

# Consumer attitudes towards leftover food takeout interventions: a case study of the doggy bag in Japan

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## Abstract

**Purpose** – The purpose is to explore consumer acceptance of the doggy bag as an intervention to promote sustainable food consumption. In particular, it explores consumer attitudes towards taking home the leftover food from eating out at restaurants as a way of sustainable consumption.

**Design/methodology/approach** – A consumer survey to explore consumer attitudes, followed by an investigation of the media communications that promote the doggy bag as a tool to reduce food wastage.

**Findings** – Strategic communication was employed in an inclusive approach to increase the impact of the doggy bag on consumer behaviour. Consumers show a positive inclination towards using the doggy bag to take home the leftovers of their restaurant meals and reduce food wastage. Cultural biases can cause hurdles in the acceptance of the tool.

**Originality/value** – To the best of the author's knowledge, this is the first study to approach the behavioural analysis of leftover food takeout interventions studied from the consumer perspective. Furthermore, it is based on a novel approach of experimental methods at ready-to-eat food outlets for communicating with consumers.

**Keywords** Food wastage, Consumer attitude, Meal leftovers, Doggy bag, Nudging, Japan

**Paper type** Research paper

## Introduction

Food waste-related consumer behaviour has been identified as a persistent global problem for many years. Capitalist behaviour and overconsumption tendencies have led to food overproduction globally, causing an estimated 200% increase in the amount of food wastage between the 1960 and 2000s (Gustavsson *et al.*, 2011). Nearly one-third of global food is either lost or wasted, accounting for nearly US\$310 billion worth of food wastage in developing nations and US\$680 billion in developed nations, mostly in North America and Europe

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(Gustavsson *et al.*, 2011). Amongst other issues, some research on food behaviour has focused on food consumption (e.g. Tanner *et al.*, 2004). These studies have mainly highlighted household food wastage as a major concern and other contexts that cause food wastage by people (e.g. Giordano *et al.*, 2019; Grosso and Falasconi, 2018). Some other studies have focused on anti-consumption or non-consumption of food (e.g. Chatzidakis and Lee, 2013; Kashif, 2019), where anti-consumption is defined not as a pure antonym of consumption, rather as a behaviour against consumption due to ethical concerns, environmental concerns, symbolic concerns and consumer resistance (Chatzidakis and Lee, 2013). In this interplay between consumption and non-consumption, the socio-ecological consciousness (SEC) of consumers has an important role. SEC underlines the importance of mindsets, attitudes and perceptions, intrinsic emotions and memories regarding consumption-related consciousness (Aitsidou *et al.*, 2019). Nudging people into practising conscious consumption is a strategic manner of behavioural transformation that led consumers towards good decisions, not only for themselves but also for the environment (Ebeling and Lotz, 2015; Hansen, 2016; Kallbekken and Saelen, 2013; Lehner *et al.*, 2016). Szakos *et al.* (2020) showed that affective, cognitive and conative factors influence consumer perceptions and consciousness regarding food wastage. However, there is still limited empirical evidence regarding the antecedents that influence people's reaction towards the need for controlling food wastage (Schanes *et al.*, 2018).

In recent times, the global corona pandemic, since March 2020, has added to the complexities of food wastage globally. People have been forced to stay indoors to reduce the spread of the COVID-19 pandemic due to governmental regulations such as social distancing, quarantines and lockdowns (Yap and Chen, 2020). This has also led to panic buying of large quantities of food due to induced anxiety or fear (Addo *et al.*, 2020). Perceived scarcity has caused consumers to engage in uncontrolled and irrational shopping (Király *et al.*, 2020), such as stockpiling (Chronopolous *et al.*, 2020; Zheng *et al.*, 2020). Even though some consumer groups have reacted rationally and altruistically to panic buying of food (Anderson, 2020), there exists an emphatic need to understand how such panic-induced food consumption and related wastes may be controlled in trying times, for example, as in the COVID-19 pandemic (Li, 2020; Yuen *et al.*, 2020).

The SDG goals (2030), especially SDG-12 Responsible Consumption and Production, are directed at reducing the per-capita food wastage at retail and consumer level, by half, by 2030 (eu-fusions.org, 2016). In this regard, the study of the impact of interventions and innovative approaches to control food wastage from the consumer's perspective is gaining new ground (Martin-Rios *et al.*, 2018). There are, however, limited empirical studies that evaluate the impact of varied interventions to reduce food wastage (Kallbekken and Saelen, 2013; Stöckli *et al.*, 2018a, b). More work is also needed to understand how conscious food consumption behaviour and relevant interventional control manifests in various empirical contexts and cultures to deepen the overall understanding of the field (Szabo-Bodi *et al.*, 2018; Warde, 2014).

To address the knowledge gaps, this paper examines the role of interventional tools to curb the wasteful food consumption habits in human society. It will involve the “doggy bag” as the research object. The doggy bag is an innovative intervention tool that is currently being developed and tested for consumer food wastage in Japanese cities. It is aimed at reducing food wastage by promoting the reuse of food leftovers when consumers dine at restaurants by gently nudging consumers towards conscious consumption. With the aim of addressing identified research need in food wastage, this study explores consumer acceptance of the doggy bag for sustainable food consumption and their attitudes towards taking home the leftover food from eating out at restaurants.

## Theoretical background

### *Conscious consumption and food wastage*

Conscious consumption is a subjective action towards the very act of consuming goods and services (Muldoon, 2006) and involves a subjective rethinking of actions regarding

purchase and use of commodities (Venkatesan, 2018). Conscious consumption is indicative of a shift in the mindset regarding the possession of material and non-material goods and services considering the social, ecological, political and cultural consequences (Zalega, 2015). “New consumerism” (Carr *et al.*, 2012; Schor, 1999) emphasises how conscious consumption is expressed as “*any choice about products or services made to express values of sustainability, social justice, corporate responsibility and takes into account the larger context of production, distribution, or impacts of goods and services*” (p. 224). Novel connotations to conscious consumption extend to life slow down (Kramarczyk, 2015), minimalism (Dopierala, 2017) and even the spiritual understanding of the need to consume (Saleem *et al.*, 2018).

While consumers are seen to have lagged in conscious consumption practices in the early 2000s, later research has indicated an increase in responsible consumption (Zukin *et al.*, 2006; Dalton, 2009). Ironically, there is also increasing evidence of status and identity conformations, brand consciousness and conspicuous consumption attitudes amongst various cohorts of the global society (O’Cass and Siahtiri, 2014; Rageh Ismail and Spinelli, 2012). Therefore, enabling a conscious behaviour at the level of the individual is posited “as a traction inducing vehicle for instituting sustainability” effectively (Venkatesan, 2018). The cognisance of such behaviour and subsequent evaluation of actions is highly contributory for fostering sustainable bio-economies (Venkatesan, 2018).

Studies on conscious consumption for food are mainly directed towards understanding theoretical and contextual understandings regarding food wastage and provided insights into the issue. For example, Szabo-bodi *et al.* (2018) found that in Hungary, different food types were wasted in different households and that the higher-income households contributed more to food wastage in general. Grandhi and Singh (2016) found that in Singapore, food wastage was attributed to numerous reasons including food mismanagement, food reuse and even risk of brand hurt. Gaiani *et al.* (2018) profiled consumers in Italy and categorised them into four types of food wasters depending on their food consumption habits and attitudes. Two reasons, such as lack of knowledge regarding food management and the tendency of exaggeration for food consumption were prime reasons for food waste. Aschemann-Witzel *et al.* (2015) emphasise how consumer psychographics, including motivational factors, ability to prioritise and food management skills, play a greater role than the socio-demographic issues influencing the consumers. All the studies above highlight emphatically the need to explore ways of reducing food wastage through consumer-based practices and performances in varied contexts.

#### *Leftover food takeout and food wastage*

Extant literature shows increasing interest in food wastage-based studies and one can see the interest manifesting in different regions across the globe to elicit different insights. In the United States, Zuraikat *et al.* (2018) showed that leftover food takeout is considered as an effective strategy to reduce food waste and overconsumption due to large food portions. In New Zealand, Miranda *et al.* (2018) demonstrated that 84% of the restaurant consumers agreed to use the option of leftover food takeout but when faced with a half-eaten meal situation, only 5% of the consumers dared to exercise the option. Smith *et al.* (2020) showed that more food on the plate was wasted if the meal was expensive, if the food consumption duration was longer and during dinner time. They further pointed out that consumers were largely motivated to reduce plate waste to save money and to contribute to social and environmental issues related to food, hence underlining the role of restaurants to motivate consumers to reduce plate waste when eating out. In a study conducted in the UK, it was found that young women tended to leave food in restaurants and over half of the respondents claimed to have asked for leftover food takeout in the past (Giorgi, 2013). The same study also stated that 40% of the respondents were embarrassed to ask for a container to take out

leftover food. [Bozzola et al. \(2017\)](#) discussed that improvements in the design of takeout containers were promoted to encourage voluntary action to reduce food wastage in Europe.

Some studies also attributed food wastage to the more deeply embedded cultural aspects of food consumption behaviour. In South Korea and China, a large serving of food in restaurants is considered as a sign of hospitality. According to [Kobayashi \(2020\)](#), it is considered rude for restaurants to eat up or take out in South Korea, thereby calling for more stringent action by the local administration to reduce food wastage. In China, leftover food was taken out so that it could be consumed by the servants of the households ([Aoki, 2020](#)). On the other hand, Japan, the subject of this study, has exhibited a significantly different awareness of leftover food than China. [Fujikura and Zhang \(2019\)](#) showed that although 42% of the Japanese respondents (students) did not take out leftover food, the overall awareness regarding food wastage was significantly higher than Chinese respondents, suggesting the possibility of a positive impact with a small degree of intervention to prevent food wastage in restaurant meals.

### *Nudging*

Nudging is defined as effective persuasion towards a desired or expected behaviour that is largely beneficial for self and society ([Cialdini, 2007](#)). Information alone may not be enough to change consumer behaviour. Hence, efficient use of activities, tools, communication and other persuasive actions are important to nudge people towards sustainable choices ([Lehner et al., 2016](#)). Nudging is also referred to as choice architecture: it leads people away from cognitive biases and irrational heuristics. Choice architects impress people so that their behaviour can be altered in the desired manner ([Hall, 2013](#); [Thaler and Sunstein, 2009](#)). Nudging can employ either a utilitarian approach that steers consumers to select a rational action for maximum utility, or a psychological nudging approach that steers consumers towards sustainable choices while maintaining the freedom of individual choice ([Cialdini, 2007](#)). Nudging also instigates consumers to be equipped with the knowledge and tools required to make informed decisions and express responsible behaviour ([Higham et al., 2016](#); [Lin et al., 2017](#)). When studied in the context of conscious consumption, nudging is shown to elicit a system of obligation that allows for anti-consumption, voluntary curfew and frugal behaviour. While constraining or strategically limiting consumer choices ([Seyfang, 2007](#)), an embracing attitude towards sustainable consumption of available and potentially scarce resources is encouraged. This typically manifests as consumer “opt-out” through “default nudges” that manipulate consumer choices without infringing liberty or autonomy and without coercion, however, still affecting a person’s decision process ([Ebeling and Lotz, 2015](#)).

Nudging in food consumption behaviour is a relatively new concept and demands attention for studying food waste reduction ([Gaiani et al., 2018](#); [Von Kameke and Fischer, 2018](#); [van Dooren et al., 2020](#)). While the nudging approach helps to display social cues and is shown to significantly reduce food wastage in hotels and restaurants ([Kalbekken and Saelen, 2013](#)), it could be less impactful at household levels due to lack of effective intervention methods ([Lehner et al., 2016](#)). [Aldrovandi et al. \(2015\)](#) highlight the socio-cultural paradigm in conscious consumption as “*the concern about food intake is driven by the individual’s beliefs about where their consumption ranks amongst others*” (p. 20), signalling that employing a social norms intervention strategy may allow the faster impact of the nudging strategy for behavioural change.

In particular reference to food plate wastage in restaurants, extant studies have highlighted the need for nudging customers through other means. Some of the suggested solutions include educating restaurant guests ([Jagau and Vyrastekova, 2017](#)), instigating moral norms and consumer regret of wastage ([Stöckli et al., 2018a, b](#)), using doggy bags ([Sirieux et al., 2017](#)) and through additional financial costs to discourage wastage ([Dolnicar et al., 2019](#)). Overall, it is emphasised that there are good practices available for managing restaurant food waste;

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however, these practices are not widely used for various cultural or social reasons (Filimonau *et al.*, 2020a, b).

### *Doggy bag*

Controlling food waste through various means, whether related to food production or storage and consumption is emphasised for its contribution towards resource sustainability. Studies by the Scottish government show that the take home service of restaurant food controls restaurant plate waste, reduces carbon impacts and decreases food-related costs. Here, the effect of the spread of doggy bags is analysed in terms of cost effectiveness and it is expected to be particularly effective in motivating employees (Zero waste Scotland, 2014). In yet another study, exploring food wastage in restaurants in China, results show that a large part of the restaurant food waste in the country comes from the overbearing expectations of consumers for high quality food and the resulting overproduction of food by the restaurants to sustain customer loyalty, hence underlining the need for timely mitigations to counter the wasteful phenomenon (Filimonau *et al.*, 2020a). On the other hand, Beizer (2017), in a study on the use of doggy bags in France, has shown how the concept of taking home leftovers from restaurant meals received negative publicity largely due to the existing social stigma attached to such practices. The concept is now being relaunched as gourmet bags through persuasion and awareness, invoking communication (Gourmetbag.fr, 2020) and through legal regulations to prevent food loss. Given this context of varied approaches and outputs in different parts of the world, the investigation of the doggy bag in Japan is expected to add further nuances to the understanding of food wastage interventions as a field of study.

In Japan, the “doggy bag” is positioned as a product-based innovative tool that is designed to promote the habit of bringing back the leftovers of consumers’ meals when they eat in restaurants. The Doggy Bag Committee (DBC), a Japanese non-profit organisation, was created in 2009 to promote the doggy bag as an innovative approach to complement national and local government policies on food wastage reduction. This was further supported by the Food Loss Reduction Promotion Law enacted in Japan in October 2019, where the concept of “doggy bags” was positioned as one of the main Food Loss and Waste (FLW) reduction methods (The Mainichi, 2019).

### **Methodology**

Data was collected through a consumer survey and the investigation of the media communications that promote the doggy bag in Japan.

#### *Consumer survey*

A survey, conducted in February 2020 just before the soft lockdown in Japan, was part of an experimental study (Charness *et al.*, 2012) designed to inform restaurant customers about the option to take home their leftover food after their meals. In the experiment, in-store posters and on-table POP information for the “takeout of leftover food campaign” were used to inform consumers about the doggy bag concept. A survey with a semi-structured questionnaire (Bryman and Bell, 2011) was conducted with 185 respondents in five restaurants across Osaka prefecture in Japan in 2019. The purpose of the survey was to investigate the consumer attention and attitude regarding the takeout campaign of leftover food and the doggy bag concept. Questions were themed on four constructs across 15 items to explore consumer attention to the doggy bag campaign, attention to campaign messages, attitudes to food behaviour and food reuse and attitudes for reusing leftover food. Of the total, 50% of the respondents were male and 48% were female. Furthermore, 55% of the respondents were in

the age bracket of 20–39 years, 36% in the age bracket of 40–59 years and the remaining 8% were in the age bracket of 60 years and above.

As the COVID-19 pandemic in Japan took hold of public life the follow-up surveys in restaurants could not be conducted in the same manner as in 2019. Additionally, complete data follow-up was also difficult to achieve. Therefore, some important questions were asked through an FLW awareness survey conducted when DBC participated in an environmental exhibition in Aichi Prefecture. Key questions of the previous survey were posed to visitors to assess whether the impact of the pandemic had any influence on how they viewed the issue of food loss and wastage. For similarity and ease of understanding, we use 185 responses selected randomly from the total sample in this study with approximately 50% male and 50% female respondents.

### *Media communication analysis*

The various access points of communication for the doggy bag concept were studied to understand how consumers were empowered regarding the need for food wastage reduction and the need for a relevant interventional tool. Various access points were studied to understand how customers were further engaged with the doggy bag as a concept to reduce food wastage. These included the Doggy Bag webpage, Facebook page, Twitter, Instagram and the Doggy Bag application. Open coding (Goulding, 2001) was employed to elicit important themes and keywords that formed the basis of the communication with customers. This helped to identify recurring themes and keywords, which could be further clustered to identify emergent patterns (Creswell, 2007) and establish the nudging strategies used.

## **Results and discussion**

This section presents the empirical data obtained from both primary and secondary data sources to understand the customer attitude towards the interventions for food loss wastage and particularly in the context of the doggy bag as a tool. The survey analysis gave the following picture regarding consumer attitudes. The four constructs investigated from the survey are shown below (see Tables 1–5).

### *Attention to the campaign*

The respondents were asked, “Did you notice the in-store poster and table POP (information) for the doggy bag campaign before ordering food today?” Most respondents notice the doggy bag campaign in the restaurants where they go for their meals. The respondents were asked, “Which of the following messages in the campaign were most inspiring?”. The campaign, “If you do not eat it, bring it home” seems to hold the attention of most consumers, followed by the message “You can enjoy your meal twice”.

Noticed and read the content	Noticed but did not read content	Did not notice
69%	22%	9%

**Table 1.**  
Attention to doggy  
bag campaign

“If you do not eat it, bring it home”	“Take it home at your own risk”	“You can enjoy your meal twice”	None of them attracted my attention
72%	8%	15%	5%

**Table 2.**  
Attention to campaign  
messages

*Attitudes*

Most respondents expressed a willingness to take home leftover food from their meals by using the doggy bag concept as well as a willingness to refer it to their acquaintances. However, customer understanding regarding the need for sustainable behaviour regarding food seems to be the weakest attribute as it is spread across the entire scale.

After the respondents were informed about the doggy bag concept and its role in reducing food wastage, they were asked follow-up questions on their attitudes to practise reusing leftover food. 68% of the respondents agree that if the leftover food is not reused it eventually becomes waste. However, this agreement does not show manifestation into constructive

**Table 3.**  
Attitudes to food behaviour and food reuse

Factor	Positive	Somewhat	Negative	Neutral
Consciousness regarding one's food consumption	55%	29%	6%	10%
Willingness to take back leftover food from one's meal	63%	19%	5%	13%
Opinion regarding the Doggy-bag "take-out of leftover food" campaign	51%	25%	7%	17%
Willingness to refer the Doggy bag concept to family and friends	58%	27%	5%	10%
Customer's understanding regarding need for sustainable behaviour for food	27%	32%	18%	23%

**Table 4.**  
Consumer attitudes of reusing left over food

Attitude towards re-using food	%
Because it is a waste otherwise	68.3%
I want to reduce food garbage	13.6%
Only if the store recommends	7.5%
Resistance due to hygiene concerns	4.5%
I do not want to take it home and eat the same thing	4.0%
Other reasons	2.0%

**Table 5.**  
Correlation between items of the survey

Factor 1	Factor 2	R-value	t-value	P
Intention to use the leftover food take-away option	Opinion about the Doggy bag "take-out of leftover food" campaign	0.458	6.908	8.383
Intention to use the leftover food take-away option	Willingness to refer the Doggy bag concept to family and friends	0.420	6.188	4.063
Intention to use the leftover food take-away option	Customer's understanding regarding need for sustainable behaviour for food	0.336	4.760	3.992
Intention to use the leftover food take-away option	Attention to doggy bag campaign	0.04	0.543	0.587
Awareness of ordering food amount	Customer's understanding regarding need for sustainable behaviour for food	0.366	5.257	4.145
Awareness of ordering food amount	Willingness to spread awareness of the campaign	0.170	2.303	0.022
Awareness of ordering food amount	Did you consider eating everything in your plate	0.676	12.247	2.084

**Note(s):** Correlation between factors to study intention to use take-away option for leftover food (\*All values at 0.05 levels of significance)

action as only 13% of the respondents show an inclination to take some action regarding reducing food garbage. A small percentage also indicates dependence on the store's recommendations for the reuse of leftover food.

*Correlation between factors*

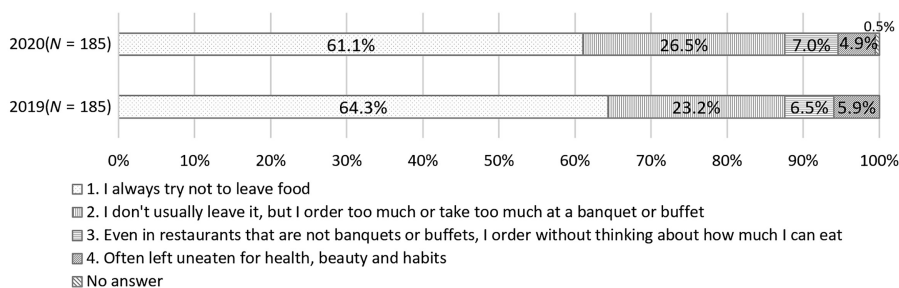
A correlation analysis between the various factors investigated in the study provided important statistical insights. Most of the respondents prioritise enjoying meals over reusing food. However, if bringing back leftovers is linked to enjoying a meal, their behaviour may shift to constructive.

*Comparative responses between pre-COVID-19 and COVID-19 times*

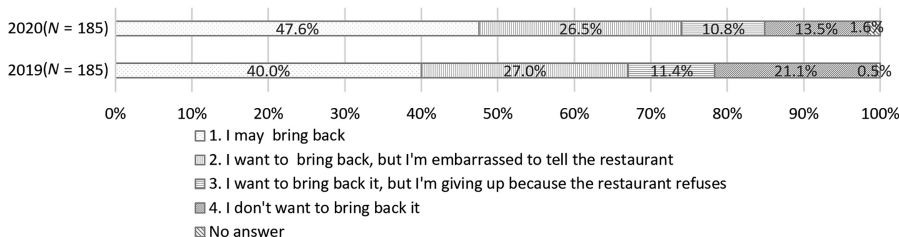
Some questions that were repeated in the 2019 (*pre-COVID-19*) and 2020 (*COVID-19*) survey rounds are shown in a comparative form as seen below (see [Figures 1 and 2](#)). Amongst the four aspects studied in [Figure 1](#), more people in 2020 attribute food waste to their tendency to serve themselves more food in buffets or banquets than they can eat. Some attribute it to their inability to judge their capacity to eat and over-order the food quantity. As seen in [Figure 2](#), there is an increase in consumer inclination to return leftover food home. A lesser number of the respondents expressed embarrassment and support from restaurants regarding their decision to take out leftover food. There is also a significant decrease in the number of consumers who do not want to bring leftover food home.

*Media communications about the doggy bag*

The timely and updated information and communication regarding the doggy bag was mostly communicated by employing a variety of online media, largely, social platforms. The following activities were observed on the various access points for the doggy bag concept in Japan (see [Table 6](#)).



**Figure 1.** Comparative responses regarding common reasons for causing leftover food (2019–2020 responses)



**Figure 2.** Comparative responses regarding inclination to bring home leftover food (2019–2020 responses)



**Table 6.**  
Variety of digital  
access points for the  
“Doggy bag” initiative  
in Japan

Access point	Year	Event
Webpage	2010	Consumer education regarding food wastage and loss takeaway campaign ( <a href="https://www.doggybag-japan.com/home-en">https://www.doggybag-japan.com/home-en</a> )
	2017	Green purchasing campaign, national food loss reduction competition
	2018	Delicious meals national campaign. Slogan contests
	2019	Promotional events and takeout stickers
Facebook		Information about events with photos and videos/clips from TV programs ( <a href="https://www.facebook.com/doggybagJapan/">https://www.facebook.com/doggybagJapan/</a> )
Twitter		Photos and promotional campaigns from restaurants that participate in the food loss reduction initiatives. “Doggy bag idea contest” for promoting new food culture
Instagram		Promotes the doggy bag initiative as a stylish way to takeaway leftover food from restaurant meals ( <a href="https://www.instagram.com/doggybag_committee/">https://www.instagram.com/doggybag_committee/</a> )
Mobile app		“The Doggy bag self-responsibility app” – lists all stores that allow the use of doggy bag, the QR code allows takeout approval for every doggy bag transaction from customers

Table 1 is a list of the varied access points used for the promotion and communication of the doggy bag. It lists the main events conducted by the doggy bag committee and its related stakeholders to increase the visibility of the initiative. Additionally, the activities and events were also directed towards encouraging consumer engagement as a promising way to get their attention and hence leverage the tools of consumer references and word-of-mouth to ensure the dispersal of the doggy bag initiative (see Figures 3a and 3b).

Figure 3 shows snapshots of the doggy bag-related communication on the doggy bag website. Figure 3a is an announcement of a new doggy bag idea contest in which the public is invited to present their ideas for designing a doggy bag and other initiatives. Figure 3b is a collage of how the doggy bag application screens will appear on a mobile with a login page and a QR page to register when using the doggy bag at restaurants.

The analysis of the communication indicates that four main aspects were used to educate consumers regarding the need for and the impact of the doggy bag interventional tool:

Firstly, communication at all access points was designed to engage the customer with the doggy bag concept. Keywords and appeals such as responsible consumption of food, healthy eating, saving food, reducing food wastage and being environmentally friendly were used frequently to attract customer attention. Two themes emerged strongly in the communication, namely, Japanese food culture and Japan’s need for food self-sufficiency. The first theme on food culture aims at protecting local cuisines, educating people about local food production and consumption and increasing awareness regarding the need for food-related self-sufficiency through resource-related sustainability. The second theme of “food self-sufficiency” highlights how Japan’s food-related self-dependence has been declining over the years and is amongst the lowest in developed countries. There is a strong emphasis on encouraging the Japanese public to take home the leftover food from their meals in restaurants, hotels and workplaces etc. There is also a concerted effort to institutionalise food loss measures through several steps, including the doggy bag approach.

Secondly, the doggy bag promotion is strongly tied to the philosophy of “*Mottainai*”, a nationwide movement to encourage recycling behaviour in Japanese society and that is based on the four pillars of: reuse, reduce, recycle and respect (<https://www.mottainai.info/jp/>).

Thirdly, a strong effort towards consumer engagement is seen through the competitions and other events or activities associated with the doggy bag campaign. These activities, to encourage customer participation from both adults and kids, emerged as a popular tool used across all access points for the doggy bag. For example, the doggy bag design contest



**Figure 3.**  
(a) Online Doggy bag  
contest; (b) Doggy bag  
app operational  
through QRC  
identification

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encouraged participants to present their ideas regarding material, packaging and naming of doggy bags (<http://www.env.go.jp/recycle/foodloss/contest.html>).

Fourthly, the campaign encouraged participation from consumers and citizens by inviting them to information meetings to facilitate a collaborative system between citizens, government and public organisations for welfare and sustainability. The role and function of food banks in a corona infected and post corona society is highlighted in these meetings.

The analysis of the primary and secondary data brings out a deeper insight into the application and impact of the doggy bag concept in Japan. In a survey conducted in 2019, it was seen that most respondents (69%) were drawn to the doggy bag campaign posters and information placed in restaurants and hotels. 72% of the respondents were attracted to and recalled the campaign message *“If you do not eat it, bring it home”*. Most respondents had a positive attitude towards the concept of food reuse as well as the doggy bag concept. However, there were divided opinions regarding the overall understanding of consumers regarding sustainable behaviour for food. Similarly, when asked about the reason for a positive attitude towards practising food reuse through doggy bags, most respondents (68%) pointed out that they would use it to reduce waste. The remaining participants highlighted other reasons such as recommendations from the store, concerns regarding food hygiene and disinterest in eating the same food at home.

A significant correlation is observed between the participants' opinions about the doggy bag campaign and their intention to use the leftover food takeaway option. Intention also showed a significant correlation with the willingness to spread the information about the doggy bag campaign to others. However, it shared a weak correlation with their understanding regarding the need for sustainable behaviour for food. Results showed that although the participants understood the concept, it did not lead to actual takeaway behaviour. This can be attributed to why the intention to take out did not show a significant correlation to their attention to the doggy bag campaign.

A significant correlation is observed between the participants' awareness of ordering the food and their understanding regarding the need for sustainable behaviour for food. Significant correlations were also seen between participants' awareness of ordering food amounts with their willingness to spread awareness of the campaign and with their understanding regarding finishing the food on their plates.

A comparison between results of 2019 (pre-COVID-19 times) and 2020 (COVID-19 times) provided positive indications of a behavioural shift amongst consumers towards the reduction of food loss and wastage. Firstly, there is a positive shift in the number of participants who consciously try not to leave food uneaten. Secondly, more people were considering bringing back their leftovers from the restaurant. Thirdly, there is a significant decrease in the number of participants who refused to take leftover food home. Fourthly, fewer consumers were leaving food uneaten due to health reasons, beauty reasons and the habit of leaving food. Lastly, there is also a decrease in the number of respondents who were unable to bring back leftover food due to restaurant constraints. On the other hand, the number of respondents who were embarrassed to tell the restaurants their desire to take their leftover food home remained unchanged. Nearly 27% of the respondents faced this embarrassment that hindered their practice of food loss reduction. This pointed to the continuing influence of the embedded socio-cultural food behaviour restraints in Japanese society (Kobayashi, 2020).

Overall, the results show positive indications for both improved understanding of global concern regarding food wastage and a positive attitude towards the take home leftover food concept. From the customer's perspective, two contrasting elements exist. On the one hand, it is seen that the Japanese respondents are inculcating a positive attitude towards the idea of sustainable food behaviour towards the doggy bag concept and the take home leftover food campaign. They understand that there is imminent food wastage when leftovers remain

unused. Conversely, there is still a strong element of social constraint to practise the idea in everyday life mainly due to their hesitance to ask restaurants to pack their uneaten meals and due to constraints from the restaurants themselves. From a strategic perspective, it is seen that the promotional strategy uses a strong element of nudging-based communication with the Japanese society for ensuring the reduction of food wastage. Communication on all channels of outreach is aimed at creating more customer engagement, confidence and trust in the concept of the take home leftover food campaign and the doggy bags. By engaging the Japanese public through media messages, promotional material and activities for initiating customer-generated ideas for doggy bags, the Japanese government is making a strong attempt to connect both emotionally and rationally with the Japanese society to encourage the reduction of food loss and wastage. This points to the use of the nudging strategy and choice architecture for the consumers (e.g. [Lehner et al., 2016](#); [Thaler and Sunstein, 2009](#)), to slowly lead the people towards understanding the immediacy of the situation regarding food loss in Japan and inspiring them to adopt new behaviours regarding leftover meals. People are engaged via rational nudging and emotional nudging ([Cialdini, 2007](#)), through consumer education and awareness campaigns (rational) and via photos, slogans and design competitions (emotional). This is aimed at multiple outputs: creating more conscious consumption behaviours amongst people ([Muldoon, 2006](#); [Venkatesan, 2018](#)), contributing towards the need for food-related self-sufficiency in Japan and expressing responsible behaviour ([Lin et al., 2017](#)). At the same time, the results of the study emphasise the role of the socio-cultural paradigm in conscious consumption ([Aldrovandi et al., 2015](#); [Warde, 2014](#)).

Given the identified opportunities regarding the use and eventual impact of interventional tools for reducing food wastage, this present study on the doggy bag concept in Japan points to specific implications. It highlights that all innovative ideas in conscious consumption must instigate the urgency of sustainability and nudge people towards making responsible consumption-based decisions ([Lehner et al., 2016](#)). Information alone may not be enough to steer change in mindset, rather a well-defined communication is important to achieve the desired results of nudging ([Lin et al., 2017](#)). The doggy bag concept propagation in Japan has been slow in growth and consumer adoption rate but over time, it has resulted in positive indications of behaviour shift and possible adoption of the interventional strategy. It has created a growing awareness of the issues regarding food wastage amongst people and their function in reducing food-related wastage. It has instigated the formation of a new food behaviour culture by nudging people to use the doggy bags in their everyday life and create a push-effect so that restaurants can become more open to customer requests for take home leftover meals. It is important to bring in an element of personalisation (e.g. doggy bag container design competitions) and lifestyle sophistication (e.g. as seen in the Instagram communication) to attract the consumers. This indicates that nudging can be used strategically to create a lifestyle and personal identity around conscious consumption ([O'Case and Siahtiri, 2014](#); [Rageh Ismail and Spinelli, 2012](#)). By doing so, the negative or constraining cultural influences can be mitigated in favour of promoting the possibility for new consumerism to some degree ([Carr et al., 2012](#)).

Companies and organisations should study how practising consumers can become active agents for behavioural change ([Thaler and Sunstein, 2008](#)). It is important to study how resistance due to cultural norms can be reduced ([Aldrovandi et al., 2015](#)) and how commercial producers and sellers can support responsible consumption practices ([Von Kameke and Fischer, 2018](#)). The pandemic situation has emphasised the need for taking corrective measures to deal with the panic shopping tendencies of people (e.g. [Yap and Chen, 2020](#)) and subsequent hoarding of food (e.g. [Zheng et al., 2020](#)). Policymakers need to be aware of the possible irrational tendencies of consumers during the panic in mind ([Kiraly et al., 2020](#)) and promote the strategic actions of the doggy bag initiative accordingly.

## Conclusions

Food loss and wastage is a popular research topic and the challenge of controlling food waste has been increasingly emphasised in recent years considering the sustainable development goals. In particular, the role of food wastage interventions to control food loss has been duly stressed. However, there is a lack of empirical studies that explore the role of FLW interventions and consumer perceptions regarding food wastage in the food consumption cycle. The results of the present study contribute to the identified need for more research around food wastage by providing an insight into consumer attitudes specifically towards the concept of taking home leftover meals with the doggy bag. This is a first study to explore consumer attitudes towards leftover food takeout interventions as well as one of the first to be based on a novel approach of experimental methods at ready-to-eat food outlets for communicating with consumers, thus making it unique both in terms of context as well as methodological approach. The study is exploratory in nature and findings hold significance in terms of direction for future research that can use more confirmatory analyses to explore consumer attitudes towards the use of FLW interventions. While this study finds connection with the aspect of consumer nudging, more nuanced approaches at exploring the issue through varied theoretical lenses for consumer behaviour should be conducted in future research. This can assist to better highlight the role of FLW interventions in the matter of behavioural transformations regarding food consumption and food wastage from a conceptual as well as practice-based standpoint. While this study looks specifically into the Japanese market, more such studies from varied cultural contexts are needed so that policymakers and stakeholders related to the food industry develop relevant policies and promotions considering the local needs and regional socio-cultural contexts. In a world of rapidly depleting economic and material resources, an important way forward is to improvise and rethink existing consumption systems to benefit the socio-economic structures of human society. Interventional tools supported by persuasive nudging can lead society to a more sustainable future.

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