What influences students' food waste behaviour in campus canteens?

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Abstract

Purpose – Reducing food waste is one of the critical challenges of campus canteens. This study aims to test an extended theory of planned behaviour that incorporates moral norm, food taste and campus food-saving climate to understand the influence factors of food waste behaviour on campuses.

Design/methodology/approach – To evaluate the proposed model, an online survey was utilized to collect 513 valid questionnaires.

Findings – The findings suggest that (1) attitudes towards food waste, subjective norm and perceived behavioural control have a significant influence on intention to reduce food waste; (2) Moral norm and food taste are shown to have a favourable effect on the intention to reduce food waste; (3) Food waste behaviour is significantly determined by intention to reduce food waste; (4) Campus food-saving climate negatively moderates the relationship between intention to reduce food waste and food waste behaviour.

Originality/value – This study paves the way to enhance the understanding of the factors of food waste among college students. In addition, this study develops practical strategies to prevent large amounts of food from being wasted on campus.

Keywords Food waste, Campus, Theory of planned behaviour, Food taste, Moral norm

Paper type Research paper

1. Introduction

In recent years, food waste has emerged as a significant concern all over the world. Food waste has increasingly gained attention from the public, academics and governments (Charlebois *et al.*, 2015; Gruber *et al.*, 2016). For example, the Sustainable Development Goals (SDG 12.3) issued by the United Nations have set a specific aim for a 50% reduction in per capita global food waste at the retail and consumer levels by 2030 (Champions, 2016). Food waste is a major concern in terms of global food security. One-third of worldwide food production is estimated to be lost or wasted along the different stages of the food supply chain from farm to table (Kummu *et al.*, 2012). Consumer food waste at the consuming stage is usually high in developed countries. In view of global statistics, the average household in the

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United Kingdom discards about one-third of food purchased for eating, accounting for 17% of household waste (Evans, 2011). In the United States, around 31% of food is lost or wasted at the retail and consumer levels (Buzby *et al.*, 2014). The amount of food that is lost and discarded cannot be ignored. Such a large amount of food waste means a waste of resources and energy and even causes environmental damage.

Food waste is a significant concern with substantial environmental, economic and social consequences (Wang *et al.*, 2018). Every year, around 88m tons of food are wasted in the European Union, with related expenses exceeding €143bn (FUSIONS, 2016). Food waste at landfills creates a significant amount of greenhouse gas linked to climate change (Porter *et al.*, 2016). Besides the economic and environmental effects of food waste, there is a social component, considering that one in every nine people in the world is hungry, at a frequency of 11.3% (Sustainable Development Knowledge Platform, 2020). Despite the focus on this problem, it is predicted that household food waste accounts for roughly 42% of all food generated in Europe (European Commission, 2011). In China, 19% of all edible food is thrown away each year (Liu *et al.*, 2013), amounting to 200bn CNY in lost revenue (Li *et al.*, 2019). To minimize the amount of wasted food, existing surveys have been conducted to determine the factors that mostly contribute to food waste at the household. However, the EU-28 young aged 15-24 should be closely monitored since they discard over 6% of their weekly food purchases (European Commission, 2014). According to Food Recovery Network (2017), 22m pounds of food are discarded on university campuses each year, amounting to an average of 142 pounds of food waste per student. Although regulation measures are helpful to limit food waste, limiting students' food waste is still a challenging task for canteen managers. To this end, conducting a comprehensive knowledge of students' food waste behaviours on college campuses may reduce food waste.

Previous studies on food waste primarily focus on household food waste behaviour (Van der Werf *et al.*, 2020; Di Talia *et al.*, 2019), food waste reduction (Graham-Rowe *et al.*, 2019; Michelle *et al.*, 2021), food waste behaviour in primary, middle and high schools (García-Herrero *et al.*, 2019; Lagorio *et al.*, 2018), within business-to-business workplace (Luu, 2021), in hospitality industry (Luu, 2020) and in restaurants (Aysen and Yetkin Ozbuk, 2020; Xu *et al.*, 2020; Van Herpen *et al.*, 2021). Young adults have been recognized as one of the most wasteful segments of the population (Stancu *et al.*, 2016). According to the National Bureau of Statistics of China (NBSC, 2019), 30.3m students are enrolled in Chinese universities in 2019. Food waste happens mostly at university canteens, which are significant places for food consumption end (Derqui *et al.*, 2018). The university is a unique social organization, and students are special consumer groups. There are great differences between household food waste behaviour and students' food waste behaviour, such as economic status and dining environment. College students are an important part of Chinese society. Their eating habits and food waste behaviours are related to China's future sustainable development. However, there is a shortage of knowledge on the factors that impact students' food waste behaviour. Thus, this study investigates what factors influence students' food waste behaviour in campus canteens based on theory of planned behaviour (TPB). The critical contribution is to increase understanding of the factors of food waste among college students and develop practical strategies to prevent large amount of food from being wasted on campus.

The remainder of the paper is formatted as follows. Section 2 lays the theoretical foundation and develops the hypotheses. The research approach is demonstrated in Section 3. Section 4 analyses the data and reports the statistical results. Section 5 provides the study's conclusions and discussions. Section 6 discusses managerial implications and limitations.

2. Literature review and research hypothesis development

2.1 Theory of planned behaviour

The theory of planned behaviour proposed by Ajzen (1991) asserts that intentions have a direct effect on behaviour, which is determined in turn by attitudes, subjective norms and

perceived behaviour control. Attitudes are a general assessment of a person's general positive or negative judgement of a certain behaviour (Ajzen, 1991). Subjective norms describe individuals' perceived social pressure from significant people to participate in the action (Ajzen, 1991). Perceived behavioural control measures the perceived ease or difficulty of engaging in a certain behaviour and indicates the possible obstacles or facilitators of performing that behaviour. Finally, behavioural intention is regarded as the most significant precursor of behaviour (Ajzen, 1991).

Many food-related research used the TPB to investigate household food waste behaviour (Van der Werf *et al.*, 2020), household food waste reduction (Graham-Rowe *et al.*,2015) and household food waste recycling (Mak *et al.*, 2018). In recent years, academics have focussed their attention on food waste in universities. On measures to reduce food waste, Derqui and Fernandez (2017) established standardized vital indicators of food waste audits and employed indicators to assess plate waste in school canteens, motivating managers to develop food waste reduction initiatives. Pinto *et al.* (2018) demonstrated that a simple environmental education initiative can significantly reduce plate waste in university canteens by increasing awareness of daily food waste, while Ellison *et al.* (2019) illustrated that the education campaign has no impact on students' food waste behaviour, only alters their beliefs related to food waste. Some scholars focussed on the impact of food waste, for example, García-Herrero *et al.* (2021) evaluated the effects of food consumption and wastage by integrating life cycle assessment, environmental life cycle costing, nutritional evaluation and a food waste audit. On the influencing factors of food waste, Richardson *et al.* (2021) indicated that changing the plate shape and size is a strategy to reduce food waste in a university dining hall. Similarly, Zhao and Manning (2019) found that a range of factors influences the amount of food plate waste in a university canteen, including gender, different food categories, plate size, portion size and palatability. Also, Wu *et al.* (2019) evaluated characteristics, influencing factors and environmental effects of plate waste in six universities in Beijing, but the internal factor of individual, the food attribute factor and the environmental factor are ignored. Qian *et al.* (2021) investigated the influencing factors of university students' food waste generation from individual-level and family-level characteristics, catering features and regional locations, but the cognitive factors of college students are ignored.

Stancu *et al.* (2016) suggested that food-related variables should be included in the TPB to explain food waste behaviour fully. Except cognitive factors of TPB, students' food waste behaviour is also related to moral factor, food attribute factor and environmental factor. Moral judgements have shown to be significant in understanding food choice behaviour (Raats *et al.*, 1995). The integration of moral norms in the TPB has demonstrated its utility in behavioural research. Furthermore, it is verified that the power of TPB could be substantially enhanced by including the element of the moral norm in the study of energy consumption (Abrahamse and Steg, 2009). Food waste behaviour seems to include moral aspects, as customers feel guilty or concerned about discarding food (Stefan *et al.*, 2013). Reduced food waste behaviour may be seen as altruistic since it requires people to sacrifice personal benefits to preserve the air and environment. Besides, students' behaviour of wasting food is related to the taste of food in campus canteens. Taste is regarded as one of the most critical senses known to influence the foods consumed (Steptoe *et al.*, 1995). When consumers consider food to have an unpleasant taste, they generally leave food on the plate (Marais *et al.*, 2017). In addition, students' food wasting behaviour will also be affected by the campus climate. A university is an organization with an organizational climate. Organizational climate refers to "common practices, shared beliefs, and value systems that an organization follows" (Chen and Huang, 2007). Some studies asserted that organizational climate is multidimensional and investigated various aspects (Patterson *et al.*, 2005). Recently, an increasing number of academics have begun to examine domain-specific organizational

climates, such as organizational learning climate (Park and Rothwell, 2009), organizational innovation climate (Hsu and Fan, 2010) and organizational electricity-saving climate (Zhang *et al.*, 2013). In this paper, our research focusses on college students' food waste behaviour. Campus food-saving climate is defined as students' perception that saving food is encouraged and supported in the university campus. Some scholars pointed out that the factors influencing university students' food waste are multidimensional (Qian *et al.*, 2021). To fully understand students' food waste behaviour, it is crucial to add the internal factors of the individuals, the food attribute factors and the environmental factors. This paper introduces the organizational climate in human resources into the field of food waste for the first time. In this study, based on the TPB, we add moral norm, food taste and campus food-saving climate to study students' food waste behaviour.

2.2 Research hypothesis development

The TPB posits that the intention determines behaviour, and intention is determined by attitudes, subjective norms and perceived behaviour control (Ajzen, 1991). When individuals hold a positive attitude towards specific behaviours, their willingness to participate will increase. Individuals may experience psychological pressure and are more inclined to participate in food waste reduction activities if they consider that significant other people expect them to join in a specific behaviour. Individuals are more inclined to participate in an activity if they have sufficient control over it. In terms of food waste, we anticipate attitudes, subjective norms and perceived behavioural control to positively influence people's behaviour intention according to the TPB (Ajzen, 1991).

According to the food waste literature, TPB has been widely applied to analyse household food waste behaviour. The researcher employed TPB to verify the factors and correlations of household food waste behaviour. For example, Aktas *et al.* (2018) observed that all components of TPB influenced intention to reduce food waste, and behavioural intention promoted food waste behaviour in families. However, there is little study on food waste at campus canteens adopting TPB. Prior studies in the restaurant setting have employed TPB to understand the behavioural intention in choosing environmentally friendly restaurants (Jang *et al.*, 2015). Thus, the TPB model is used to evaluate food waste behaviour at campus canteens. We provide the following hypotheses according to the above analysis:

H1a. Attitude to food waste is positively related to intention to reduce food waste.

H1b. Subjective norm is positively related to intention to reduce food waste.

H1c. Perceived behavioural control is positively related to intention to reduce food waste.

H1d. Intention to reduce food waste is negatively related to food waste behaviour.

Moral norm refers to an individual's assessment of the moral correctness or incorrectness of a certain behaviour (Ajzen, 1991). It has been suggested that a moral or ethical component to behaviour should be incorporated in the TPB model (Conner and Sparks, 2005). According to a recent study in the environmental literature, moral norm is a valuable contributor to the TPB. The TPB comprises moral norms to illustrate people's intentions to engage in different pro-environmental behaviours. For example, it has been shown that moral norms significantly influence the willingness to recycle (Chan and Bishop, 2013). In addition, a moral responsibility to minimize food waste was often mentioned as a motivator to discard less food in interview studies (Graham-Rowe *et al.*, 2015). Regarding food waste, the behaviour of wasting food is influenced by moral elements. If people feel guilty after discarding food away (Parizeau *et al.*, 2015), they will be obligated to prevent wasting food and protect the natural environment. We anticipate that higher moral norm will contribute to less food waste. Thus, we propose the following research hypothesis:

H2. Moral norm is positively related to intention to reduce food waste.

Taste is regarded as one of the most essential senses in determining the foods consumed (Steptoe *et al.*, 1995). It is formed by combining oral perception, taste experience and olfaction sense (Moskowitz, 1978). Food waste study examines whether food taste influences food waste behaviour. Food taste, it seems, has a significant effect on whether or not food is consumed (Jagau and Vyrastekova, 2017). When consumers consider food to have a poor taste, they generally leave food on the dish. Given that food's taste creates appeal, if the taste does not match consumer expectations, it may easily be discarded (Marais *et al.*, 2017). Therefore, the following research hypothesis is established:

H3. Food taste positively affects intention to reduce food waste.

The organizational climate plays a vital role in shaping workers' perceptions and behaviours and refers to employees' assessments of an organization's practices and policies (De Clercq and Rius, 2007). The university campus is an organization with its campus atmosphere. University campuses should encourage students to save food by creating a food-saving climate and place a high significance on food saving in a food-saving environment. When a campus has a food-saving climate, students are more likely to conserve food to comply with campus rules and climates. Furthermore, students are more likely to comply with external pressure to conserve food when campuses have a higher level of food-saving environment since not saving food undermines publicly acceptable behaviour climates, which may generate their poor image and psychological pressure. In contrast, when the food-saving climate is low or non-existent, students will feel less pressure to conserve food. Therefore, when the campus food-saving climate is powerful, the influence of intention to reduce food waste on food waste behaviour can be weakened. Conversely, when the food-saving climate is low, the intention to reduce food waste becomes an influential factor affecting food waste behaviour. As a result, the following hypothesis is presented:

H4. Campus food-saving climate negatively moderates the effect of intention to reduce food waste on food waste behaviour.

Drawing upon the above literature and analysis, the TPB framework was introduced to explain food waste behaviour. Figure 1 presents the conceptual framework.

3. Methodology

3.1 Sample and data

The questionnaire survey was sent out through Sojump (http://www.sojump.com/). A link to the questionnaire was placed on a research platform. Respondents completed the survey and

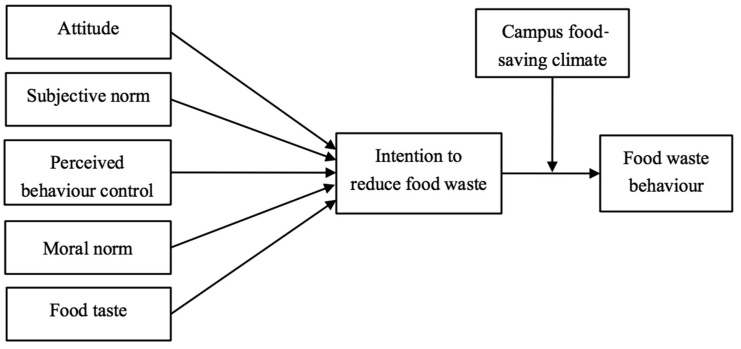

Figure 1.
Conceptual framework

were awarded points that can be redeemed for money. After deleting the invalid questionnaires, 513 valid questionnaires were analysed, including respondents from different demographic backgrounds. The demographic details are shown in Table 1. Female made up 57.5% of all participants. The participants were aged under the age of 30. Moreover, monthly income was below 6000 CNY for 90.6%.

3.2 Measures

This study used the mature scale from earlier studies to ensure the validity of the items. Items for attitude were derived from Van der Werf *et al.* (2020) and Aysen and Yetkin Ozbuk (2020). Items for subjective norm were derived from Russell *et al.* (2017) and Aysen and Yetkin Ozbuk (2020). Items for perceived behaviour control were derived from Stefan *et al.* (2013) and Aysen and Yetkin Ozbuk (2020). The items of moral norm were adapted from Stancu *et al.* (2016) and Thø gersen and Olander (2006). The items of food taste were adapted from Aysen and Yetkin Ozbuk (2020) and Tanner and Wölfing (2003). The items of intention to reduce food waste were derived from Aysen and Yetkin Ozbuk (2020) and Visschers *et al.* (2016). Items for campus food-saving climate were developed based on Zhang *et al.* (2013) and Bock *et al.* (2005). The scale of food waste behaviour was adapted based on Stancu *et al.* (2016) and Stefan *et al.* (2013). Because the original items were written in English, they were translated to Chinese using a back-translation process. We adjusted the items in light of the research setting. Then, two marketing students were invited to review the questionnaire. They provided helpful suggestions for modifying the item language. The language fluency of some items was revised based on their feedback. From the respondents' perspective, the final form of the questionnaire is simple and easy to understand. According to previous studies on food waste behaviour (Van der Werf *et al.*, 2020; Aydin and Yildirim, 2021), this study employed seven-point Likert scale to measure variables, ranging from strongly disagree (1) to strongly agree (7).

4. Data analysis and results

This research utilized SPSS 18 and AMOS 20 to analyse survey data. First, the measurement model's reliability and validity were investigated. Second, in this research, all hypotheses were tested.

4.1 Measurement model

We employed confirmatory factor analysis (CFA) to confirm the measurement model prior to testing the hypotheses. Table 2 displays the scales' reliability and validity scores.

Table 1. Demographic characteristics of the sample

Variable	Categories	Frequency	Percent (%)
Gender	Male	218	42.5
	Female	295	57.5
Age	≤20	231	45
	21–30	282	55
	>30	0	0
Education	Junior college degree	113	22
	Bachelor's degree	192	37.4
	Master's degree or above	208	40.6
Monthly income(CNY)	≤3,000	299	58.3
	3,001–6,000	166	32.4
	6,001–10,000	48	9.4
	>10,000	0	0

The Cronbach's alpha of each construct ranged from 0.745 to 0.890. As a result, the scale is reasonably reliable (Fornell and Larcker, 1981). Furthermore, the composite reliability scores of all constructs were larger than 0.7. For each construct, the average variance extracted (AVE) was more than 0.5. According to the analysis above, the scale has sufficient convergent validity (Bagozzi and Yi, 1988).

To verify discriminant validity, the correlation coefficient and square root of the AVE of each concept were analysed. It exhibits the discriminant validity provided in Table 3. The square root of the AVE of each construct was found to be larger than their corresponding correlation coefficients with the construct. Thus, the scales achieved sufficient discriminant validity (Paulraj *et al.*, 2008).

This study used self-reports to collect data, which may contribute to common method bias. To remove the bias, we employ the standard assessment method that Harman's single-factor test was implemented to evaluate the bias (Podsakoff *et al.*, 2003). The analysis results reported that all the items were extracted into seven factors, and the most enormous explained variance was 25.913% that was less than the threshold of 30% (Malhotra *et al.*, 2006). Thus, the common method bias was not observed in this research.

4.2 Hypothesis testing

4.2.1 Results of path coefficient test. To calculate the path coefficient, the structural equation model was used in this study. The results of path coefficients are displayed in Figure 2. We can

Construct	α	CR	AVE
Attitude	0.860	0.860	0.673
Subjective norm	0.786	0.801	0.573
Perceived behaviour control	0.868	0.875	0.636
Moral norm	0.816	0.821	0.605
Food taste	0.887	0.894	0.679
Campus food-saving climate	0.745	0.753	0.509
Intention to reduce food waste	0.868	0.873	0.633
Food waste behaviour	0.890	0.893	0.677

Note(s): α = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted

Table 2. Results of measurement model analysis

Constructs	1	2	3	4	5	6	7	8
Attitude	*0.820*							
Subjective norm	0.348	*0.757*						
Perceived behaviour control	0.355	0.353	*0.797*					
Moral norm	0.426	0.256	0.174	*0.778*				
Food taste	0.160	0.161	0.198	0.172	*0.824*			
Campus food-saving climate	−0.006	−0.033	0.056	0.060	−0.023	*0.713*		
Intention to reduce food waste	0.325	0.375	0.284	0.321	0.273	−0.034	*0.796*	
Food waste behaviour	−0.555	−0.496	−0.468	−0.370	−0.130	0.025	−0.466	*0.823*

Note(s): 1. Off-diagonal elements are correlations between constructs; 2. Diagonal elements are the square root of average variance extracted

Table 3. Discriminant validity analysis

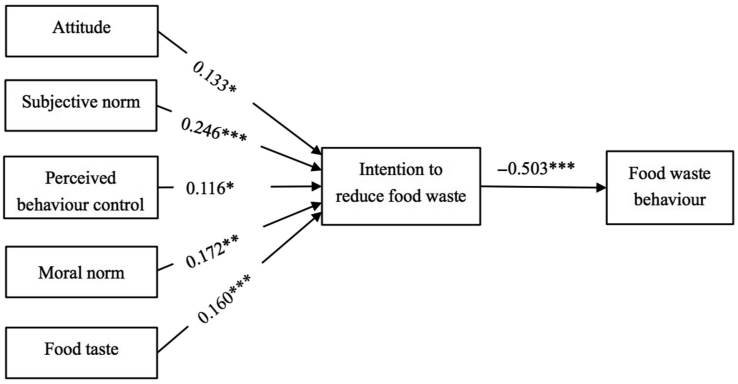

Figure 2.
Results of path coefficients

Note(s): *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

find that attitude positively correlates to intention to reduce food waste ($\beta = 0.133$, $p < 0.05$). As such, H1a is supported. The path coefficient from subjective norm to intention to reduce food waste ($\beta = 0.246$, $p < 0.001$) is positive and significant. Hence, H1b is supported. Perceived behaviour control is positively connected to intention to reduce food waste ($\beta = 0.116$, $p < 0.05$). Therefore, H1c is supported. Intention to reduce food waste is negatively linked to food waste behaviour ($\beta = -0.503$, $p < 0.001$). Thus, H1d is supported. In addition, moral norm and food taste are significantly linked to intention to reduce food waste ($\beta = 0.172$, $p < 0.01$; $\beta = 0.160$, $p < 0.001$), respectively. Hence, these findings support H2 and H3.

4.2.2 Moderating effect. This study employed hierarchical regression analysis to examine the moderating effects. We conducted three procedures for moderating effects. First, to eliminate the influence of different measurements of variables on the statistical results, we constructed an interaction term of standardized independent and moderating variables after standardizing the independent and moderating variables. Second, the dependent variable, as well as the control variables, was included in the equation. The independent and moderating variables were then introduced one after the other. Third, the interaction term was then introduced to the equation.

The study examines the moderating effect of campus food-saving climate based on the above analysis steps. According to Table 4, model 1 exhibited the link between control variables and food waste behaviour. Based on model 1, model 2 added intention to reduce food waste as the independent variable. The result showed that intention to reduce food waste is negatively related to food waste behaviour ($\beta = -0.23$, $p < 0.001$). In other words, the stronger students' intention to save food, the less they waste food. From model 3, campus food-saving climate negatively moderates the connection between intention to reduce food waste and food waste behaviour ($\beta = -0.077$, $p = 0.024 < 0.05$). That is to say, campus food-saving climate is conducive to weaken the negative impact between intention to reduce food waste and food waste behaviour. Hence, hypothesis H4 is supported.

To comprehend the moderating impact clearly, this study provided a diagram that displays a moderating effect. A standard deviation above and below the mean of campus food-saving climate was used to create high and low levels (Li and Tang, 2010; Dawson, 2014). As illustrated in Figure 3, the moderator of campus food-saving climate significantly influenced the relationship between intention to reduce food waste and food waste behaviour.

Dependent variables	Food waste behaviour M1	M2	M3
1.Control variables			
Gender	−0.122**	−0.111**	−0.112**
Age	−0.107*	−0.082	−0.082
Education	−0.087	−0.079	−0.075
Income	0.051	0.016	0.019
Experience	−0.498***	−0.438***	−0.439***
2.Independent variable			
Intention to reduce food waste		−0.23***	−0.229***
3.Moderating variable			
Campus food-saving climate		0.03	0.023
4.Moderating effect			
Intention to reduce food waste * campus food-saving climate			−0.077*
R^2	0.367	0.413	0.419
Adj. R^2	0.36	0.405	0.409
F	58.707***	50.707***	45.365***

Note(s): *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 4.
Hierarchical regression results

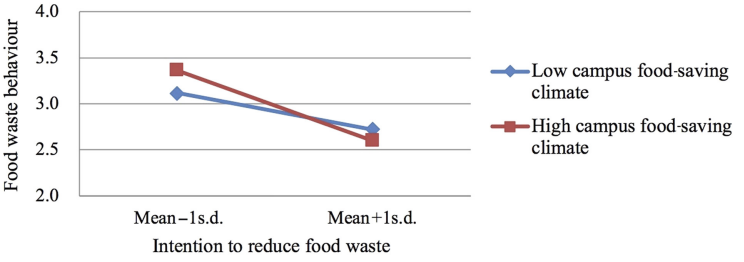

Figure 3.
The moderating effect of campus food-saving climate

5. Conclusions and discussions

Previous studies investigating the behaviour of food waste mainly focussed on household food waste behaviour and reducing food waste. However, existing studies rarely focus on food waste in campus canteens. To achieve our aims, this article applies organizational climate in human resources to the field of food waste for the first time. Based on the extended TPB, the present research examined an integrated model of food waste behaviour that included conventional cognitive variables (attitudes, subjective norms, perceived behavioural control), moral factor (moral norm), food attribute factor (food taste) and environmental factor (campus food-saving climate).

Attitude is inextricably linked to intention to reduce food waste, which contradicts prior research. This result is not in accordance with study (Wu *et al.*, 2019). The possible reason is that the research sample focusses on six universities in Beijing, and China's capital is a developed metropolis in the north. Also, prior studies have shown attitude has no influence on intention to reduce household food waste (Russell *et al.*, 2017). What might be generating such inconsistent behaviour? We expect that household food waste behaviour is the same as campus food waste behaviour, but in fact, they are different in many aspects. For students, the campus canteen is just a place to eat and cannot store food. Rarely do students have a high income or need to make shopping plans. With the development of economy, students' environmental awareness has been improved, and food waste has been reduced. The

university will publicize to students to eliminate the waste of food and cherish the hard-won food so that they understand that wasting food is a bad habit and increase the behaviour of reducing food waste. The more favourable a student's attitude toward food waste is, the more possible food waste reduction will occur. Subjective norm is associated with the intention of food waste reduction. This result is not consistent with the study (Wu *et al.*, 2019) but in accordance with studies (Visschers *et al.*, 2016). Therefore, if students feel the pressure of saving food from the atmosphere, they will be willing to reduce food waste. Perceived behaviour control is associated with the intention to minimize food waste and is seen as a vital driver of that intention. This result is consistent with the study (Wu *et al.*, 2019). But there are different views. For example, Stancu *et al.* (2016) asserted that perceived behavioural control is irrelevant to the willingness not to waste. University campuses publicize to students not to waste food. Students' intention to reduce food waste will enhance if they consider power over the amounts of food wasted at campus canteens. The findings indicated that the stronger a student's perceived behavioural control over eating habits at canteens, the less food waste occurs.

The moral norm does play a part in the drive to reduce food waste. However, this finding contradicts previous studies indicating that the moral norm did not significantly impact (Stancu *et al.*, 2016). Students' moral awareness is generally strong, which contributes to the intentional reduction of food waste. As anticipated, this research discovered a significant influence on food taste on the intention to reduce food waste. This finding contradicts past research indicating a negative correlation between the two (Aysen and Yetkin Ozbuk, 2020). This finding shows that people who make food selections based on their taste have a higher inclination to minimize food waste. Moreover, in university dining, the intention to minimize food waste was a strong predictor of food waste behaviour. This finding also confirms a previous study (Russell *et al.*, 2017), revealing that individuals with a greater degree of desire to limit food waste reported less waste. Finally, campus food-saving climate weakens the negative impact between intention to reduce food waste and food waste behaviour. The food-saving climate can make students feel the external pressure of wasting food and promote the change of students' behaviour.

6. Implications and limitations

6.1 Practical implications

The research has significant implications for both academics and practitioners. This study highlights the importance of moral factor, food attribute factor, environmental factor in combination with cognitive predictors in explaining food waste behaviour. Our findings indicate that promoting a positive attitude, subjective norms and a feeling of control may be useful methods for enhancing intention to avoid food waste. The campuses should provide food-saving education to improve students' awareness and pressure of food saving and help to increase students' sense of control to reduce food waste. Also, the universities should strengthen the educational advocacy, practically cultivate the habit of saving and create an atmosphere of shame on waste and honor on saving. For instance, in university canteens, electronic screens can be used to display slogans calling for saving food. Canteen managers can stick small signs on the dining table to remind students not to waste food and place a sign next to the food residue table to appeal to students that food is hard won. All these help improve students' awareness of saving food and develop the habit of saving food.

The study suggests that wasting food is immoral behaviour. There are ways to promote moral norms. University campuses should take a series of educational measures to promote students' moral responsibility to save food and make students understand the negative consequences of food waste (e.g. number of hungry people in the world). This can be achieved by disseminating how much food and how much resources they waste by their waste

behaviour. It helps students realize that wasting food is immoral and produces a sense of guilt about wasting food to reduce food waste. Besides, canteen managers should investigate students' eating tastes and launch food packages, which is conducive to formulate a wide variety of food plans that meet most students' needs. In addition, campus food-saving climate plays a vital role in reducing students' food waste behaviour. Combined with "clean your plate" campaign advocated by the government, the universities should take some educational guidance to foster the development of a food-saving climate that encourages food conservation. Some initiatives, such as encouraging campus canteens to set a specific objective of food savings, can be implemented. Additionally, best practices for reducing food waste may increase students' knowledge and awareness about food waste. Schools can improve students' understanding of environmental problems through environmental courses or environmental practice. This will help transform students' awareness of food waste into food-saving behaviour.

6.2 Limitations and future research

It is necessary to acknowledge some of the limitations of this study. First, countries all over the world attach importance to food waste behaviour. However, different countries have different cultures and institutional contexts. Therefore, a replication of this study in other countries is performed to evaluate the generalizability of the findings. Second, as time and the environment change, people's thinking and behaviour may change. The questionnaire data are used in this paper. The model may be verified with longitudinal data in future investigations to improve the stability of the research findings. Third, this study only investigates students' food waste behaviour. There are other types of staff on campus, such as faculty. Between faculty and students, there should be many distinctions (e.g. different economic status). Other elements such as smaller plates, paying for food by the portion, considering the menu may also influence food waste behaviour. Hence, future research can include more consideration when extending the findings of this study to other samples and on other elements. Fourth, students' food waste behaviour is self-reported behaviour, not the actual observed behaviour in this paper. In future research, target groups can be selected and their wasted food can be weighed by conducting field studies. This helps to replace self-reported behaviour with actual food waste behaviour, thus improving the stability of research results.

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