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Food Quality and Preference

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https://doi.org/10.1016/j.foodqual.2012.11.001

Food Quality and Preference 28 (2013) 375–381

Contents lists available at SciVerse ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

Avoiding food waste by Romanian consumers: The importance of planning and shopping routines

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ARTICLE INFO

Article history:
Received 7 March 2012
Received in revised form 2 October 2012
Accepted 1 November 2012
Available online 10 November 2012

Keywords:
Food
Waste
Shopping
Guilt
Consumer behaviour

ABSTRACT

Food waste is generated in immense amounts across the food life cycle, imposing serious environmental, social and economic consequences. Although consumers are the single biggest contributor to this volume, little is known about the drivers of food waste in households. This exploratory study aims to investigate the role of food choices and other food-related activities in producing food waste. A survey of 244 Romanian consumers examined the influence of intentions not to waste food, planning and shopping routines, as well as moral attitudes and lack of concern towards wasting food, a subjective norm of disapproval towards food waste, and perceived behavioural control on consumers' self-reported food waste. Results show that consumers' planning and shopping routines are important predictors of food waste. Planning and shopping routines are determined by moral attitudes towards food waste and perceived behavioural control. This implies that in order to change consumers' food waste behaviour, efforts should be directed towards providing consumers with skills and tools to deal with their food-related activities.

1. Introduction

In recent years, a decrease in food prices coupled with an apparent abundant availability of food have led to negligence towards food and an increase in wasteful behaviour (Stuart, 2009). Prior research has indicated that consumers are the single biggest contributor to the total volume of food waste generated (Griffin, Sobal, & Lyson, 2009), surpassing the waste generated in harvesting, processing, and distributing food. This amount of food waste is consequential, not just as it represents a monetary loss for households, but also as it wastes natural resources, affects food availability for developing countries, and generates greenhouse gasses (Stuart, 2009). Thus, a good understanding of factors that contribute to the amount of food waste generated by consumers is crucial. Yet, there is a surprising lack of studies investigating food waste disposal from the household food choice and consumer behaviour perspective. In fact, de Coverly, McDonagh, O'Malley, and Patterson (2008, p. 290) state that "While there have been numerous studies of waste commissioned by waste management authorities, these rarely find their way into public or academic domains". Most of the existing academic literature on food waste has focused on estimating the amount of food losses (e.g., Griffin et al., 2009), with little attention to the factors driving these food losses.

The current study examines how could people avoid or reduce the amount of food that they dispose of, focusing on avoidable food waste, which includes all food and drink products that at some point prior to disposal were edible. This type of waste represents the majority of food waste generated at the household level (WRAP, 2009). The disposal of food is the final step in the food provisioning process (Munro, 1995) entailing a series of food-related behaviours from purchasing food to preparing and eating it (Jensen et al., 2012). Throughout this process people make many interrelated decisions, and choices made earlier in the purchasing and preparation processes are likely to influence how much food consumers end up wasting. The ability to balance the purchased and consumed amount of food may be related to practices and routines consumers have built around their household activities, thus these will be investigated in our study.

Our objective is to study food waste from a food-related behaviour perspective and to explore its possible drivers among Romanian consumers. There is reason to believe that most people share an ideal not to waste, as they tend to be waste aversive (Bolton & Alba, 2012). The main question then is whether consumers' planning and shopping routines are important predictors of food waste, over and above intentional processes. Even though the current study focuses on one specific country, Romania, the basic concepts in our framework should be applicable to any society, as argued in previous research (Barr, Gilg, & Ford, 2001).

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http://dx.doi.org/10.1016/j.foodqual.2012.11.001

The present study uses the Theory of Planned Behavior (TPB) (Ajzen, 1991) as a starting point as it has been used to predict household decisions to minimize or recycle waste (Biswas, Licata, McKee, Pullig, & Daughtridge, 2000; Knussen, Yule, MacKenzie, & Wells, 2004) as well as many food-related behaviours (Conner & Armitage, 2002). The TPB has proved to be flexible in looking at the additional role of concepts not originally included in the model, such as past behaviour and executive functions (Collins & Mullan, 2011) or dread of risks (O'Connor & White, 2010), also it has been used as a basis for developing conceptual models of consumer behaviour (Barr et al., 2001). Thus, as the occurrence of food waste is very much embedded in the established routines that people have set up in their everyday food choice and consumption behaviour, these routines will be added to the framework.

The TPB posits that intentions can be predicted by attitudes, subjective norms and perceived behavioural control. In this study attitudes are examined with two concepts that differ from general attitude measurement typically used in a TPB context. First, more general attitudes towards waste were measured as lack of concern about food waste, as people share an ideal not to waste food, thus measuring directly whether people think that wasting food is good or bad is unlikely to differentiate between them and may suggest a normative meaning as well. Second, moral aspects have been argued to be an important addition to the TPB (Conner & Armitage, 1998). In recent studies on food-related behaviours, moral attitudes were included in the TPB to account for moral influences and proved to enhance the prediction of intentions to purchase organic foods (Arvola et al., 2008) or to consume ready-to-eat meals (Olsen, Sijtsema, & Hall, 2010). The moral aspect of attitudes seems relevant for food waste as well, as most consumers feel bothered or guilty when engaging in wasteful behaviour (Bolton & Alba, 2012; Evans, 2012).

Two other constructs influencing intentions are subjective norms and perceived behavioural control. Subjective norms refer to what is considered approved or disapproved behaviour in a specific situation (Ajzen, 1991); people should intend to waste less food if wasting food is disapproved by important others. Perceived behavioural control relates to the degree to which consumers think reducing food waste is under their control. Consumers who lack the skills to buy and prepare only the amount of food that is necessary for their household, may also be short of motivation to form intentions of not wasting food, as they do not feel they have the capability to avoid food waste (Evans, 2012).

In addition to intentions not to waste food, planning and shopping routines may be relevant in explaining the amount of food waste. In the purchase stage, people often follow shopping routines (Maubach, Hoek, & McCreanor, 2009) and report routinely buying more food than needed (Evans, 2012). Planning routines such as checking inventory levels may, for some consumers, decrease product spoilage (Chandon & Wansink, 2006) as it prevents them from underestimating inventory and purchasing items they already have at home. Other planning routines, such as making shopping lists or planning meals in advance, may also help consumers to decrease unplanned purchases and limit food waste (Bell, Corsten, & Knox, 2011).

We expect that planning routines (e.g., checking inventory, making shopping lists, planning meals ahead) will have a negative influence on the amount of food wasted, while certain shopping routines (e.g., buying too much food or unintended products) should have the opposite effect. Following the TPB, attitudes, subjective norms and perceived behavioural control are used to predict intentions not to waste food, which in turn predict the amount of food wasted. In addition, these factors could impact on planning and shopping routines as concerns about wasting food, social pressure not to waste food, and perceived behavioural control may affect these activities (e.g., lead consumers to check inventory levels or to apply self-control while shopping).

2. Method

Data were collected in June 2011 by means of a web-based questionnaire using the Qualtrics software. A focus group discussion with seven respondents and a pilot test with 15 Romanian consumers were conducted to support the questionnaire design. The questionnaire was developed in English, translated into Romanian, and distributed to Romanian consumers through online platforms (Facebook, LinkedIn). A link was sent to potential respondents who were asked to forward it to friends and acquaintances.

A total of 268 Romanian consumers participated in the survey. During data screening, two cases were removed (one outlier and one non-Romanian respondent). Furthermore, 22 respondents were removed because they did not meet the criteria of having some responsibility in both cooking and shopping and having about half of the responsibility for at least one of them resulting in a final sample of 244 respondents. Table 1 provides a summary of demographics as compared to the general population.

2.1. Measurement of constructs

Questions on food waste were asked at the beginning of the questionnaire in order to avoid other questions from biasing responses to these questions. Items were developed by the authors based on previous studies as indicated in Table 2.

Food waste behaviour was measured with one item on general food waste and four items on the waste of specific perishable foods, which prior research has indicated are wasted most (WRAP, 2009). The last item was deleted in the confirmatory factor analysis because of low loading on the corresponding construct. Unlike behaviour and the other constructs, *intentions* were measured in relation to avoidance of food waste, as asking about intentions to waste food would make very little sense to respondents. One item (the likelihood of not throwing away food in the coming week) did not correlate highly with the other intention items, and given its strong behavioural content it was dropped from the final construct. *Planning routines* were measured with three items related to planning of shopping and meals, and *shopping routines* with two items referring to excess purchasing of food. The *attitudes towards food waste* were composed of two constructs: moral attitudes and lack of concern. *Subjective norms* and *Perceived behavioural control*

Table 1
Characteristics of the respondents compared to the general population.

Characteristic	Sample	Population[a]
Household size (mean)	2.88	2.92
Presence of children	30% of households with children <18 years	60% of households with children <25 years
Number of children (mean)	0.41	1.21
Income (mean)	2.000–2.500 LEI	2.316 LEI
Age (mean)	38.2	39.5
Gender	86% females, 14% males	51.2% females, 48.8% males
Area of residence	45% urban areas	55% urban areas

[a] Data from Census of Population and Dwellings, National Institute of Statistics Romania.

Table 2
Confirmatory factor analysis results ($n = 244$).

Factors and items	Factor loadings	CR	AVE
Food waste			
Items worded as: "How much ... would you say that you throw away, of what you buy and/or grow, in a regular week?" ('*not at all*', '*less than a tenth*', '*more than a tenth but less than a quarter*', '*more than a quarter but less than a half*' and '*more than a half*')			
Food	0.69	0.69	0.36
Milk and dairy products	0.58		
Fresh fruits and vegetables	0.56		
Meat and fish	0.56		
Bread and other bakery products[d]	–		
Intention not to waste food			
How likely is it that you will not throw away food during the next week?[d]			
Scale: 'not at all likely'(1) to 'extremely likely' (7)	–		
I intend not to throw away any food over the next week	0.60	0.50	0.33
In general, I try very hard not to throw away food	0.55		
Scale: 'strongly disagree' (1) to 'strongly agree' (7)			
Planning routines			
How frequently do you make a list of the food you want to buy prior to your shopping trip?	0.57		
How frequently do you check your food inventories prior to your shopping trip?	0.74	0.80	0.67
How often do you plan your meals, in advance, for several days ahead?	0.57		
Scale: 'never' (1) to 'always' (7)			
Shopping routines			
How frequently would you say that you buy too much food (more than you need or can eat) when you go shopping?[a]	0.73	0.88	0.66
How frequently would you say that you buy food items that you did not intend to buy?[b]	0.74		
Scale: 'never' (1) to 'always' (7)			
Moral attitudes			
Throwing away food does not bother me[c]	0.88		
When I throw away food I feel guilty[c]	0.75	0.83	0.72
Scale: 'strongly disagree' (1) to 'strongly agree' (7)			
Lack of concern			
I do not really worry about the environmental impact of the food that I throw away	0.87		
I do not really worry about the impact of my food waste on the distribution of resources in the world	0.84		
I do not really worry about the amount of food that I throw away[b]	0.78	0.79	0.58
I do not really worry about the cost of the food that I throw away[b]	0.77		
Scale: 'strongly disagree' (1) to 'strongly agree' (7)			
Subjective norms			
Most people important to me disapprove of me cooking/preparing more than enough food	0.72		
Most people important to me disapprove of me throwing out some food	0.96	0.66	0.40
Scale: 'strongly disagree' (1) to 'strongly agree' (7)			
Perceived behavioural control			
It is very difficult for me to predict exactly how much food is going to be eaten in my household over a regular week[e]	0.41		
I am able to cook and prepare exactly the amount of food that my household needs	0.86		
I am able to buy exactly the amount of food that my household needs	0.93	0.71	0.56
Scale: 'strongly disagree' (1) to 'strongly agree' (7)			

Goodness-of-fit of the measurement model: $\chi^2 = 405.80$, df = 184, $p < 0.001$, $\chi^2/df = 2.20$, IFI = 0.90, CFI = 0.90, RMSEA = 0.07.

[a] Brook Lyndhurst (2007).
[b] Exodus (2007).
[c] Hamilton, Denniss, and Baker (2005).
[d] These items were deleted in the analysis process due to low factor loadings on the corresponding constructs.
[e] These items were reversed for the analysis.

(*PBC*) were measured with two and three items respectively (see Table 2).

In addition to socio-demographics (Table 1), consumers' awareness regarding the amount and type of food they waste and its consequences, their involvement with food and the frequency of their grocery shopping trips were included as background characteristics (Table 3).

2.2. Data analysis

An empirical analysis was run in two stages. First, a preliminary confirmatory factor analysis (CFA) was conducted to test the reliability and validity of the measurement scales. Second, a structural equation model was run in AMOS (Arbuckle, 1995) to test the conceptual model.

The overall goodness-of-fit indices of the confirmatory factor analysis shown at the bottom of Table 2 indicate acceptable fit of the measurement model (MacCallum, Browne, & Sugawara, 1996). Additional testing of scale diagnostics encompassed assessments of convergent validity and discriminant validity (Anderson & Gerbing, 1988). Convergent validity was assessed via the size of the factor loadings. The loadings of items on their respective factors were all, except one, higher than 0.50 and all factor loadings were significant ($p < 0.01$). Item convergence was also assessed through the average variance extracted (AVE) and construct reliability (CR). Fornell and Larcker (1981) suggested that an AVE value equal to or greater than 0.50 and a CR value equal to or greater than 0.70 demonstrate convergent validity. The reported food waste and subjective norms only slightly missed these standards, while the intention not to waste food had somewhat lower but still acceptable values. For all the remaining constructs, both AVE and CR exceeded the cut-off values showing that the indicators effectively measured their construct.

Finally, discriminant validity of the factors was checked (Fornell & Larcker, 1981). The results showed that the average variance ex-

Table 3
Background factors of consumers' food waste.

Items	Mean	Standard deviation
Awareness		
I know exactly how much food we throw away every day	5.0	1.70
I know exactly what kind of food we throw away	5.2	1.59
I am aware of how much money I pay weekly for food that gets thrown away	4.8	1.60
Food waste is not a problem for the environment as it is natural and biodegradable[a,b]	4.7	1.78
The fact that I waste food does not affect the undernourished people in the world because anyway I could not give that food to them	4.1	1.88
Scale: 'strongly disagree' (1) to 'strongly agree' (7)		
Food involvement		
How would you rate your general involvement with food?	5.3	1.24
Scale: 'not at all involved' (1) to 'extremely involved' (7)		
Frequency of shopping	Percentage	
How often do you usually do your main shopping trips?[a]		
• 2–3 times per week or more often	8%	
• once a week	42%	
• 2–3 Times per month or less often	50%	
How often do you usually do smaller "top up" shopping trips?[a]		
• daily	16%	
• 2–3 times per week	37%	
• once a week or less often	47%	

[a] Brook Lyndhurst (2007).
[b] Exodus (2007).

Table 4
Matrix of correlations ($n = 244$).

	1	2	3	4	5	6	7	8
1. Food waste	–							
2. Intention not to waste food	−.27*	–						
3. Planning routines	−.47***	.24*	–					
4. Shopping routines	.73***	−.24*	−.29**	–				
5. Moral attitudes	−.27**	.76***	.32**	−.34***	–			
6. Lack of concern	.22**	−.54***	−.13	.12	−.41***	–		
7. Subjective norms	.14	.25**	−.08	.14	.26***	−.32***	–	
8. PBC	−.62***	.18	.33***	−.66***	.24**	−.14*	−.18**	–

* $p < .05$.
** $p < .01$.
*** $p < .001$.

tracted by the measure of each factor was larger than the square of the correlation estimate of that factor's measure with all measures of other factors in the model (Table 4), indicating sufficient discriminant validity. Consistent with the preliminary confirmatory factor analysis, we conclude that the measurement model is satisfactory.

3. Results

3.1. Background variables

The Romanian respondents report being involved with food issues and being relatively aware of how much food they waste and of how much they pay for the food they waste (Table 3). Comparatively, their awareness of the social and environmental consequences of food waste is much lower.

Some of the background variables significantly correlated with the reported food waste. We found a negative correlation between awareness regarding the amount and cost of food waste and reported food waste ($r = -.14$, $p = .032$). In terms of socio-demographics, age correlated negatively ($r = -.21$, $p = .001$) and household income correlated positively ($r = .14$, $p = .026$) with reported food waste. However, as the coefficients of correlation were relatively low, we did not include these variables in the structural model.

3.2. Conceptual model: drivers of food waste

Fig. 1 shows the results of testing the conceptual model. The model converged well and its fit was satisfactory (as indicated at the bottom of Fig. 1). Overall, explained variance is 65% for food waste, 65% for intentions, 19% for planning routines and 51% for shopping routines.

Results show that the intention not to waste food does not have a significant effect on reported food waste. Rather, planning and shopping routines explain most of the variance in food waste, with the latter having the largest influence. As expected, planning routines have a negative effect on food waste, while shopping routines are positively associated with food waste.

In line with our conceptual model, moral attitudes and lack of concern exert a significant positive and negative impact on the intention not to waste food, respectively. In terms of relative importance, moral attitudes are the most important in explaining individuals' intentions, although, as shown previously, intention is not significantly related with reported behaviour in this study. Furthermore, moral attitudes and perceived behavioural control significantly and positively influence planning routines and negatively influence shopping routines, with perceived behavioural control exerting the most important influence. Overall, the pattern 'perceived behavioural control – shopping routines' has the greatest relative importance in explaining reported food waste. The remaining relationships that have not been mentioned were not significant.

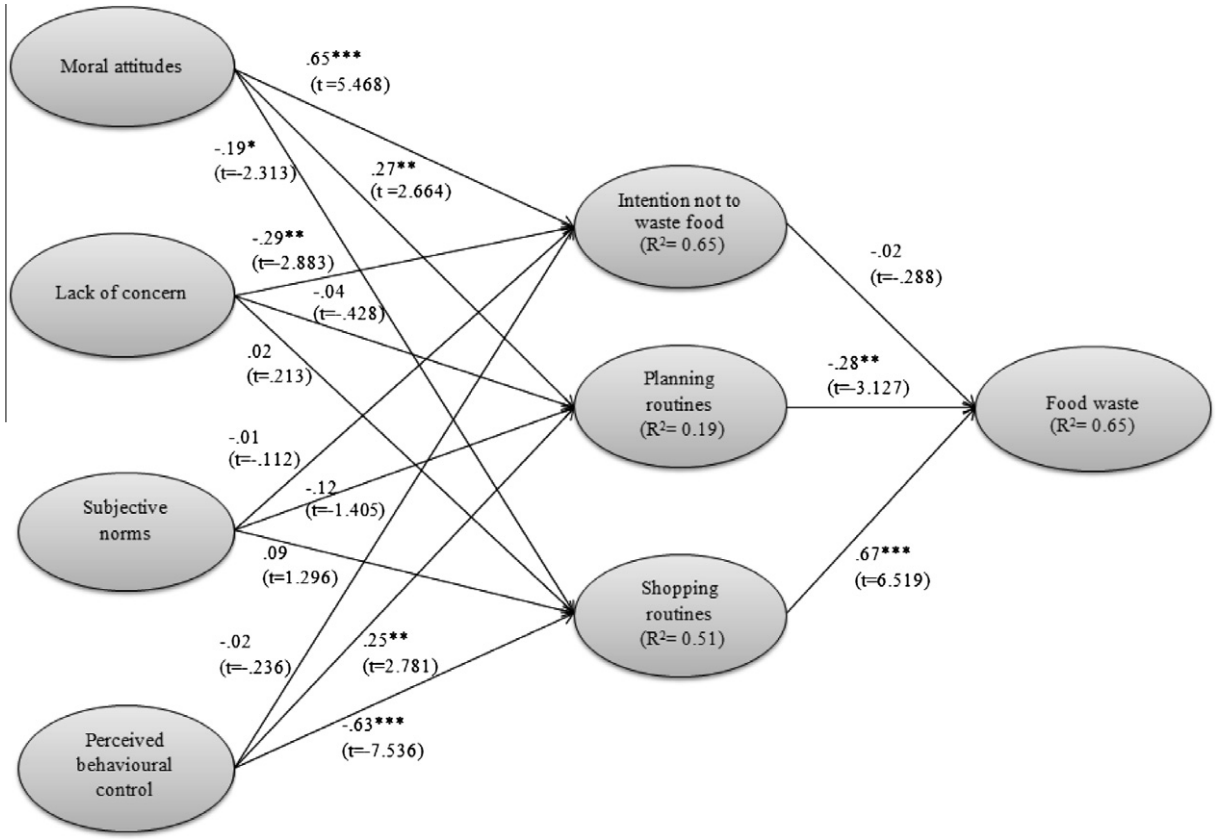

Fig. 1. Drivers of food waste based on structural model results. *Note:* $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Goodness-of-fit of the measurement model: $\chi^2 = 408.22$, $df = 188$, $p < 0.001$, $\chi^2/df = 2.17$, IFI = 0.90, CFI = 0.90, RMSEA = 0.07.

4. Discussion

The present study shows that consumers' planning and shopping routines predict their food waste, while their intentions not to waste food do not transfer into behaviour. Consumers' attitudes as lack of concern towards food waste and moral attitudes (i.e., feelings of guilt when discarding food), determine their intention not to waste food, as expected based on the Theory of Planned Behavior model (TPB) (Ajzen, 1991) and previous research on food-related behaviours (Conner & Armitage, 2002). In addition to explaining intentions, and in line with previous findings (Olsen et al., 2010), moral attitudes made a significant contribution towards explaining the food waste generated by consumers with planning and shopping routines as mediators.

The subjective norm of disapproval towards food waste did not have the expected effect. When considering that consumers in this study are generally unaware of the environmental consequences of food waste and therefore do not link food waste with environmental issues, this finding is in line with previous evidence showing that the normative construct in the TPB is often a weak determinant of intention, especially in the food domain (Armitage & Conner, 2001; Conner & Armitage, 2002).

The intention not to waste food did not significantly impact the reported food waste. This was against our expectations and suggests that reduced food waste may not be the result of conscious intentions not to waste food, but instead food waste is a result of the daily routines that consumers perform. This finding seems to imply that avoiding food waste is not a volitional, goal-oriented or planned behaviour, even if the ideal of not wasting food exists.

There may be several reasons for the low efficacy of the adapted TPB in our study. First, food waste may be perceived mainly as a food-related behaviour being thus embedded in consumers' food provisioning routines and not driven by conscious intentions. Previous research in the food domain has shown that intentions are not always good predictors of behaviour (Armitage & Conner, 2001). Second, operationalizing TPB constructs in food waste behaviour ended up in several compromises between the typically used scales and adaptations that would fit the food waste context.

The low correlation between the intention not to waste food and the reported food waste in our study could be explained, in part, by the fact that the two constructs refer to opposite actions. However, measuring the intention not to waste food seems more natural, as expecting consumers to form intentions to waste food is rather peculiar. Similarly, the low contribution of perceived behavioural control in intentions may be due to the measurement of control as the capability to balance planning and shopping routines with household consumption, thus being closer to the operationalized measures of planning and shopping routines in our study.

All in all, consumers' routines with regard to planning and shopping for food are important constructs to consider when studying food waste, since these determine the amount of food disposed of. Moreover, models of consumers' food waste should take into account both general and moral attitudes, together with consumers' perceived behavioural control.

4.1. Implications for future research

Planning and shopping routines are important predictors of food waste behaviour as well as mediators of the influence of moral attitudes (i.e., feelings of guilt) and perceived behavioural control on food waste. However, we still lack knowledge as regards

what kind of attitudinal and control beliefs are the most important in relation to these routines. Furthermore, insight into how consumers develop and use food-related skills is needed in order to understand how food waste results from the food provisioning process in households. Although wide attention is paid to food waste as a problem in the public arena, there has been a lack of studies looking at the determinants of food waste in households.

The adapted TPB model did not perform as expected, partly due to difficulties in operationalizing the constructs in a meaningful way within the framework. This implies that future research should focus on developing improved models to predict consumers' food waste behaviour. Such models should integrate attitudinal motivation, skills (perceived behavioural control) and food-related behaviours prior to disposal of food, as well as, possible additional mediators of the relationships between food waste and consumer attitudes, norms and perceived behavioural control, for instance resource-related factors. In further research the investigation of the effect of these factors on actual food waste behaviour is recommended.

Another area where additional research would be useful is consumers' perception regarding food waste behaviour. Our results indicate that consumers do not perceive the environmental implications of food waste. Consumers may, thus, consider food waste to be a food-related behaviour, and as such more related to factors that influence food choices (Steptoe, Pollard, & Wardle, 1995), for example throwing food away can be a way to ensure good sensory quality and avoid health risks, although the practice may increase expenses. Additionally, in food-related behaviours social influences are generally weak predictors (Conner & Armitage, 2002), whereas in environmental behaviours such influences are important determinants of behaviour (Barr et al., 2001). Thus, further research could explore whether framing food waste-related messages as environmental ones would increase the role of norms in explaining food waste behaviour.

Finally, culture is known to have an impact on consumers' food waste (Stuart, 2009), therefore future research should investigate whether the results of the present study would apply in cultures that have recently paid more attention to the food waste problem and where consumers are thus likely to be more aware of food waste as an environmental issue.

4.2. Implications for policy makers and social marketers

Policy makers are mainly concerned about the environmental and social consequences of food waste with a high interest in reducing food waste in households. In order to reach this target, social marketing campaigns are employed, for example the Love Food Hate Waste campaign[2] in the UK, attempting to raise people's awareness about the issue as well as providing helpful guidelines supporting consumers to reduce waste. The results of this study add to the understanding of determinants of consumer food waste and thus provide a basis for further developing social marketing campaigns.

The main finding of the current study that planning and shopping routines impact on food waste behaviour suggests that giving people practical tools to enhance their routines can decrease food waste. These tools should cover activities around food purchasing as well as meal and storage practices at home. Planned shopping activities would lower consumers' susceptibility to overbuying and more skilled meal practices would help to balance prepared and consumed amounts of food, thus resulting in a decrease in the amount of food waste. Social marketing campaigns aimed at enhancing consumer skills and changing routines may need to take alternative approaches than those in the typically used information campaigns.

Consumers' routines are also mediators of the relationship between moral attitudes and food waste. For social marketers, this implies that when trying to change people's food waste behaviour one could either directly aim at changing consumers' routines or aim at changing their attitudes towards food waste. The latter route would make consumers feel more morally obliged and therefore persuade them to make changes in their planning and shopping routines (e.g., control their buying) that would result in lower food waste.

4.3. Limitations

The present study has several methodological limitations. The scale measuring the dependent variable contained self-reported items and such self-reports may be biased estimates of true behaviour. As mentioned in the first part of the discussion, some of the measured constructs have been adapted to fit the purpose of the study and therefore they do not always follow the original recommendations in terms of compatibility of constructs. For instance, the perceived behavioural control items do not refer directly to the ease or difficulty of not wasting food, but to the capability of balancing incoming food and consumption. Furthermore, intentions were asked about *not* wasting food (rather than wasting food) and lack of concern was used as a measure of general attitude due to our expectation that the item measuring general attitude as suggested in the TPB would not differentiate between people. Future measurement of these constructs requires further development. However, despite of these limitations, the results indicate that the role of routines is important in addition to the constructs typically included in the TPB model.

Although the sample represents the Romanian population well, there were more females, more consumers from the urban areas and fewer households with children than in the population under study. One of the reasons for these discrepancies may be the sampling technique used. However, having a higher number of women in the sample is rather normal in food-related studies, since women have generally more of the responsibility for cooking and shopping than males, and are more willing to answer questionnaires related to food issues.

5. Conclusion

The findings of the present study, conducted among Romanian consumers on their self-reported food waste, indicate that consumers' food waste is driven mainly by their food provisioning-related routines rather than by an intention not to waste food. Furthermore, consumers' routines are influenced by feelings of guilt and perceived behavioural control with respect to planning, shopping and cooking skills.

Apart from being the first one of its kind conducted among Romanian consumers, the main contribution of this study is that it provides basic knowledge for developing campaigns aimed at decreasing the level of food waste generated at the household level. The results suggest that such campaigns should be aimed at influencing consumers' practices related to food, such as changing their planning and shopping routines. Changing people's attitudes towards food waste would have an effect on food waste as well, this effect being mediated by their routines related to planning and shopping for food.

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[2] http://www.lovefoodhatewaste.com/.

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