Experiments have tested measures guest-facing. Kallbekken and Sælen (2013) tested smaller plates and a sign saying to come back for more at a hotel buffet to see how behaviours influenced waste. There was a significant fall in food waste. The nudge is cheap, and will work for buffet-style Indian restaurants. Despite surplus, hierarchy states managers need to re-use it safely, donate where food safety rules allow and then, recycle it (Papargyropoulou et al., 2014).

### **5.2 The business case**

The financial benefits of these measures have been evaluated across various sites. Hanson and Mitchell (2017) analysed cost and benefit data for 1,200 business sites across 700 companies in 17 countries and found a median benefit-cost ratio of 14 to 1. The restaurant-specific report that followed examined 114 restaurant sites in 12 countries and found that, on average, a restaurant saved seven dollars in operating costs for each dollar invested. Over a year, kitchen food waste fell by 26 per cent on average, plus 75 per cent of restaurants had recouped their investment. Every site has kept the aggregate investment below 20,000 dollars (Clowes et al., 2019).

You can save money by buying less food, spending less labour on food that doesn't end up being sold, spending less on disposal and where applicable, earning revenue from dishes developed from trimmings or leftovers. The first step is an approach that simply entails setting a target, measuring waste and acting on the biggest sources of waste (Clowes et al., 2019).

## **6. Case Analysis: IKEA Food, Leanpath and IKEA Lyssach**

### **6.1 The IKEA Food programme**

IKEA feeds a staggering number of guests every year through the running of restaurants, bistros, and Swedish Food Markets in stores. The Food Is Precious programme, launched by Shangri-La

in 2017 with the aim to halve food waste in these operations by the end of August 2020 (Leanpath, 2019a). In February 2015, the programme has four pilots, two in the UK and two in the US. The pilots used systems by two suppliers, Leanpath and Winnow Solutions (Food Loss and Waste Protocol, n.d.). Other stores started to roll out in December 2016.

The technology is easy to understand. A scale attached to a bin weighs the food the staff throw out. The staff enter what the food was and why it was thrown. Cloud software prints off reports that show the biggest areas of waste. According to IKEA, stores that were engaged with the program from the beginning kept their waste levels low. This led the food services managing director to believe that this showed lasting change and not a temporary effect (Leanpath, 2019a).

## **6.2 The IKEA Lyssach case**

In northern Switzerland, the IKEA Lyssach is serving between 6,000 and 8,000 meals within a six-day working week. For a period of one year, it monitored food wastage utilizing Leanpath at its restaurant, co-worker restaurant, bistro and Swedish Food Market (Leanpath, 2018). Based on case documentation by Leanpath, over one year of monitoring and targeted prevention, IKEA Lyssach reports a 45% waste reduction by weight and 50% food-waste cost reduction (Leanpath, 2018; Finn, 2019).

The significance of attitude is depicted in the case. Lyssach's complete conversion of its food waste into biogas led the staff to believe that waste was not a genuine problem. The Leanpath data showed how much money the waste represents. The food manager and his team saw food waste as part of doing business before measurement (Leanpath, 2018). In terms of arrangement of the hierarchy a respectable disposal route hid the fact that prevention was still an option. The measurement change impacted the vision and action of the staff.

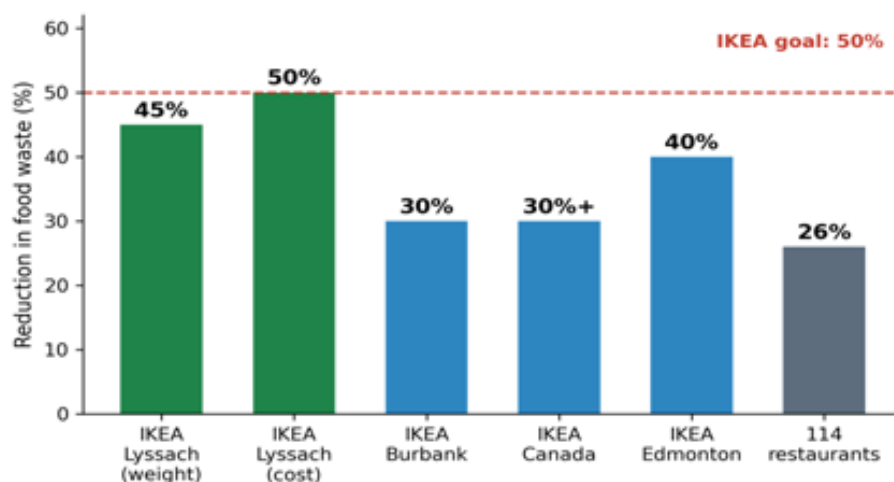
## **6.3 Other IKEA results**

Other IKEA sites reported similar growth. IKEA Burbank of California started monitoring waste in February 2017 and learned that its annual waste exceeded 15000 kilos. They further discovered that their waste was reduced to 30 percent, which saved 10038 meals throughout the year. Using the information supplied by Leanpath, managers revised production sheets and identified when employees were not following them. IKEA Canada used Leanpath in December 2018 and over the next year cut food waste by 30%+. More than 94,000 kg of food waste has been saved. That's roughly 200,000 meals! The cumulative reduction of 40 percent achieved by IKEA Edmonton was the best in Canada. Results are presented in Table 2 and Figure 2.

**Table 2 Reported results from IKEA Food, Leanpath and comparison restaurant data**

| Site                           | Setting                                                                                                              | Reported result                                                  | Source                                        |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-----------------------------------------------|
| IKEA Lyssach (Switzerland)     | 6,000 to 8,000 meals per six-day week; restaurant, co-worker restaurant, bistro, food market; one year with Leanpath | 45% less waste by weight; 50% less waste cost                    | Leanpath (2018); Finn (2019)                  |
| IKEA (USA)                     | Burbank                                                                                                              | Tracking from February 2017; baseline over 15,000 kg per year    | 30% reduction; 10,038 meals saved in one year |
| IKEA Canada                    | Leanpath introduced December 2018; nationwide restaurants and bistros                                                | Over 30% in one year; over 94,000 kg saved (about 200,000 meals) | Leanpath (2020)                               |
| IKEA (Canada)                  | Edmonton                                                                                                             | Store within the Canadian roll-out                               | 40% cumulative reduction in one year          |
| 114 restaurants (12 countries) | Independent multi-site analysis, not IKEA                                                                            | 26% average reduction in year one; 7:1 average return            | Clowes et al. (2019)                          |

**Figure 2 Reported reductions in food waste across IKEA sites and a multi-site restaurant study**



Note. IKEA Canada is plotted at 30 percent although the source reports 'over 30 percent'. Values are as reported by the organisations involved and are not independently audited.

## **7. Analysis and Discussion**

### **7.1 What the evidence shows**

Three trends appear. To begin with, the described decreases were not only consistent in direction, but were also quite similar in magnitude. According to Clowes et al. (2019), the IKEA sites report 30-50 percent, and the independent multi-site restaurant study reports an average 26 percent drop in the first year. The expectation from a mix of independent restaurants is what a lower number of the wider group would deliver, which is less than the number of a major corporate programme. When organisations measure food waste or incorporate specific food donation behaviours, the evidence reveals a decrease in food waste. Nonetheless, this amount varies depending on the restaurant type, the baseline waste amount, the intervention and measuring periods.

In addition, the mechanism is the same in each case. All of them combined the steps of Figure 1: measure what is wasted and why, set a target and act on the largest causes. The bustling hub of Burbank witnessed the production of operational sheets, while in the serene town of Lyssach there was a noticeable shift in employee disposition, and the wider restaurant studies involved alterations to purchasing practices, portion sizes and menus. Every case is not based on one tool which is in concord with the view of waste as a multi-stage problem (Pirani & Arafat, 2016).

The financial return is big compared to the cost. Restaurant food-waste reduction offers a significant financial return on investment, with 7 to 1 being the average reported ratio (Clowes et al., 2019).

### **7.2 Transferability to Indian restaurants**

There are various provisions in India that favour the approach. Reducing ingredient costs is one of the easiest ways for restaurants to save money. Changes in portion and menu do not require new equipment. Smaller F&B outlets can use a scale and log-sheet that shows the dish and reason, while bigger chains and hotels can automate the tracking.

Evidence showing how these conditions play out, meanwhile, is limited. Forecasting is tough with buffet, thali and banquet format. Managers may hesitate to run short or cut portions because of social expectations. Staff turnover can weaken training, and many owner-managed restaurants have limited record keeping. There are safety and regulatory restrictions on donation. None of that removes the argument for measurement but Indian restaurants need to adapt methods, say monitoring waste by meal period and setting targets by format, and not copy the corporate model.

### **7.3 Why cooked food needs a specific approach**

You may manage raw stock through ordering and storage. In contrast, cooked food relies on timing and quantity decisions made hours before guests arrive. The essence of control is forecasting and forecasting needs data. Within weeks, a restaurant that tracks daily sales and waste by dish builds its own forecasting tool.

### **8. Conclusion**

This paper examined the reasoning behind why restaurants waste their cooked food and how it can be reduced using secondary evidence along with the IKEA Food, Leanpath and IKEA Lyssach cases. Food wastage can take place at many different times and for many different reasons. There are many different causes of food wastage. Unplanned waste is not manageable, and this is the last of the factors.

Evidence from cases indicate that site-specific waste measured reductions of 30 to 50 percent have been observed at IKEA sites, while evidence from a multi-site analysis of 114 restaurants indicates an average first year reduction of 26 percent with a seven to one return. The “Lyssach case” shows that the first change is often one of attitude, namely from managing waste as a normal cost to managing it as controllable. The evidence suggests starting measurement simple (as defined above), acting on largest causes, and adapting approach to buffet/thali/banquet formats for Indian restaurants. The most important next step is direct research in Indian restaurants. For the time being, the strongest conclusion is that cooked food waste is as much about operational efficiency as it is about sustainability, and that measuring it is where reduction starts.

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