

# The role of impulsiveness and habit strength in reducing food waste

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Impulsiveness  
and habit in  
reducing food  
waste

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## Abstract

**Purpose** – This study applies and extends goal concepts by exploring the roles of goal intention and implementation planning in explaining how consumers minimize food waste (FW). It consists of impulsiveness in a food domain and food waste-related habit strength as obstacles in this motivational process.

**Design/methodology/approach** – Survey data from 399 Vietnamese consumers and structural equation modeling are used to test the proposed model.

**Findings** – The results establish a causal mechanism from goal intention to food waste reduction behavior via implementation planning. It also highlights mechanisms in which impulsiveness leads to a weak goal intention and careless implementation planning, consolidates FW-related habit strength and makes consumers fail to achieve food waste reduction (FWR) goals.

**Research limitations/implications** – Future studies would benefit by investigating FWR behavior in different contexts based on the theory of trying or model of goal-directed behavior with the other traits, such as self-esteem or environmental values.

**Practical implications** – Businesses should design smaller eating portions to limit consumer impulsiveness in buying food. Food policymakers should educate consumers to form and maintain implementation planning, provide them with useful tools to deal with food habits or stimulate ethical motives to reduce FW.

**Originality/value** – This study extends goal concepts by exploring different routes, highlighting the competing roles of impulsiveness and habit strength compared with goal intention on FWR behavior.

**Keywords** Food waste reduction, Goal concepts, Impulsiveness, Habit strength, Structural equation modeling, Vietnam

**Paper type** Research paper

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## Introduction

Consumers and households are proven as primary sources of food waste (FW) generation (Graham-Rowe *et al.*, 2019). For example, Vietnam has been facing a severe problem with household FW when the estimated results of FW generation in Vietnam for 2015, 2020 and 2025 are 21,420; 33,264 and 49,920 tonnes per day, respectively (Nguyen *et al.*, 2014). According to National Institute of Nutrition of Vietnam, the average amount of food consumption per day for a typical Vietnamese person is about 0.523 kilograms (adequacy of 2,100 kcal per day). Therefore, if all kinds of food were wasted with a same ratio and such amounts of FW were prevented, the number of Vietnamese people that could be fed per day, about 41 million for 2015, 64 million for 2020 and 95 million for 2025. Although FW can happen throughout food supply chains, reducing it at consumers or households is considered a priority (Schmidt and Matthies, 2018). Thus, there is an emphasis that preventing household FW represents a crucial leverage point for promoting sustainable consumption (e.g. Kaur *et al.*, 2022; Porpino, 2016; Schanes *et al.*, 2018; Schmidt and Matthies, 2018). In this

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perspective, understanding different factors and routes affecting household FW for developing interventions is essential (Stancu *et al.*, 2015; Stefan *et al.*, 2013).

Previous studies use alternative theories, such as the theory of interpersonal behavior (e.g. Russell *et al.*, 2017), the comprehensive model of environmental psychology (e.g. Graham-Rowe *et al.*, 2019), social practice theory (e.g. Schanes and Stagl, 2019), attitudinal theories (e.g. theory of planned behavior – TPB; Stefan *et al.*, 2013; Stancu *et al.*, 2015) or a combination of those (e.g. Heidari *et al.*, 2020) to explain household FW-related behaviors. However, those perspectives are limited in explaining household FW-related behaviors due to difficulties in operationalizing intentions and behavior to ensure the compatibility of the constructs (e.g. Attiq *et al.*, 2021; Stancu *et al.*, 2015; Stefan *et al.*, 2013). For the limitations, this study adopts a recycling waste perspective to treat FW reduction (FWR) as a goal-directed process (Thøgersen, 1994). It focuses on FWR behavior rather than FW behavior. In this sense, this study follows the approach for goal concepts to split intention into goal intention and implementation planning (Bagozzi and Dabholkar, 1999). Because implementation planning encourages people to engage in more frequent, specific action, it is suggested to partially mediate the intention–behavior relationship (Luszczynska *et al.*, 2007). Therefore, this explores the main route to FWR about how goal intention minimizes FW, hereafter called goal intention, can explain FWR via implementation planning to reduce FW, hereafter called implementation planning.

A recent review emphasizes the role of implementation planning in reducing household FW (Lins *et al.*, 2021). Still, poor planning is also among the main reasons for the high amount of FW (Silvennoinen *et al.*, 2019). Consumers have ambivalent attitudes towards FW prevention and feel conflicts between goal intention and individual preferences and tendencies (Schanes *et al.*, 2018). Although goal intention and implementation planning can be set up, consumers are often distracted by habits (Verplanken and Faes, 1999). Also, it is suggested that the goal-directing process is better understood if habits are included (Thøgersen, 1994). Usually, consumers often eliminate leftovers for convenience, are lazy to reheated food or do not like the taste of that food, resulting in FW. If those behaviors are repeated, FW-related habit strength (hereafter called habit strength) could be formed (Gollwitzer and Oettingen, 1998). Those conflicts require much research to obtain a more comprehensive understanding and find practical solutions to the problem (e.g. Porpino, 2016; Schanes *et al.*, 2018; Schmidt and Matthies, 2018; Stancu *et al.*, 2015). Therefore, this study extends the goal concepts by comprising habit strength as a counter-intentional force competing with the goal intention to harm implementation planning (Verplanken and Faes, 1999). This study expects goal intention and habit strength to have a combined but opposite impact on implementation planning, forming competing routes to FWR.

Furthermore, habit strength is a process in which a stimulus generates an impulse to act (Gardner, 2015). Thus, it is essential to consider impulsiveness (e.g. in a food domain) and habit strength (Verplanken and Orbell, 2003; Verplanken and Sato, 2011) to understand consumer responses with insufficient goal intention or implementation plan, resulting in maladaptive actions of FW generation. As the abstract constructs, impulsiveness in the food domain and habit strength are expected to capture the most salient impulsive (e.g. overpreparation, excessive purchase or overstockpiling; Porpino *et al.*, 2015) and habitual factors (e.g. shopping, storing or cooking routines; Schanes *et al.*, 2018; Stancu *et al.*, 2015) as the most predictors of FW-related behaviors. However, no study we have known has explored their combined role in FW-related behaviors. Thus, this study continuously extends the goal concepts by combining impulsiveness and habit strength and exploring new routes (e.g. impulsiveness → goal intention/implementation/habit strength → FWR), which is expected to generate effective interventions (Verplanken and Orbell, 2003; Verplanken and Sato, 2011) to FWR.

For FW issues, most previous studies were done in developed Western countries, while we have just known a few studies in developing country contexts (e.g. Kaur *et al.*, 2022;

Thi *et al.*, 2015). Exploring factors explaining FW-related behaviors in a new context is expected to generate additional contributions (Schanes *et al.*, 2018; Schmidt and Matthies, 2018). Therefore, this study makes an effort to answer unexplored questions, such as whether the consequence of the goal of waste reduction (i.e. success or failure) is repealed by goal intention or habit strength in a developing country, Vietnam? Based on a survey sample of 399 Vietnamese consumers, a structural equation modeling approach is used to test the proposed model (Anderson and Gerbing, 1988).

This study aims to contribute to the FW literature by primarily applying the approach for goal concepts to explain FWR. It also primarily combines impulsiveness and habit strength to extend this approach by investigating competing routes to FWR. The following parts discuss a short overview of household FW, develop the research hypotheses, propose a theoretical model, present the research design, analyze the data and discuss the results. The last parts are for some practical implications, limitations and future research.

## Theoretical framework

### *Household food waste: a short overview*

FW is a societal problem with negative consequences for food security, the environment and consumer well-being (Aschemann-Witzel *et al.*, 2015). Household FW could be related to all kinds of food and every stage of the food provisioning process, from purchasing food to preparing and eating it (Stancu *et al.*, 2015). Recent reviews (e.g. Porpino, 2016; Porpino *et al.*, 2015; Schanes *et al.*, 2018; Stefan *et al.*, 2013) revealed behavioral factors (e.g. impulse buying, unplanned purchase, large package preference, overpreparation, excessive purchase, stockpiling, shopping, cooking skills or the like) as the most salient antecedents of household FW. However, most interventions based on these factors are ineffective in decreasing household FW, so it was encouraged to explore different theoretical perspectives behind those factors for further studies (e.g. Porpino, 2016; Schanes *et al.*, 2018). Besides, most previous studies focus on FW behavior, while only a few studies focus on FWR (e.g. Diaz-Ruiz *et al.*, 2018; Heidari *et al.*, 2020; Schmidt, 2016). Therefore, this study extends the current literature of FW research to include impulsiveness (in a food domain) as a personality trait and habit strength to find new ways to explain FWR for effective interventions.

### *Goal intention and implementation planning to reduce food waste*

To reduce FW, consumers must show care throughout this process, from forming goal intention, implementing planning, making purchasing decisions, storing and meal preparation under a series of controlled actions so that FW is at a minimum (Bagozzi and Dabholkar, 1999; Thøgersen, 1994). A few studies suggest that intention and planning to avoid FW are predictors of FW-related behaviors (Stefan *et al.*, 2013; Stancu *et al.*, 2015). However, those studies define planning as a routine of repeated actions (i.e. a habitual behavior). Thus, the nature and content of implementation planning are not fully captured to obtain a goal, which refers to when, where, how and how long consumers should act to reduce FW (Bagozzi and Dabholkar, 1999). In this study, FWR is a goal process; thus, goal intention determines implementation planning (Bagozzi and Dabholkar, 1999; Bagozzi and Warshaw, 1990; Thøgersen, 1994; Verplanken and Faes, 1999). This mechanism is expected to capture households' food provision process and actions entirely on shopping, storing, preparing, consuming, disposal of food and the reciprocal steps (Schanes *et al.*, 2018). Previous studies indicate that implementation planning partially mediates intention–behavior relationships because it encourages people to engage in more frequent, specific action planning (Luszczynska *et al.*, 2007). Therefore, this study suggests the main route from goal intention to FWR via implementation planning (i.e. goal intention → implementation

planning → FWR). It expects that goal intention positively affects implementation planning (Bagozzi and Dabholkar, 1999), and goal intention and implementation planning positively affect FWR.

- H1. Goal intention indirectly affects FWR via implementation planning, in which (a) goal intention positively affects implementation planning and (b) implementation planning positively affects FWR.

#### *Food waste-related habit strength*

FW generation is generally embedded in the established routines of consumers formed in their everyday food consumption and disposal (Stefan *et al.*, 2013; Stancu *et al.*, 2015). Thus, habit strength results from repeatedly performing a behavior (e.g. throwing food) that reaches a point whereby an action is performed with a high degree of automaticity (Verplanken, 2006). This bad habit may be formed due to short-term driven motives (e.g. thrilling food for convenience) at the expense of long-term benefits of attaining valued goals (e.g. saving food for protecting the environment; Verplanken and Faes, 1999). Reducing FW can be achieved through multiple planning courses, such as preparing appropriate portions of meals, storing just enough for a specific period or avoiding buying too much food (Porpino, 2016). However, habit strength can involve disliking leftovers or liking surplus meals. Therefore, this bad habit would become a competitor of the goal intention to weaken implementation planning to reduce FW (Gollwitzer and Oettingen, 1998). However, no empirical studies have systematically investigated the role of habit strength as a mental construct in explaining goal intention, implementation planning and FWR.

Previous studies reveal that implementation planning might be more effective when it involves approach behavior than avoidance behavior (Gollwitzer and Brandstatter, 1997). Still, it does not seem to break the negative impact of bad habits (Verplanken and Faes, 1999). A few pieces of evidence indicate that shopping habit and intention to avoid FW has opposite effects on FW behavior (Stancu *et al.*, 2015). Since habit strength reduces the cognitive load of decision-making, it can make such implementation planning fail to obtain expected consequences (Thøgersen, 1994). Because many actions performed daily result from habit strength (Verplanken, 2006), this study suggests that habit strength would harm implementation planning and negatively affect FWR. Based on these discussions, this study extends the approach for goal concepts (Bagozzi and Dabholkar, 1999) to investigate a mediating mechanism of habit strength → implementation planning → FWR as a competing route with the main route of goal intention → implementation planning → FWR.

- H2. (a) Habit strength directly and (b) indirectly affects FWR via implementation planning, in which (c) it negatively affects implementation planning.

#### *Impulsiveness in a food domain*

The role of consumer impulsiveness in driving FW is controversial and unclear in the present literature (van Doorn, 2016). Consumer impulsive buying is suggested to associate with FW generation due to individual preference for economical grocery shopping, such as quantity discounts in supermarkets (Aschemann-Witzel *et al.*, 2015; Schmidt and Matthies, 2018). A few empirical pieces of evidence support this perspective (e.g. Pfau and Piekarski, 2003). However, previous studies also discuss that a poor shopping plan and an uncertain buying intention might result from the risk of impulsive buying (Parfitt *et al.*, 2010), leading to FW. This viewpoint implies that impulsive buying may increase FW via shopping practices based on poor planning and an uncertain intention to reduce FW.

However, impulsive buying behavior is different from and is affected by impulsiveness as a personality trait (e.g. Badgaiyan and Verma, 2014). Previous studies suggest that

personality traits can influence FW management (e.g. [Aschemann-Witzel et al., 2015](#); [de Hooge et al., 2017](#)). However, we have not known whether the impulsiveness trait affects consumer FW-related behaviors ([Porpino, 2016](#); [Schanes et al., 2018](#)). Therefore, this study includes the impulsiveness trait (in a food domain, hereafter called impulsiveness) as a tendency to find joy in food shopping as a built-in trait that is not expected to change daily ([Badgaiyan and Verma, 2014](#)). It investigates whether this trait affects goal intention, implementation planning and FWR.

A few studies include consumer intention and planning to explain FW-related behaviors; however, the results are limited with weak or non-significant associations ([Stancu et al., 2015](#); [Stefan et al., 2013](#)). Their studies also include some facets of impulsive buying (e.g. overshopping) besides intention and planning; thus, the large variance of FW-related behaviors is captured by those facets. Avoidance of impulsive buying has a high potential for intended behavioral changes to reduce FW ([Schmidt and Matthies, 2018](#)). However, the stable nature of impulsiveness may weaken goal intention and implementation planning, making these motivations fail to reduce FW. Therefore, this study proposes that impulsiveness negatively affects goal intention, implementation planning and FWR. The discussions above also imply indirect effects of impulsiveness on FWR via implementation planning and goal intention. Therefore, this study continuously extends the approach for goal concepts ([Bagozzi and Dabholkar, 1999](#)) to include the third and fourth routes of impulsiveness → implementation planning/goal intention → FWR.

H3. Impulsiveness indirectly affects FWR via implementation planning, in which (a) it negatively affects implementation planning.

H4. Impulsiveness indirectly affects FWR via goal intention, in which (a) it negatively affects goal intention.

Furthermore, avoiding impulsive buying of more food than currently necessary can lead to FW-preventing habits and increase the likelihood of household FW-preventing ([Schmidt, 2016](#)). In contrast, impulsiveness may lead to bad habits of wasting food in the exact mechanism ([Verplanken and Faes, 1999](#)). Although the relationship between impulsiveness and bad habits has been discussed in some studies (e.g. [Verplanken and Sato, 2011](#)), its relationship with FW-related behaviors is still unexplored. It is believed that impulsive persons have a strong urge to stimulate at the moment without thinking about future consequences ([Bowlin and Baer, 2012](#)). In addition, impulsive people are more vulnerable to the omnipresent temptation of tasty food, leading them to overbuy food ([Guerrieri et al., 2007](#)). These tendencies to overbuying and without thinking about future consequences can lead to repeated FW behavior and, in turn, form habit strength ([Verplanken and Orbell, 2003](#)).

A few pieces of evidence from qualitative studies show that consumers tend to minimize FW based on their good habits ([Stuart, 2009](#)). In contrast, [Porpino et al. \(2015\)](#) report that Brazilian mothers have the habit of cooking from scratch, which leads to overpreparing and more waste. Therefore, habit strength may play an essential part in understanding a widespread phenomenon such as FWR. If FW behavior has habitual characteristics, it should have implications for persuasive communication that can be used to change FW-related habits. Thus, this study expects impulsiveness to affect habit strength positively and forms the last route of impulsiveness → habit strength → FWR.

H5. Impulsiveness indirectly affects FWR via habit strength, in which (a) it positively affects habit strength.

H6. Impulsiveness negatively affects FWR.

Methods

Research context and sample

This study investigates how Vietnamese consumers reduce FW, including all food and beverage edible products before disposal (Stefan *et al.*, 2013; Stancu *et al.*, 2015). Regardless of many efforts from local to national levels, the effectiveness of policies to solve the problem is limited due to a lack of legal framework, low coverage, improper waste storage, less encouragement for composting, lack of proper disposal practices and public awareness (Thanh and Matsui, 2011). While this country is still poor, with income per capita at a low end of the world's average level, household FW has increased, resulting in many social, moral, health, economic and unethical issues (Thi *et al.*, 2015). Therefore, this context is interesting to investigate households' FWR.

A self-administrated survey questionnaire was used to collect data from Vietnamese consumers who represent their families. A sample of 399 consumers were given the questionnaire and self-completed under the interviewer's guideline through convenience sampling from the Mekong Delta region in Vietnam. The Mekong Delta region was also chosen to investigate household solid waste generation by previous studies (e.g. Thanh and Matsui, 2011; Thanh *et al.*, 2010). The respondents were informed that the survey concerned FW in their households and asked to participate in the survey voluntarily. The demographic information of the sample is shown in Table 1.

Construct measurements

FWR was measured by asking respondents to indicate the levels of their FW prevention on one item in the form: "On one side, I have to ensure quality meals for my family, but on the other side, I regularly buy and prepare (type of food) with as little amount as possible" using a seven-point scale (1 = Never – 7 = Always). This item was adapted from prior studies (e.g. Diaz-Ruiz *et al.*, 2018; Heidari *et al.*, 2020) to measure FWR for nine food sub-categories that consumers often buy and prepare on a typical day. These food sub-categories are the main subjects of FW generation named dairy, fresh fruits, vegetables, meat, fish, seafood, beverage, rice and other rice products (Stefan *et al.*, 2013).

Goal intention was measured using three items used by Stancu *et al.* (2015) but was adjusted to capture the formation of a goal intention (Bagozzi and Dabholkar, 1999). This study used three items to measure implementation planning to reflect shopping, storing and

Table 1.  
Demographics

Demographics	Frequency	%	Demographics	Frequency	%
<i>Gender</i>			<i>Religion</i>		
Female	222	55.6	Yes	300	75.2
Male	177	44.4	No	99	24.8
<i>Residential area</i>			<i>Marital status</i>		
Countryside	268	67.2	Married	297	74.4
Urban	131	32.8	Single	102	25.6
<i>Income (VND)</i>			<i>Age</i>		
Under 3 (million)	24	6.0	Under 36 years old	201	50.4
3 ÷ 5	75	18.8	36 years old or above	198	49.6
5 ÷ 7	99	24.8	<i>Education</i>		
7 ÷ 9	66	16.5	Primary school	45	11.3
9 ÷ 11	57	14.3	High school, intermediate	125	31.3
11 ÷ 13	22	5.5	College	65	16.3
13 ÷ 15	22	5.5	University	141	35.3
From 15	34	8.5	Higher education	23	5.8
<i>Total</i>	399	100.0		399	100.0



preparing meals for households (e.g. [Luszczynska et al., 2007](#)). Habit strength was measured using a subscale including four items extracted from a 12-item self-report index of habit strength scale ([Verplanken and Orbell, 2003](#)). This subscale represents four different facets of the habit strength: automaticity, lack of awareness, lack of control and mental efficiency, used by previous studies (e.g. [Honkanen et al., 2005](#)). Impulsiveness was based on [Badgaiyan and Verma \(2014\)](#). This scale was justified to adapt to the retailing context from the original impulsiveness scale ([Rook and Fisher, 1995](#)). This scale included eight items, with four items measuring the affective component while the other four measuring the cognitive part of the trait of impulsive buying tendency in a food retailing context. However, this study eliminated three reverse items similar to implementation planning for shopping. These items were: “Most of my purchases are planned,” “I carefully plan most of my purchases” and “Before I buy something, I always carefully consider whether I need them.” Another item, “I often buy food without thinking” was not also used because it captured the aspect of “lack of awareness,” leading to overlapping with the measure of habit strength. The rest of the four-item subscale used in this study fulfills the impulsive nature of spontaneity, lack of reflection and planning and impulsivity ([Rook and Fisher, 1995](#)). The measures of goal intention, implementation planning, habit strength and impulsiveness were rated on a seven-point Likert-type scale (1 = Entirely disagree – 7 = Entirely agree).

### Analytical procedures

A confirmatory factor analysis was performed to evaluate the measurements’ internal consistency, convergent and discriminant validity ([Anderson and Gerbing, 1988](#)). Next, a structural equation model was used to estimate the proposed model. The fit is reported by chi-squared ( $\chi^2$ ) and three other fit indices: *RMSEA*, *GFI* and *CFI*. *RMSEA* should be < 0.08, and *GFI* and *CFI* should be greater than 0.90, indicating a good model fit ([Browne and Cudeck, 1993](#)).

## Results

### Measurement model analysis

A CFA of the measurement model including five constructs results in an acceptable fit with the data ( $\chi^2 = 276.73$ ;  $df = 106$ ,  $p = 0.000$ ; *RMSEA* = 0.064; *GFI* = 0.921; *CFI* = 0.969). [Table 2](#) and [Appendix](#) present the results of the CFA.

As shown in [Appendix](#), all factor loadings on the constructs were highly significant ( $p < 0.001$ :  $t$ -value > 13.0) with values ranging from 0.62 to 0.94, which shows the convergent validity of the constructs. The composite reliabilities exceeded the minimum value of 0.70, and the variances extracted surpassed the recommended threshold of 0.50 ([Anderson and Gerbing, 1988](#)). Most absolute values of correlations were below 0.60 (see [Table 2](#)), and the squared correlation between each pair of constructs was less than the average variance extracted from each pair of constructs, which constitutes the discriminant validity among the constructs ([Fornell and Larcker, 1981](#)).

Constructs	Mean	SD	1	2	3	4	5
1. Food waste reduction behavior	2.98	1.90	1.00				
2. Goal intention	3.75	1.67	0.18	1.00			
3. Implementation planning	4.08	1.47	0.50	0.21	1.00		
4. Habit strength	3.70	1.59	−0.60	−0.08 <sup>ns</sup>	−0.64	1.00	
5. Impulsiveness	4.02	1.41	−0.39	−0.24	−0.52	0.49	1.00

**Note(s):** ns: Non-significant at  $p < 0.05$

**Table 2.**  
Construct means,  
standard deviations,  
and correlations

**Table 3.**  
Testing the proposed hypotheses

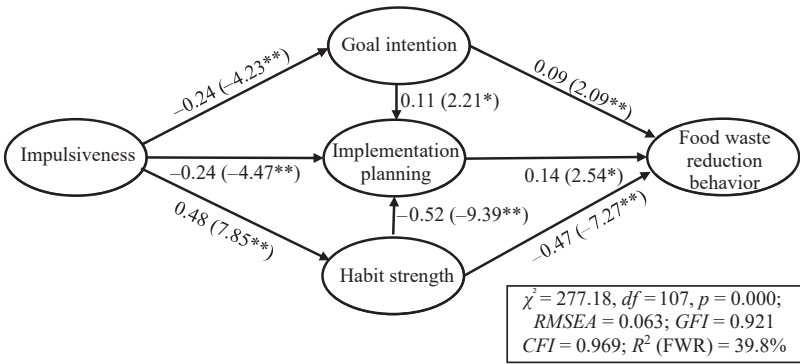
*Testing proposed hypotheses*

The estimated results in Table 3 indicate the acceptable fit with the data of the estimated model ( $\chi^2 = 277.18$ ;  $df = 107$ ,  $p = 0.000$ ;  $RMSEA = 0.063$ ;  $GFI = 0.921$ ;  $CFI = 0.969$ ). The estimated model showing the significant relationships between the constructs is shown in Figure 1.

The results in Table 3 indicate that most proposed hypotheses are supported by the data. Specifically, goal intention has an indirect effect on FWR via implementation planning (H1:  $\beta = 0.004 \div 0.042$  and  $p < 0.05$ ). Besides, the causal relationships of habit strength  $\rightarrow$  implementation planning  $\rightarrow$  FWR (H2b:  $\beta = -0.147 \div -0.013$  and  $p < 0.05$ ) and impulsiveness  $\rightarrow$  implementation planning  $\rightarrow$  FWR (H3:  $\beta = -0.083 \div -0.005$  and  $p < 0.05$ ) are also significant. The results mean that implementation planning keeps a role as a mediator for the effects of goal intention, habit strength and impulsiveness on FWR. Also, impulsiveness indirectly impacts on FWR via goal intention (H4:  $\beta = -0.057 \div -0.002$  and  $p < 0.05$ ) and habit strength (H4:  $\beta = -0.321 \div -0.143$  and  $p < 0.01$ ).

In addition, FWR is found to be positively influenced by implementation planning (H1b:  $\beta = 0.14$ ,  $t = 2.21$  and  $p < 0.01$ ) and goal intention (H4b:  $\beta = 0.09$ ,  $t = 2.09$  and  $p < 0.05$ ).

Relationships	Coefficients		Conclusion
<i>Indirect effects</i>			
	<i>Confidence intervals 95%</i>	<i>p-values</i>	
Goal intention → IP → FWR	0.004 ÷ 0.042	$p < 0.05$	H1: Supported
Habit strength → IP → FWR	−0.147 ÷ −0.013	$p < 0.05$	H2b: Supported
Impulsiveness → IP → FWR	−0.083 ÷ −0.005	$p < 0.05$	H3: Supported
Impulsiveness → Goal intention → FWR	−0.057 ÷ −0.002	$p < 0.05$	H4: Supported
Impulsiveness → Habit strength → FWR	−0.321 ÷ −0.143	$p < 0.01$	H5: Supported
<i>Direct effects</i>			
	<i>Std. estimate</i>	<i>t-value</i>	
Goal intention → IP	0.11	2.21*	H1a: Supported
IP → FWR	0.14	2.54*	H1b: Supported
Habit strength → FWR	−0.47	−7.28**	H2a: Supported
Habit strength → IP	−0.52	−9.39**	H2c: Supported
Impulsiveness → IP	−0.24	−4.47**	H3a: Supported
Impulsiveness → Goal intention	−0.24	−4.23**	H4a: Supported
Goal intention → FWR	0.09	2.09*	H4b: Supported
Impulsiveness → Habit strength	0.48	7.95**	H5a: Supported
Impulsiveness → FWR	−0.06	−1.09 <sup>ns</sup>	H6: Not supported
<b>Note(s):</b> * $p < 0.05$ ; ** $p < 0.01$ ; ns: non-significant; $R^2$ (FWR) = 39.8%; IP: Implementation planning; indirect effects were estimated using bootstrapping procedure in AMOS 24.0			





Especially, FWR is negatively affected by habit strength (H2a:  $\beta = -0.47$ ,  $t = -7.28$  and  $p < 0.01$ ), but not influenced by impulsiveness (H6:  $\beta = -0.06$ ,  $t = -1.09$  and  $p > 0.05$ ). Implementation planning is positively affected by goal intention (H1a:  $\beta = 0.11$ ,  $t = 2.54$  and  $p < 0.05$ ), but negatively associated with habit strength (H2c:  $\beta = -0.52$ ,  $t = -9.39$  and  $p < 0.01$ ) and impulsiveness (H3a:  $\beta = -0.24$ ,  $t = -4.47$  and  $p < 0.01$ ). Impulsiveness has a negative effect on goal intention (H4a:  $\beta = -0.24$ ,  $t = -4.23$  and  $p < 0.01$ ), but a positive effect on habit strength (H5a:  $\beta = 0.48$ ,  $t = 7.95$  and  $p < 0.01$ ). Therefore, the results indicate that impulsiveness weakens goal intention and implementation planning but consolidates habit strength, making the goal of FWR fatal.

## Discussions

This study illustrates an integrated model to explore the role of goal intention and implementation planning in explaining FWR. It is the first study to combine and explore the roles of impulsiveness and habit strength on FWR. It investigates that impulsiveness makes the consumer goal of reducing FW fatal by weakening goal intention and implementation planning but consolidating habit strength. Therefore, this study contributes to the current literature by extending goal concepts (Bagozzi and Dabholkar, 1999) to understand better why consumers' efforts (e.g. goal intention and implementation planning) fail in reducing FW in the presence of conflict tendencies (i.e. habit strength and impulsiveness). This study is also the first to explore factors explaining Vietnamese consumers' FWR, highlighting the global environmental and social phenomenon via additional evidence (Schanes *et al.*, 2018), which is relatively limited in developing country contexts (e.g. Kaur *et al.*, 2022; Thi *et al.*, 2015).

### *Theoretical implications*

Empirical evidence showing the relationships between goal intention, implementation planning and FWR demonstrate the model's predictive validity for consumption goal concepts (Bagozzi and Dabholkar, 1999; Bagozzi and Warshaw, 1990). Therefore, it provides a different mechanism (i.e. the main route of goal intention  $\rightarrow$  implementation planning  $\rightarrow$  FWR) from previous studies based on other approaches (e.g. TPB, environmental psychology, or others: Attiq *et al.*, 2021; Heidari *et al.*, 2020; Graham-Rowe *et al.*, 2019; Russell *et al.*, 2017; Schanes and Stagl, 2019; Stefan *et al.*, 2013; Stancu *et al.*, 2015) to explain FW-related behaviors. Besides, consistent with previous studies (e.g. Heidari *et al.*, 2020; Stancu *et al.*, 2015; Stefan *et al.*, 2013), the results imply that consumers may form awareness about the guilty status of FW and want to change their FW behavior. However, goal intention ( $\beta = 0.09$ ) and implementation planning ( $\beta = 0.14$ ) have weak effects on FWR, indicating that their goal to reduce FW seems less controlled.

This lack of control could also happen to actions following implementation planning (e.g. Stefan *et al.*, 2013; Stancu *et al.*, 2015) by a powerfully negative effect ( $\beta = -0.51$ ) of habit strength on implementation planning. Besides, a strongly negative impact ( $\beta = -0.47$ ) of habit strength on FWR demonstrates that this bad habit is the primary source of household FW. The results showing a solid competing route of habit strength  $\rightarrow$  implementation planning  $\rightarrow$  FWR versus a weak main route of habit strength  $\rightarrow$  implementation planning  $\rightarrow$  FWR are consistent with the established literature (Verplanken and Orbell, 2003; Verplanken and Sato, 2011) but generate new insight into the approach for goal concepts (Bagozzi and Dabholkar, 1999; Bagozzi and Warshaw, 1990). The findings confirm habit strength as a strong competitor of goal intention as the leading cause of ineffective implementation planning, increasing household FW. The findings also extend our knowledge compared with previous studies, including some aspects of habits (e.g. shopping or storing routines) in explaining household FW (e.g. Stancu *et al.*, 2015; Stefan *et al.*, 2013).

This study primarily investigates the relationship between impulsiveness and FWR. It is different from the previous studies, which show a strong effect of impulsive food buying (as behavior) on FW-related behaviors (e.g. [Aschemann-Witzel et al., 2015](#); [Pfau and Piekarski, 2003](#); [Schmidt and Matthies, 2018](#); [Stefan et al., 2013](#); [van Doorn, 2016](#)), this study finds that this association is not significant. Instead, impulsiveness is more profoundly behind goal intention, implementation planning and habit strength. Therefore, this study fulfills calls by previous studies (e.g. [Porpino, 2016](#); [Schanes et al., 2018](#)) to investigate new mechanisms for FW-related behaviors, including FWR. The three routes of impulsiveness → goal/implementation planning/habit strength → FWR reveal that impulsiveness plays an essential role in mediating antimotivations (e.g. a less conscious intention and a poor shopping plan; [Parfitt et al., 2010](#)). The findings also contribute to the current literature to better understand the relationship between impulsiveness and FW-related behaviors (e.g. [de Hooge et al., 2017](#); [Diaz-Ruiz et al., 2018](#)), by which it fulfills a call for more attention to stable traits in explaining FW-related behaviors ([Schanes et al., 2018](#); [Schmidt and Matthies, 2018](#)).

#### *Practical implications*

This study has some practical implications for reducing household FW. Our approach of goal concepts to minimize FW (e.g. goal intention and implementation planning) is consistent with effective communication campaigns (e.g. [Schanes et al., 2018](#); [Schmidt and Matthies, 2018](#); [Stancu et al., 2015](#)). Therefore, food policymakers should encourage consumers to form and maintain goal intention and implementation planning and educate consumers to consolidate such motivations. These policies may be successful in generating possible results in reducing FW. It is worth noticing that implementation planning is more effective than goal intention. Still, such plans are also the result of goal intention. Thus, it is crucial to establish the whole process in the consumers' minds. One way to influence the formation of the entire process is to raise the adverse effects of FW on their life, at least on financial losses and well-being, to enhance their awareness of the phenomenon ([Lins et al., 2021](#)).

However, habit strength is an obstacle to goal intention and implementation planning. Thus, social communication methods should be developed to help improve consumers' buying, storing and preparing skills through television shows for family financial management. Providing consumers with practical tools to deal with their habits and routines around food (e.g. giving shopping list templates or checklists regarding pre-shopping activities) is another effective way to form FW prevention habits (e.g. [Stancu et al., 2015](#)). Also, social communication programs stimulating consumer ethical motives or self-esteem related to food choice and consumption ([Grewal et al., 2019](#)) may be a solution. These motives could enhance consumers' awareness of the negative consequences of FW to change FW-related bad habits ([Verplanken and Faes, 1999](#)).

It is also essential to pay close attention to consumer impulsiveness. Businesses or food policymakers could develop education programs regarding the negative consequences (e.g. more FW can lead to a decrease in quality of life) associated with food impulsive buying. It is noteworthy that impulsiveness entirely results in FW via mediators (e.g. goal intention, implementation planning or habit strength). Therefore, instead of focusing on only this trait, interventions should be considered for the whole process to break each stage in this mediating mechanism. For example, food businesses should use fewer discount coupons and make smaller portions or food packages to limit impulsive consumers from buying more than needed ([Porpino, 2016](#)), thus restricting FW-related habits. Food policymakers should also encourage households to assign different family members to be in charge of one or some activities in the household food provision. This intervention could help limit the negative effect of individual impulsiveness on household food-related plans and increase the feasibility of implementation planning to minimize FW.

### Limitations and future research

Some limitations should be noted. The present research is based on a nonrepresentative Vietnamese consumer sample; therefore, future studies should use more representative samples. This study focuses on FWR. Thus, future studies should investigate other types of wasting behaviors or sustainable food consumption in different contexts. In addition, this study is based on goal concepts (Bagozzi and Dabholkar, 1999). Therefore, it does not capture other attitudinal motivations (e.g. attitudes towards success or failure) and potential mediators of the relationships between individual traits and FWR, such as desires. Further studies can test other perspectives, such as the theory of trying (Bagozzi and Warshaw, 1990), to predict wasting behaviors. This study focuses on consumer impulsiveness in buying food. Therefore, future studies should include a general scale of impulsiveness (e.g. Rook and Fisher, 1995), other traits such as self-esteem (Grewal et al., 2019) or values (Diaz-Ruiz et al., 2018). Finally, this study uses self-reported behavior and correlation methods on cross-sectional data. Experimental designs should be used to address issues of causality in future studies.

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### Further reading

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### Appendix

The appendix for this article can be found online.

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