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Theoretical Approaches to Food Waste Behaviours: An Overview

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Abstract

Food waste around the world has emerged as a pressing issue that calls for attention and intervention. Analysing the food waste problem without understanding wasteful behaviour antecedents may oversimplify this multi-faceted issue, which will then compromise the development of interventions. This paper provides an overview of the theoretical approaches to food waste behaviour antecedents, followed by evidence-based interventions, using the Theory of Planned Behaviour (TPB), the Norm Activation Model (NAM), and the Social Practice Theory (SPT). These theories encompass the psychological, behavioural, societal, material, and structural factors that influence food waste practices. Our aim is to obtain a holistic understanding on the antecedents of food waste behaviours and theory-based interventions.

Introduction

In recent years, food waste around the world has emerged as a pressing issue that calls for attention and intervention. With reference to the United Nations Environment Programme (UNEP), food wastage reaches a staggering amount of 931 million tonnes per annum. On a per capita scale, the average global food waste per year is 74 kg. This amount is comparable across country income groups (low, lower-middle, upper-middle, and high-income), indicating that the efforts to mitigate and prevent food waste should be emphasized at the universal level [1].

Food waste is viewed as an environmental crisis as it poses threat to planetary health. An array of environmentally unsustainable activities is performed during the food production stage, which depletes the variability of living species and destruct the areas of habitat [2]. These irresponsible practices include deforestation, overuse of fossil fuel, overfishing, as well as the exploitation of groundwater and wetland. In addition to habitat loss and destruction, food waste is exacerbating climate change and pollution [3]. The mismanaged food wastes will eventually end up in landfills and emit greenhouse gases such as methane gas and carbon dioxide, which aggravates global warming [4–5]. Food waste is also a serious societal burden. Unfortunately, this excess food did not help to reduce global hunger due to the uneven distribution of food resources [6–7]. On one side of the world, roughly 720 to 811 million people live in food scarcity and insecurity [8]; on the other side, an abundant amount of food has been wasted due to oversupply, excessive access, and high affordability [9]. The wasted food could have been used effectively to combat hunger in countries that encounter food shortages. Furthermore, the economic costs of food waste are also worth noting. Within households, the wasting cycle of purchasing foods, not eating them, and discarding them represents monetary losses in the family [10]. In a global context, food production requires a considerable amount of the world's energy,

water, and land resources [11]. These finite resources are wasted all at once when food waste occurs [12].

In response to these food waste ramifications, the target of halving food waste at the retail and consumer levels by 2030 to ensure a sustainable food system has been set in motion by the United Nations (UN), as stated in the Sustainable Development Goal (SDG) 12, Target 12.3. In our previous work, we extensively explored the drivers and barriers to household food waste reduction and prevention [13]. The understanding of the impact of one's food waste on health, environment and economy would promote food waste management. More importantly, promising food waste reduction interventions call for a theoretical understanding of behavioural antecedents in the first place. Theoretical frameworks being applied in exploring the determinants of food waste behaviours can serve as a reference in the development or improvement of interventions [14].

Hence, this paper provides an overview of the theoretical approaches to food waste behaviours antecedents, followed by a theory-based intervention using the Theory of Planned Behaviour (TPB) [15], the Norm Activation Model (NAM) [16], and the Social Practice Theory (SPT) [17]. This article serves as an implication for stakeholders who commit to tackling food waste issues to derive a holistic understanding on antecedents of food waste practices and design interventions through theoretical lenses.

Theoretical approaches to food waste behaviours antecedents

TPB, NAM, and SPT are the theoretical frameworks that have dominated the scholarly discussion in food waste. These theories capture the psychological, behavioural, societal, material, and structural variables that predict food waste behaviours. In the following sub-sections, the main concepts of each theory and their applicability to the food waste context are discussed.

1) Theory of planned behaviour (TPB)

The TPB is a social psychological theory that depicts the transformation of cognitive antecedents into real-world behaviours (Figure 1) [18]. It is an extension of the theory of reasoned action (TRA) which applies to behaviours beyond an individual's volitional control [19]. The perceived behavioural control (PBC), which represents one's perception of their capability to perform certain behaviours, either viewing their desired action as challenging or relatively easy to perform [20], is added as a new antecedent to intention and behaviour in TPB, which else remains unchanged. The other antecedents are the attitude, which refers to one's overall appraisal of their behaviours, either evaluating

their ways of acting as positive or negative, and the subjective norm, which reflects one's perceived social pressure and expectation to comply in particular ways [21]. These mechanisms activate the direct precursor of behaviours, which is one's intention to perform specific actions. Finally, the heightened intention predicts the actual performance of the desired behaviours [18].

In a research conducted by Davies et al. [19] to study recycling intention and behaviour, the TRA failed to predict recycling behaviour due to several factors: (1) TRA explained only 3% of the variance in recycling behaviour and had poor model fit with a Hosmer-Lemeshow p value of 0.30; (2) recycling intention failed to predict recycling behaviour using TRA; (3) past behaviour, which was included as additional antecedent, had greater predictive power than subjective norm to predict recycling intention; and (4) attitude had no effect on recycling intention but had a direct impact on recycling behaviour. In contrast, TPB outperformed TRA in predicting recycling behaviour and had a good model-fit with a Hosmer-Lemeshow p value of 0.64 although the predictive usefulness was minimal. Nevertheless, few limitations are found in TPB, and will be further discuss.

When applying TPB to the food waste reduction context, people who hold favourable attitudes to decrease food waste, who perceive their significant others approve of their food waste reduction behaviours, and who feel in control of and are confident in their ability to curb food waste are predicted to have positive intentions to mitigate food waste. The enhanced intention thereby transforms into actual food waste reduction behaviours [22].

Previous literature has adopted extended versions of TPB in their food waste studies [22–24]. This approach facilitates newer discovery of different psychological and behavioural variables that explain food waste practices, which complement the original predictors of TPB (attitudes, subjective norms, and perceived behavioural control). For instance, a study from the United Kingdom revealed that the positive role of pro-environmental self-identity, guilty concerns, and anticipated regret for wasting food are the key determinant factors of one's intention to reduce food waste [22]. Research in Iran derived similar findings, suggesting that one's guilty feelings associated with food waste predict future waste reduction behaviours [24]. Moreover, a study from Southern Italy identified behavioural factors that enhance one's motivation to reduce food waste, which are planning for shopping routines and serving accurate meal portion sizes [23]. In Malaysia, a study revealed that knowledge about the

negative impact of food waste and individuals' perceived benefits have positive impact on individuals' attitudes, which in turn enhance the intention for food waste management [25]. The study highlighted that environmental awareness should be promoted wherever feasible, and the psychological and individual impact of moral commitments are positively associated to intention, with higher moral obligation associated with stronger intention, which is in line with the results of studies conducted in Taiwan [26], Iran [27], Denmark [28], and among the Romanian consumers [29], indicating that moral values is a critical variable in explaining food waste behaviour (see Figure 1). This moral obligation, defined as the personal norm, is the most direct precedent of behaviours in the norm activation model, which will be discussed in the next section.

Furthermore, the TPB model is also appropriate for modelling behaviours even in extreme circumstances as Zhang et al. [30] found significant correlation between TPB and consumption behaviours following an avian influenza outbreak in China in 2017. Mejia et al. [31] indicated that the context of COVID-19 pandemic must be considered when predicting food waste management's intention and behaviour. Specifically, financial views, concerns over COVID-19, and the return to normality (no lockdown) act as important predictors of intention to reduce household food waste. Rodgers et al. [32] also pointed out that the pandemic has created situations that led to alterations in attitudes and behaviour regarding household food waste. Cross-cultural disparities were observed, which is possibly influenced by lower baseline levels of food waste in certain countries and pandemic-related impacts on food habits and behaviours, rather than the epidemic's duration or severity. For instance, more participants in the United States demonstrated perceptions of decreasing food waste than those in Italy, which could be attributed to the already lower baseline levels of food waste in Italy [33], potentially resulting in a floor effect where those who were already concerned about food waste did not perceive changes in their behaviour due to the epidemic, and the Italian participants had been under more restrictive circumstances for a longer period of time than the participants from the United States.

Even though the applicability of TPB in food waste research is well-evident, the controversies surrounding the predicting role of intention on behaviours must not be overlooked. Specifically, 'intention-behaviour' gap, the major critiques of TPB will be discussed later.

2) Norm activation model (NAM)

The NAM proposes that personal norm is the most direct precursor of behaviours. One's awareness of consequences (AC) and ascription of responsibility (AR) are the pre-conditions to activate personal norms (Figure 2). Personal norm signifies the belief and perceived obligation to behave in socially and personally desirable manners in specific circumstances [16]. AC refers to one's consciousness of whether their actions bring consequences or welfare to their surroundings [34]. AR refers to one's sense of accountability for any undesirable outcomes and the subsequent responsible behaviours to ease the issue [16].

Theoretically, the personal norm against wasting food is activated when people become aware of food waste consequences and ascribe the responsibility for mitigating food waste. The activated personal norm and commitment further mobilizes one's actual behaviours to prevent food waste [16], which contradicts with TPB that suggests AC and personal norm as dependant variables in enhancing the intention of food waste management behaviours. Moreover, the NAM model indicated that AC could influence the personal norm directly or indirectly by influencing the AR, which will in turn affect the personal norm, intention, and behaviour [35–36] (see Figure 2).
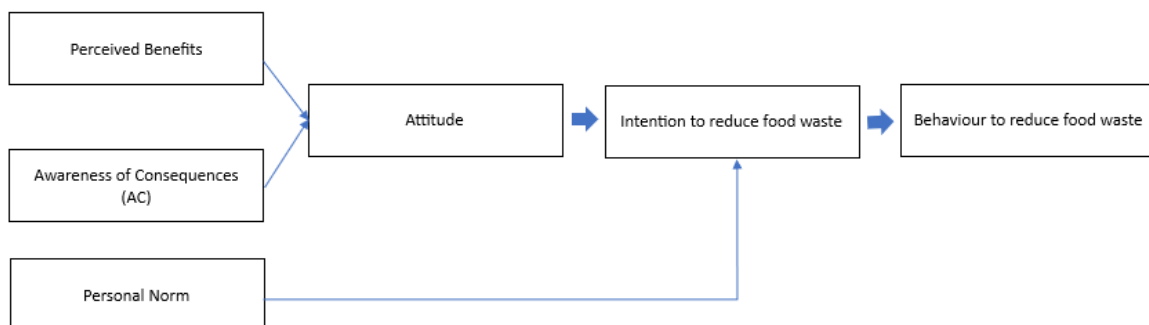

Figure 1 Extended version of TPB with awareness of consequences, perceived benefits, and personal moral norm as antecedents.
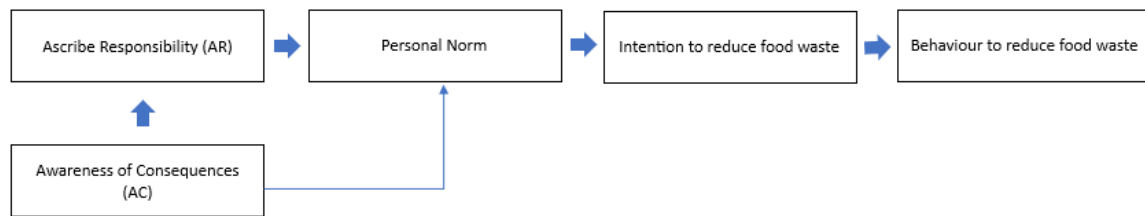
Figure 2 NAM illustrating that AC can influence personal norm directly or indirectly by influencing the AR.

On one hand, contrary to Isnaini and Halim (2023), other researchers (i.e., [16, 36–37]) found no significant impact of AC towards personal norm, which may be due to that emotional components have a greater influence and explanatory power on ecologically beneficial behaviours compared to cognitive factors. On the other hand, despite the difference in the models' structures, consistency of results was demonstrated as Obuobi et al. [36] extended NAM (see Figure 3) which instilled the awareness of benefits and lack of concern as antecedents found that awareness of benefits following a positive action will favorably influence the AR, while a lack of concern will negatively influence the intention, in which this is in line with the results reported by Stefan et al. [29] that utilize the TPB (see Figure 4).

Self-efficacy, a person's faith in their ability to manage their actions and life events is another antecedent commonly introduced in the extended version of NAM to explore the impact of psychological factors on behaviour intentions. Self-efficacy does not only indirectly impact intention through personal norm, but also has a direct influence on behaviour [37]. Moreover, Kim et al. [38] included self-efficacy as a moderator between personal norm and intention (see Figure 5) and found that it reinforced the impact of personal norm on intention of food waste reduction, indicating that individuals who identify actions that they are able to carry out will have higher intention to reduce food waste compared to those who do not.

However, one's norm or commitment to reducing food waste is easily underplayed. The first reason is that people often fail to acknowledge their food waste behaviours which could aggravate the global food waste crisis, which justifies their low level of AC [39]. The second explanation is that consumers tend to shirk the responsibility to reduce food waste in food industries and retail, resulting in a low level of AR. For example, consumers blame the marketing strategies that prompt them to purchase more than required and buy the low-price yet poor-quality groceries that lead

to food waste [40]. Nevertheless, NAM is found to supersedes TRA and TPB in predicting certain behaviour, which will be discussed later.

3) Social practice theory (SPT)

The SPT sheds light on human behaviours by offering sociological insights into food waste issues [41]. Contrary to the psychology-based approaches such as TPB that seek to investigate key cognitive, intrapersonal, intentional, structural, and motivational aspects and processes that drive or impede pro-environmental conduct [42], SPT regards food waste as a social problem rather than an individual problem by decentring the responsibility for reducing food waste from individuals whilst viewing socio-cultural structures as collectively responsible for tackling food-wasting practices [43]. Stefan et al. [29] indicated that the intentions to food waste reduction did not have a significant influence on reported food waste; rather, food waste is an outcome of the daily routines that individuals execute. Therefore, SPT aims to assess beyond an individual's attitude towards behaviour modification in managing food waste.

In this theory, the term "practices" consist of three elements, as noted by Shove et al. [17]. The first element is material, which includes facilities, instruments, and infrastructure. Second, competence, which refers to expertise, understanding, and skills. Third, meaning, which implies the practical or symbolic importance of performing behaviours of interest. Notably, Sahakian and Wilhite [44] implies that each element plays a significant role; and, modification of any of these three elements may alter habits and affect the outcome, altering multiple elements is likely to terminate a habit, and adopting only one element may not lead to behaviour change. Therefore, a material or technology is only effective when an individual discover meaning, gain skills, and establish norms regarding it [45]; and, practices are susceptible to be rehearsed, modified, or discontinued via this process [43].
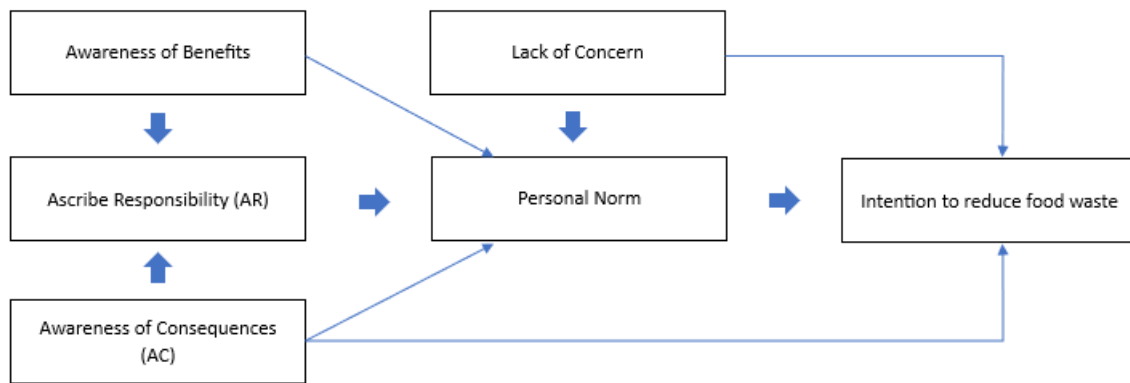
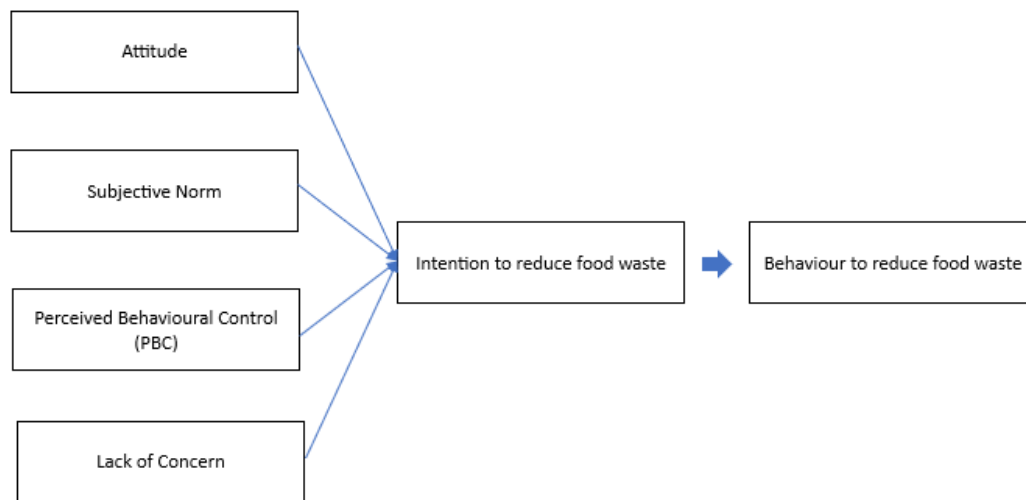**Figure 3** Extended NAM instilling the awareness of benefits and lack of concern as antecedents [36].

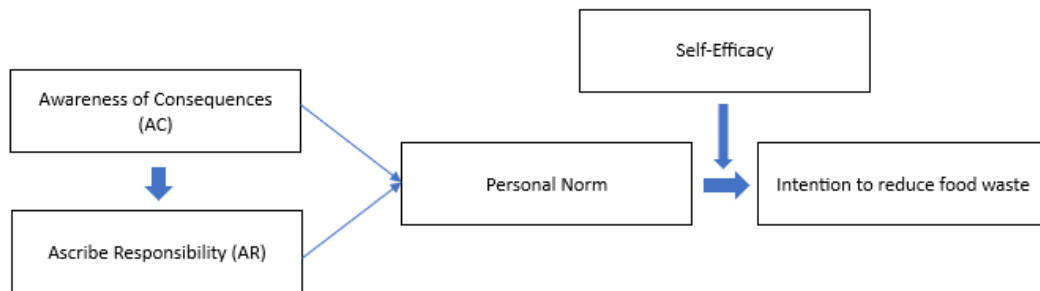**Figure 4** Extended TPB instilling lack of concern as antecedent [29].

Figure 5 NAM instilling self-efficacy as a moderator [38].

According to SPT, in order to foster practices that mitigate food waste, it is imperative to have the equipment and infrastructure that help manage food sustainably. Furthermore, possessing adequate food waste prevention know-how, and deriving a sense of purpose to curb food waste are also essential to tackle food waste. The lack of equipment to optimize food storage and space constraints of the kitchen are cited as barriers to food waste reduction [39]. Other impeding factors include one's incompetency in cooking and repurposing leftovers [46–47], insufficient knowledge on examining food safety and interpreting food date labels, and inaccurate estimation of meal portion sizes. These barriers reflect the limitation of material

and structural aspects that hampers food waste reduction efforts (Figure 1(c)).

In short, SPT asserts that interventions that target food waste reduction practices should not solely depend on changing one's psychological or behavioural attributes but also on modifying the structure of the environment to cultivate practices that are convenient and sustainable to perform, which is found to minimize a gap of TPB and will be discussed later.

Theory-based intervention

In this section, TPB, NAM, and SPT serve as the frameworks to inform and guide food waste reduction intervention. We discuss two types of interventions

that are widely recommended and applied in previous food waste studies; (1) educational and awareness campaigns, and (2) technology- and home-based interventions.

1) Educational and awareness campaign

The core of the food waste educational campaign is to provide information that fosters the understanding and awareness of food waste issues, as well as to promote desired attitudinal and behavioural changes [48-49]. Soma et al. [49–50] evaluated the effectiveness of three forms of food waste campaigns among residents in Toronto, Canada. The first type of campaign is the passive information campaign. Participants who were assigned to this campaign received a booklet and newsletters pertinent to food waste issues, guidance on grocery and meal planning, interpretation of food date labels, and skills of reusing leftovers. In addition, they were given practical tips on food waste reduction, and a refrigerator magnet with food storage guidelines. The second form of campaign incorporates gamification elements. Participants played online quiz games with food waste questions, in addition to receiving passive food waste information. The third type of campaign is community-based, where the participants were invited to attend workshops and engage in group activities, along with obtaining passive information. Overall, the passive information campaign and gamified infor-mation campaign showed higher participation rates, greater self-reported food waste awareness, and a lower self-reported amount of food wasted, as compared to the community-based information campaign [49].

Several large-scale food waste campaigns are also worth mentioning. In England, the Love Food, Hate Waste (LFHW) campaign was launched in 2007. This campaign assists the community to act against food waste. LFHW is known for organizing activities such as food waste segregation roadshows, social group works to prevent food waste, as well as cooking courses and competitions; and it has raised notable awareness on food waste reduction among residents [51]. Moreover, the Stop Wasting Food movement in Denmark was initiated in 2008, aiming to bring unsustainable food waste practices throughout the food supply chain to public attention [52].

According to Russell et al. [65], these campaigns can promote stronger subjective norms and a better sense of control that are more effective in mani-pulating food waste behaviour according to TPB and NAM. Additionally, Isnaini and Halim (2023) stated that individuals who are yet to perform food waste reduction behaviours are lack of AC of the behaviour. Thus, educating them on the harmful effects of food

waste through these campaigns serves as the primary steps in preventing food waste as increased awareness is believed to predict higher responsibility and enhance the moral obligation in managing food waste [38]. The idea of increasing the motivation and responsibility of individuals to conduct food waste reduction behaviours by enhancing their AC is also supported by other researchers such as Hamid et al. (2021), Obuobi et al. (2023) and Wang et al. (2022) [36–37, 53].

Studies also demonstrated that better outcomes can be achieved by highlighting the benefits that follows the food waste reduction behaviours further emphasize that these campaigns should be targeted towards ordinary citizens and individuals at household level, and presented with the consequences and benefits at the local, national, and international levels to enhance the impact of AC and perceived benefits on their intentions towards food waste reduction.

Besides, as anticipated pride and moral norms are found to be positively correlated with intention of food waste reduction, related behaviours can be motivated on an individual basis through social marketing campaigns such as Save the Food and Food Recovery Challenge through the disclosure of the feelings of guilt, regret and conscience experienced by individuals when they conduct food wasting behaviours, and in contrary, revealing the feelings of satisfaction, joy and confidence when they participated in house-hold food waste reduction activities [54].

Apart from the launching of these campaigns, the absence of organizational support was identified by students as a major barrier to waste separation [55]. Hamid et al. (2022) and Lucie et al. (2022) suggested local government and policymakers to consider pro-viding an in-home composting bin to certain households as this action was found to facilitate composting and remove an obstacle to this practice, which then in turn motivates individuals to sort out food waste from discarded matters.

Evidently, the advantages of an information-educational campaign come in several forms: (1) raise awareness toward food waste issues; (2) promote and activate the norms for tackling food waste; and (3) enhance one's knowledge, competence, and intention to reduce food waste. Campaign-based intervention is in line with the rationale of TPB and NAM that targets food waste behaviours from psychological, behavioural, and societal perspectives, which encourages attitudinal and behavioural changes. Hence, it is recommended that researchers incorporate TPB and NAM frame-works into their design of food waste interventions.

2) Technology- and home-based interventions

As suggested by the SPT, innovative technologies work collaboratively with psychological, behavioural, and societal interventions to promote food waste reduction. Past research identifies the disposal of expired yet edible food as one of the major drivers of food waste generation [56-57]. In response to this issue, smart food labels are designed. As stated in Hebrok and Boks (2017), the Bump Mark is an intelligent label that when human's fingers are attached to it, it appears smooth if the products are fresh while providing bumpy tactile senses when food deteriorates. This label helps consumers to examine food edibility through bio-reactive features rather than solely view expiry date as disposal criteria [58]. Besides, the Time-Temperature-Indicator (TTI) devices will display a measurable change in temperature over time, representing the entire or partial temperature history of a food product. Low quality and potentially dangerous food can be recognised by the changing colour which is based on the temperature and time since packaging [41].

In addition, the lack of visibility of products in the fridge leading to expired or spoiled food is also the main cause of food waste [59]. The intelligent fridge camera mentioned in Ganglbauer et al. [60] captures and sends real-time images within the fridge to a website where consumers can access it and track their food stock. This smart appliance facilitates consumers' grocery planning and buying decisions. Besides that, the idea of colour-coding the fridge by categorizing food groups into assorted colours has also been developed [61]. For example, red is assigned to meat while green is for fruits and vegetables. Farr-Wharton et al. [61] reported the positive effect of the colour-coding scheme on increased awareness of unconsumed food in the fridge and decreased amount of expired food waste among Australian households.

Nevertheless, the barrier is the lack of knowledge in handling leftovers and surpluses [23]. Concerning this issue, the role of online platforms on food donation, sharing, and sales are emerging. Corbo and Fraticelli [62] conducted a study in Italy that analysed eight food waste management websites and mobile apps. This research draws a distinction among these digital platforms. The first distinguishing feature is the type of givers, which often involve households, businesses, or hybrids. The second distinctive aspect is the type of transaction, which generally includes food donations or sales. Food donations occur when givers share or redistribute uneaten foods to residential communities, food service industries, or charity organizations. Food sales, on the other side, take place when grocery or shop retailers sell food products with aesthetic imperfections at relatively low prices to consumers. Amongst these transactions (food donation or sales), Corbo and Fraticelli discovered that some are taken place with a mediator involved while others do not. A mediator helps in ensuring the safety of redistributed food and monitoring the reallocation of food for organizations. These digital platforms enable consumers to better manage their food waste sustainably [62]. However, consumers express worries over the safety of shared food and their lack of confidence in the donor; therefore, food sharing is yet a commonly accepted practice [63].

Apart from that, smartphone apps like "Love your Leftovers" (Britain) and "Zu Gut fur die Tonne" (Germany) offer households with recipes for leftover meals and helpful tips on prolonging shelf life, and websites like BigOven (https://www.bigoven.com/) and SuperCook (https://www.supercook.com/#/desktop) offer users with recipes by making the most out of their excess fresh, perishable goods or leftovers [64].

The advancement of technology enhances one's competency in optimizing food storage and managing leftovers. These technologies- and home-based interventions are consistent with the principles of SPT, which emphasize the material and structural aspects that support food waste reduction efforts.

'Intention-behaviour' gap and integration of theories

Although TPB has acquired good empirical support in explaining environmentally relevant behaviours, one of the primary critiques is that it inadequately reflects the contribution of the non-cognitive determinants (e.g., habits and emotions) of behaviours that are less visible to others, such as the food waste behaviour, in which the impact of social normative determinants tends to be less crucial [65]. This indicates that TPB itself is insufficient to predict certain behaviours, often leading to extended versions of TPB which incorporated both the traditional cognitive variables (attitude, subjective norms, perceived behavioural control) and various other additional antecedents (moral norms, perceived benefits and consequences, habits, emotions). Schanes et al. [28] stated that cognitive and intrapersonal traits can only partially predict intention and, to a lesser degree, the actual behaviour. Moreover, Stefan et al. [29] did not observe a significant effect of intention on reported food waste after including shopping and planning routines as the additional determinants, and a regression analysis by Davies et al. [19] found that intention did not significantly predict recycling behaviour. A typical explanation for the weak correlation between intention and behaviour is the

'intention-behaviour' gap which illustrates the discrepancies between one intention and the enaction of behaviour. In other words, one's motivations to curb food waste often fail to transform into actual practices against wasting food [22].

Russell et al. [65] also found that negative emotions were positively associated with food wasting behaviour, contradicting the results of Bamberg and Mцşer (2007) which demonstrated that greater emotional experiences would enhance intention and subsequently, behaviour of food waste reduction. This further emphasize the significance of not utilizing intention as an alternate measure for behaviour and illustrates that approaches that overlook the interplay of habits and emotions are inadequate to accurately reflect the psychological causes of food waste behaviour. Additionally, Shove [66] stated that educational campaigns that address motivations and challenges to influence behaviour, which was based on the ABC paradigm, where social transformation is believed to be influenced by individuals' values and attitudes (A), which drives their behaviour (B) that they choose (C) to adopt, although possessed the strongest impact, still found the 'intention-behaviour' gap [66]. Thus, to minimize this gap, various theories and factors with diverse degrees can be incorporated to enhance the predictive ability [67].

Firstly, SPT is found to be effective in minimizing the 'intention-behaviour' gap in the context of food waste. Fraj-Andres et al. [67] and Schanes et al. [41] both demonstrated that young consumers' intention to reduce food waste can be attributed to household routines such as planning food shopping, managing leftovers, and practicing behaviours such as evaluating product condition before disposing it. Secondly, the TPB-NAM model has been found to have greater predictive power and has been widely used to study pro-social and pro-environmental behaviours. For instance, Fang et al.'s study in Taipei, Taiwan implementing the TPB-NAM model successfully predicted the city residents' recycling behavior [68]; and, Hamid et al. (2021) found that the elements of TPB and NAM were significantly correlated, and a stronger predictive power was demonstrated on home composting intention compared to TPB model alone [53]. Moreover, Teng et al. [69]incorporated social norm as the moderator in TPB to study if it enhances the positive impact of food choice motives on the intention of minimising food waste, and results showed that social norm, as a moderator, is also effective in enhancing the favourable impacts of customers' price sensitivity and ethical concern on the intention of food waste reduction. Lastly, Davies et al.'s (2002) study

implementing the integrated model of TPB and NAM by including personal norms as the additional antecedent, was found to increase the predictability of TPB on recycling intention by 7% and has a greater predictive power than utilizing TRA, TPB or NAM alone [19].

Beyond these theories, Mehrabian and Russell's (1974) theory of Stimuli-Organism-Response (S-O-R) where emotions play a prominent part in the organism and individuals are exposed to external stimuli, is rarely applied in the context of food waste but is proved to be suitable to explain the issue [54, 67]. Several factors are identified to be predictive of food waste intention and behaviour and may fall under the S-O-R. For example, trips, celebrations, expiration dates, marketing strategies and promotions are part of the stimuli [65–67], emotions under organism [54, 65], and the response will be food waste reduction.

To conclude, existence of the 'intention-behaviour' gap of TPB and stronger predictor power of integrated models compared to that of the TPB, NAM or SPT alone supports Foxall's (1997) view that the attitude-intention-behaviour framework focuses on mental determinants instead of the behaviour itself. Future research is suggested to integrate different models and theories when studying about a certain behaviour to increase the accuracy and predictability of the model [19].

Conclusions

This paper provides an overview of the theoretical approaches to food waste behaviours using the Theory of Planned Behaviour, the Norm Activation Model and the Social Practice Theory. It is imperative for stakeholders who strive to tackle food waste issues to adopt these theories in the development of interventions. In this vein, a comprehensive food waste behaviour antecedent can be explored while a promising intervention can be designed and introduced to the community. Ultimately, solving our planet's food waste issues is a potential solution to other environmental concerns such as climate change, resource depletion, and pollution.

Acknowledgement

Conflicts of Interest

Authors declared no conflict of interest.

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