Behavioral and Demographic Antecedents to Household Food Waste

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Abstract: Researches about antecedents to household food waste generation are increasingly becoming popular. Various dimensions, such as food handling, purchasing behavior, waste management behavior, consumer values, the role of external cues, and many other sets of predictors, including demographic variables, were identified by scholars as major influencers of food waste generation. However, there are conflicting inferences about the identified antecedents, just as there remains no consensus as to how age, gender, and income affect food waste. Moreover, there is limited literature on the influence of consumer values on food waste and in view of the local context. With the objective of augmenting extant literature, a survey of 180 primary purchasers of households was conducted, utilizing Partial Least Square - Structural Equation Modelling (PLS-SEM) as a statistical tool. Findings of this research reveal that food habits, such as food conservation and response to food conditions the acceptance of expiration date-based priced and suboptimal food, are very important to determine the extent of food waste generation. Environmental concern shows a positive effect on materialism, which supports literature positing that people who expressed deep environmental concern do not necessarily have low materialistic values and vice versa. The environmental concern could be a normative belief, an individuals perception of peoples socially accepted and desirable expectations. Thus, the respondents may have an environmental concern because this is the right behavior, but this does not hinder individuals in satisfying their material life domain.

Keywords: *Food waste, food waste behavior, food waste management, household food waste*

INTRODUCTION

Food waste is one of the most alarming situations in view of problems in consumption and production (United Nations Environment Programme, 2016). There is enough food to feed everyone, but one in nine suffers from hunger, and one in three suffers from malnutrition (World Food Programme, 2018). In the United Nations Food and Agriculture Organizations estimate, one-third of all food production for human consumption is squandered or wasted each year in many parts of the world (Food and Agriculture Organization of the United Nations, 2014).

Food waste audits are conducted in countries all over the world to measure or quantify the types and amount of food that are wasted in industries, institutions and households. There is unanimity on the inferences on how staggering the amount of food waste is in all levels of the food supply chain, that is, from agriculture to consumption. In the food supply chain, food waste in the consumption stage appears to contribute the most, thereby drawing much attention to (Food and Agriculture Organization of the United Nations, 2011). Categorizations of antecedents to food waste have emerged from various literature. In many literature analyses, food waste is viewed as a multi-faceted issue which involves not only a single variable (Schmidt, 2016).

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Various antecedents, such as food handling (Diaz-Ruiz, Costa-Font, & Gil, 2018), purchasing behavior (Stefan, van Herpen, Tudoran, & Lähteenmäki, 2013), waste management (Diaz-Ruiz et al., 2018), expiration-date-based pricing, consumer values (Diaz-Ruiz et al., 2018) and demographics (Quested, Parry, Easteal, & Swannell, 2011) are tackled by many scholars. We are not just talking about food. Consumers, who are directly and indirectly accountable for the amount of food waste, can take a look at the repercussions of behavior on food waste generation and its impact on natural resources.

Researches about factors that relate to or are causing household food waste generation are increasingly becoming popular. Demographics, specifically age, income, number of households have been investigated to infer relationships. External cues affect the food waste amount. Food waste awareness is said to influence food waste behavior. Lifestyle, purchasing behavior, the role of emotions, consumer values and social norms draw relationships to food waste generation.

The aforementioned and many other sets of predictors were identified by scholars as major influencers of food waste. However, there are conflicting findings of the influence of some variables like demographics on food waste generation. There remains no consensus as to how age affects food waste generation. Similarly, there are conflicting inferences when it comes to gender, education level, employment status and income. Further, there are limited studies on the influence of consumer behavior on food waste. Consumer values have been tackled. However, not many studies are focused on the variable, and extant literature about consumer values is said to directly and indirectly influence food waste generation.

In view of the local context, no studies on food waste antecedents have been conducted. Philippine Center for Postharvesting Development and Mechanization data is focused only on the waste that results from the harvest to the storage of rice (Dela Cruz & Bobier, 2016). The Food and Nutrition Research Institute data, on the other hand, measured food consumption loss per plate (Food and Nutrition Research Institute, 2015). The Philippine Statistics Authoritys Food Demand Survey focuses on rice wastage.

In view of the foregoing, what is the relationship between consumer behavior, demographics and food waste generation? Specifically, what is the relationship between food preparation, purchasing behavior, consumer values, external cues and demographics and the amount of food waste in the local context?

LITERATURE REVIEW

Food Waste Antecedents

The World Food Programme (2018) reiterated that there was enough food to feed everyone, but one in nine suffered from hunger, and one in three suffered from malnutrition. In the United Nations Food and Agriculture Organizations estimate, one-third of all food production for human consumption was squandered or wasted each year in many parts of the world (Food and Agriculture Organization of the United Nations, 2014). The World Wildlife Fund (2018) meanwhile stipulated that humans wasted one of every three food calories produced, which should be enough to feed three billion people. Ironically, among the many food waste audits conducted in several countries worldwide, there was unanimity on the inferences on how staggering the amount of food waste is at every level of the food supply chain. Given how alarming the findings are in terms of food squandering quantity, its environmental effect the greenhouse gas emission, its implication on the issue of world hunger, malnutrition and food insecurity, scholars from different parts of the world have extrapolated data, conducted an investigation and raised an understanding on the antecedents leading to food waste generation.

Several categorizations of these antecedents emerged from various literature. There were scholars linking overpreparation, avoidance of spoilage, inappropriate food conservation, visual consumption and food waste (Diaz-Ruiz et al., 2018; Jarjusey, 2017). Purchasing behavior, shopping routines, dietary importance, planning practices are also linked to food waste generation (Eze, 2017; Stefan et al., 2013). Consumer values such as environmental and materialistic values manifest relationship to food waste (Diaz-Ruiz et al., 2018). There are external cues the expiration-date-based pricing, suboptimal food and packaging that influence the amount of food waste, and demographics (Tucker & Farrelly, 2016; Williams, Wikström, Otterbring, Löfgren, & Gustafsson, 2012), are tackled by many scholars.

Consumer Food Waste

In the consumption stage, wastage was evident in food industries, institutions and households. In the issue paper of Natural Resources Defense Council or NDRC, it was reported that American families waste approximately 25 percent

of the food and beverages they purchase. This was estimated at \$1,365 to \$2,275 annually for the average family of four. In the United Kingdom, households and consumers contributed the most to the aggregate waste in the food supply chain from production through distribution to consumption (Food and Agriculture Organization of the United Nations, 2011). In the Netherlands, the majority were willing to reduce food waste, and their reasons for doing it are: wasting food is wasting money; it was simply unacceptable and that there were a lot of people who were hungry.

Consumers were accountable either directly and indirectly for the amount of food waste. In order to reduce or eliminate food waste, it is important for households or consumers to change their patterns and behavior in terms of purchasing, food preparation and storage.

There were researches relating waste awareness, food awareness, lifestyle, the role of emotions, social norms, and demographic influences on consumer food waste. The succeeding part of the literature talked about each of the domains and categories that influence food waste generation based on empirical researches.

Food Handling

The study of Diaz-Ruiz et al. (2018) brought together food-related and waste management variables. It mentioned that the frequently identified actions that generate food waste can be grouped into five categories, namely:

1. Food purchase
2. Food storage
3. Food preparation
4. Food consumption
5. Lifestyle

Since this portion of the literature is focused on food management and handling, food purchase and lifestyle among the aforementioned categories will be discussed in the succeeding subset of the literature.

Porpino, Parente, and Wansink (2015) presented in their food waste paradox the itinerary for food waste at households. The last four stages of the food itinerary are associated with food disposal: food stocking, food preparation, food consumption and food storage. Empirical studies among the lower-middle income class reveal that drivers of food waste are the following:

1. Food overstocking
2. Overpreparation or not cooking it properly (e.g., burning food)
3. Avoidance of leftovers
4. Spoilage/food decay after long or wrong storage

Food overstocking is related to excessive purchasing and mismanagement of household food stocks. Going further, the large packaging and reduced price of food contribute to over-purchasing, thus leading to overpreparation and food waste. This set of predictors were tested in the study of Porpino et al. (2015). In the research findings, overpreparation, avoidance of leftovers, and inappropriate food conservation were suggested to be major influencers of food squandering in the low-income context.

Purchasing Behavior

Stefan et al. (2013) suggested that some important predictors of consumer food waste are consumers planning and shopping behavior. A survey among Romanian consumers was conducted, investigating the influence of intentions not to waste food, the planning and shopping behavior, lack of concern towards wasting food, and perceived behavioral control on self-reported food waste. In their findings, planning and shopping behavior are influenced by moral attitudes as well as perceived behavioral control over food waste.

In the same vein, Porpino et al. (2015) related excessive purchasing and caring for a pet to wasted food in the low-income class respondents.

Diaz-Ruiz et al. (2018) identified three food-related factors that contribute to food waste generation purchasing discipline, price importance and dietary importance. Purchasing discipline, like buying only what is needed or making a shopping list to be specific, influences the amount of generated food waste. Prices of food are a possible cause of food waste generation. Moreover, there are conceptual links relating to nutrition, dietary consciousness, and eating a healthy diet (Quested et al., 2011) as encouraging factors to food waste reduction.

External Cues

Further, a significant part of the food waste occurrence through the entire farm-to-fork value chain was caused by the low acceptance, either in buying or consumption of products that are visually suboptimal. Issue on food waste can be redressed if consumers are willing to accept or purchase food that is said to be suboptimal (Rohm et al., 2017). Moreover, consumers reflected positive attitudes toward the prevention of food waste, but around 40% misunderstood the meaning of expiration date or best before date labels.

Meanwhile, inside the households, using large dinnerwares resulted in more food served thus more food wasted. Visual consumption practices affect the quantity of food served and wasted on different sized dinnerware (Williams et al., 2012). Stefan et al. (2013) identified spoilage, plate leftovers, and overpreparation of food as the main reasons for the discarding.

Food-borne illness and the desire to consume only the freshest food contribute to the accumulation of food waste. In addition, consumers tended to be more cautious in storing meat and dairy products compared to fruits, vegetables, and leftovers.

Another external cue was food packaging. There was little knowledge of how packaging affects household food waste. In the exploratory study of Williams et al. (2012), there were three packaging components that are related to food waste: (1) large-sized and difficult-to-empty packages; (2) passed best before date. In their findings, 20-25% of the food waste was attributed to the packaging too big packaging and the best-before date. However, participants with high environmental consciousness were more observant of the food packaging, thus resulting in lesser wasted food.

Similarly, Porpino et al. (2015) suggested that bulk-buying and buying preference for large and economy packages leads to overpreparation which consequently ends in food waste disposal. The households reiterated that some foods were not consumed due to overstocking, overbuying, buying past their expiration dates and impulse buying behavior.

Expiration-date-based pricing, as previously defined, occurs when a retailer marks down price of a perishable product according to its shelf life. The nearer the expiration date, the bigger the discount, or the lesser the price. This incurred greater demand for the good or commodity, thus leading to over-purchase. However, according to EDBP led to negative evaluations of the brand quality but said the practice had no effect on the quality image if consumers were familiar with the tactic.

Consumer Values

Diaz-Ruiz et al. (2018), in their alternative approach to understanding food waste generation, talked about environmental values and materialism values as influencers to food waste. The authors posited that food waste behavior is a complex issue that should be treated and analyzed with an integrative approach. The research finding suggested that purchasing behavior and discipline, waste prevention behavior and materialism values are direct predictors of food waste behavior. To explain the results, high and committed food waste prevention behavior leads to low food waste generation; disciplined purchasing behavior by means of making a shopping list and buying only what is needed results in lower food waste accumulation, and greater materialistic values result in a higher amount of food waste.

Graham-Rowe, Jessop, and Sparks (2014) focused on the desire to avoid experiencing negative emotions since it leads to motivation to avoiding waste. Two motivations that influence food waste were identified waste concerns and doing the right thing.

Analyzing the waste concerns, one motivation to minimize food waste was the goal not to waste money since wasting food is wasting money according to the respondents during the interview. The rationale behind the responses was leaning towards financial concerns. The thought of having wasted money as a result of household food purchases led them to experience guilt or negative emotions. The literature showed the effect of saving money and setting an example for children on food waste reduction. Said aforementioned variables were leading motivations for waste reduction. Doing the right thing, on the other hand, was identified as a motivation for minimizing household food waste. As mentioned in the article, many food purchasers talked about food waste being wrong for a variety of reasons.

Graham-Rowe et al. (2014) also identified core categories of barriers to food waste reduction. These are - the good provider identity, lack of priority, and exemption from responsibility. The good provider identity is synonymous to or implication of a good parent. To provide an abundance of healthy foods even if it meant going to waste in the end is something that parents observe. This extended to over-purchasing, to overpreparation to cooking more food than the entire family can consume.

Lack of priority meant not being too concerned, lacking engagement with food waste issues or rendering low priority to the minimization of food waste. Food waste was not perceived as a big problem, and there are bigger issues that need more attention. Moreover, wasting food was evident in many households; thus, it is perceived to be an acceptable social norm (Schmidt, 2016). Finally, another barrier to food waste reduction identified in the study was exemption from responsibility. This consumer belief turned over the issue on food waste to retailers, food industry or supermarkets which are believed to be in better control and management on a larger scale.

Household Demographics

Meanwhile, significant literature established the relationship between the number of households and the amount of food wasted. Tucker and Farrelly (2016) posited that food waste increases according to the number of household members. Further, the number of younger people was said to have an effect on the amount of food waste.

Prior to the study of Tucker and Farrelly (2016), research suggested that household size, the gender of the grocery buyer, the frequency of buying discounted food items, the respondents willingness and potential to reduce food waste and to purchase behavior influence the amount of food wasted.

Income, on the other hand, was another area of concern. (Bolaane & Ali, 2004) inferred that household income posted no direct relationship with food waste generation rate. It was the volume in packaging fractions of plastic and paper that had a direct relationship with household income. However, household food waste was assessed in Hungary by Szabó-Bódi, Kasza, and Szakos (2018). The objective of the research was to identify the most dominant types of food waste in Hungarian households and study the effect of demographic variables such as income on food wasted. As regards the effect of income on types of avoidable food waste, the result of the study suggested that the total amount of avoidable food waste per capita on a weekly basis was seen to be greater in higher-income households than in poorer households.

There were conflicting inferences in terms of gender. A research reported that women produced less food waste (Cicatiello, Secondi, & Principato, 2019; Schmidt, 2016), whereas other literature sources indicated that gender did not have an effect on the amount of food waste (Porpino et al., 2015). Meanwhile, some studies did not find a strong correlation between education attainment and food wasted (Hair, Sarstedt, Ringle, & Mena, 2012). With regard to employment status, some literature showed an association with food waste generation.

RESEARCH METHODOLOGY

The research adopted a positivist philosophy such that the focus were observations that can be quantified and lend themselves to statistical analysis. The view was external of the actor, and the focus were households. In the epistemological sense, the observable phenomena in this research, food handling, purchasing behavior, external cues and consumer values relative to food waste generation, were hypothesized, reduced to simplest elements and provided data and factual inferences. Data collection was structured with a large sample size, and measurement was quantitative (Saunders, Lewis, & Thornhill, 2009).

Factors influencing food waste generation in various dimensions were operationalized to become measurable. Deductive reasoning was the approach used in the construction of hypotheses for testing. The nature of the study was descriptive-correlational.

The household consumer, particularly, the principal buyer of each household was the unit of analysis. The principal buyer of the household is responsible for most of the food purchases and grocery shopping for household consumption.

The questionnaire was structured as follows:

a. Permission to conduct the study,

b. Questions on demographic profile,

c. Behavioral questions

The kind of data for the demographic profile was classified as nominal for gender, household composition, where respondents buy food, frequency of shopping while ordinal for educational background and income bracket. Some questions on food handling, purchasing behavior, materialistic values and environmental concern were adopted from extant literature on food waste antecedents.

The questions pertaining to the amount and frequency of food waste were estimated and self-reported. A seven-point likert scale was used by the respondents to evaluate their answers and data were treated as interval.

To measure internal consistency reliability, the questionnaires were submitted to pretesting. Thirty participants were taken for the pilot testing. The data were run to measure Cronbachs Alpha. Based on the Cronbachs alpha, the results showed that all latent variables' values were above 0.7, which indicated good internal consistency reliability. Cross loadings of the indicators to assess to what extent every latent variable is different from the others were examined. The Fornell-Larcker criterion, which compares AVEs with the squared correlations of each construct with the latent variable correlation, was applied. The general rule is that a given loading in one of these sections must be greater than any other loading in its row. The results showed that no indicator load higher on another construct than it does on the construct it intends to measure. Hence, discriminant validity was satisfied. In addition to the regression results, the quality of the structural model was evaluated by examining the three metrics, namely:

1. Coefficient of determination
2. Redundancy Index
3. Goodness of Fit (GoF).

Coefficient of determination is the amount of variability in the latent dependent variable that is explained by the independent latent variables. Based on the results, the overall potential explanatory power of food waste generation in the model equals 23.0%, which was consistent with the values found in previous studies. Low coefficient of determination values as 0.20 can be considered high in the consumer behavior discipline (Hair et al., 2012).

Redundancy measures the percent of the variance in an endogenous construct that was explained by its exogenous latent variables. High redundancy means high ability to predict. Just like mean commonality, mean redundancy was only available for endogenous blocks. According to the results, the average redundancy for FWG represents that OPRE, INFC, SPOIL, VIS, PB, PRIPA, FCOND, MV, EnC, REC, PREV predict 15% of the variability of FWG indicators. In addition, the mean redundancy for REC and PREV indicate that EnC predicts 5.2% and 4.9% of the variability of REC and PREV indicators, respectively. Lastly, MAT predicts 5.3% of the variability of EnC.

GoF measures the accounts for the model that accounts for the model quality and both the outer and the inner models. Since it takes into account commonality, this metric was more applicable to reflective indicators than to formative indicators. GoF index was 0.2467.

In addition to the three indices mentioned in the table, the Mean Communality indicates how much the block variability is reproducible by the latent variables. In our results, FWG represented that the independent latent variables: OPRE, INFC, SPOIL, VIS, PB, PRIPA, FCOND, MV, EnC, REC, PREV explained 23% of the variability of FWG. The GoF value of 0.25 implied that the prediction power of the model is 25%.

Lastly, the AVE measures the level of variance captured by a construct vis-à-vis the level due to measurement error. The general rule for AVE is that the values greater than 0.70 is ideal, while 0.50 is acceptable. In this model, the AVEs are all found to be above 0.50, which implied that the latent explained more than half of the variance of its indicators and thus, satisfied the criteria of convergent validity.

To observe population validity which is a type of external validity, a large sample was drawn from the total population of a community with classes A, B and C residents. A subdivision in Quezon City, North Olympus Subdivision, with different income classifications, ranging from Class A to C was covered in the study. For ethical considerations and discrimination avoidance, the researcher opted to consider Classes A to C as respondents and exclude D and E.

A letter of consent was given to the association in the subdivision to allow the conduct of research as well as obtain the household population.

In generating sample size, since PLS-SEM was utilized, the required minimum sample size was extrapolated from the guidelines recommended by Saunders et al. (2009). In reference, the sample size depends on the maximum number of arrows that are pointing at the latent variables.

The number of sample size generated in the subdivision in Quezon City was 180, which is beyond the minimum sample size required.

This quantitative research employed PLS-SEM in explaining and drawing inferences on the relationship between overpreparation, food conservation, spoilage, purchasing behavior, the freshness of food, external cues, waste management, external cues, materialistic values and food waste generation. To measure the relationships among latent variables,

SEM was used. There are two types of SEM; the CBSEM or co-variance-based and the PLS or the variance-based. PLS-SEM is recognized for its flexibility in theory and real data comparison and model complexity compatibility. It can also estimate a model with a huge number of latent variables.

RESULTS AND DISCUSSION

Following section describes the results and analysis of the obtained results.

Table 1 *Mean and SD of responses on Food Handling, Purchasing Behavior, External Cues, and Freshness of Food*

Latent variables	Indicators	Mean	SD
Overpreparation	I prepare food in large quantity to have the remainder for the next meal.	4.03	1.85
	I like to prepare in large quantity to save time.	4.11	1.92
	I prepare food in large quantity to have sufficient or more than enough food for my kids.	4.02	1.97
	I prepare food in large quantity because it makes me feel like a good provider.	3.21	1.92
Food conservation	I have adequate knowledge of food storage.	5.00	1.55
	I store leftovers properly in the fridge.	5.45	1.47
	I know how to preserve and recook leftovers.	5.34	1.45
Spoilage	I discard food because they easily get moulded	3.48	1.83
	I put the leftover in the fridge and are left to spoil after some time.	3.43	1.87
Visual consumption	I use large pots and pans when cooking.	4.26	1.75
	I use large dinnerware when preparing for meal and serving food.	3.98	1.75
	I use large plates for household members to use when eating.	4.13	1.99
Purchasing behavior	I usually buy only the things I need.	5.46	1.57
	I make a shopping list with what I need when I go shopping.	5.22	1.76
	I stick to my shopping list even if there are merchandising activities offered.	4.74	1.86
Price cues	It is important to me that the food I consume is cheap.	4.48	1.68
	When I see "buy one, take one" promotion, I end up buying even if the product is available at home.	3.92	1.87
	I buy suboptimal food at a discount.	3.41	2.09
Packaging cues	I buy food in large packages.	4.14	2.13
	My packaged food is difficult to empty.	5.31	1.87
Expiration date-based pricing	When food is near the expiration date, I throw the food item away.	4.17	1.98
	When food is beyond the best-before date, I throw it away.	3.31	1.93
Suboptimal food	When the food has discolored, I throw it away.	3.76	1.65
	When the food has an odd shape or is deformed, I throw it away.	3.59	1.75

Table 2 *Mean and SD of Responses on Recycling and Prevention Behavior, Materialistic Values and Environmental Concern*

Latent variables	Indicators	Mean	*SD*
Recycling behavior	I recycle glass	4.64	1.90
	I recycle paper	4.71	1.80
	I recycle packaging	4.46	1.95
	I recycle organic waste	4.04	1.96
Prevention behavior	I buy products that can be used again, rather than disposable items	5.29	1.43
	I try to repair things before buying new items	5.32	1.47
	I reuse paper	4.89	1.73
	I use my own bag when shopping, rather than one provided by the shop	4.88	1.90
Materialistic values	My life would be better if I owned certain things I don't have	4.18	1.54
	I'd be happier if I could afford to buy more things	4.03	1.58
	I admire people who own expensive homes, cars and clothes	4.09	1.56
	Some of the most important achievements in life include acquiring possessions	4.31	1.51
Environmental concern	The ecological crisis facing humankind has been greatly exaggerated	4.17	1.31
	If things continue on their present course, we will soon experience a major ecological catastrophe	4.83	1.35
	I consider food waste as a crucial problem.	5.33	1.43

Structural Model Assessment

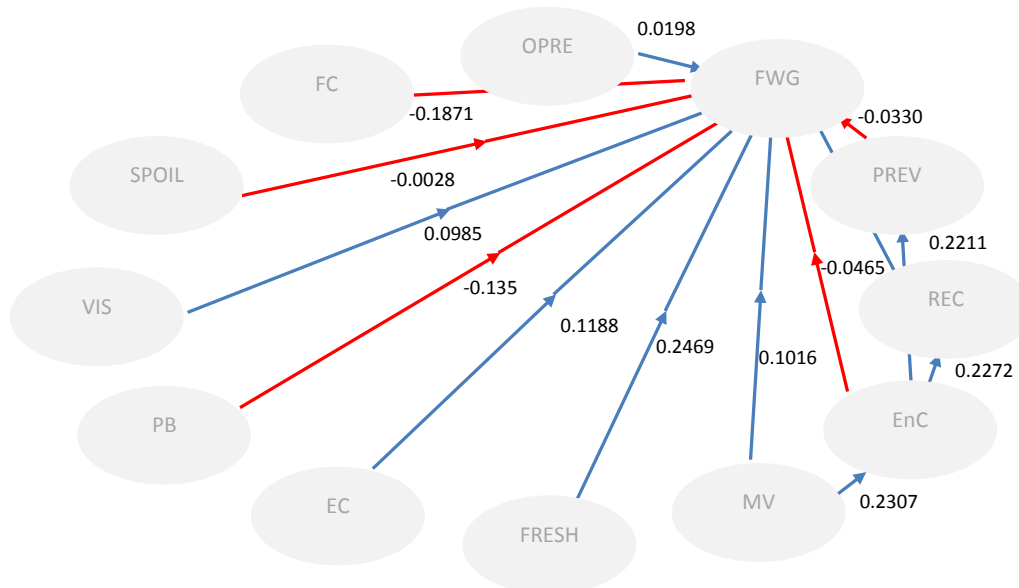After assessing the quality of the measurement model, we the inner model/structural part of the model was evaluated.

Figure 1 *Path Diagram*

As seen in Figure 1 (Path diagram), food conservation, spoilage and purchasing behavior have a negative effect on food waste generation. On the other hand, overpreparation, visual consumption, external cues (price and packaging), food condition (freshness), recycling and prevention behavior have positive effects on food waste generation. Materialistic values have positive effects on both food waste generation and environmental concern. Lastly, environmental concern has positive effects on both recycling and prevention behavior but a negative effect on food waste generation.

Table 3 *Relationship between Behavioral Variables and Food Waste Generation*

	Estimate	Std. Error	*t*-value	*p*-value
Intercept	-1.55E-16	.0677	-2.28E-15	1.000
Overpreparation	.0198	.0710	.2790	.7810
Food conservation	-.1870	.0765	-2.450	.0155*
Spoilage	-.0028	.0752	-.0367	.9710
Visual consumption	.0985	.0828	1.190	.2360
Purchasing behavior	-.1350	.0788	-1.710	.0886
External cues	.1190	.0849	1.400	.1640
Food condition	.2470	.0757	3.260	.0014*
Materialistic values	.1020	.0739	1.380	.1710
Environmental concern	-.0465	.0758	-.0613	.5400
Recycling behavior	.0107	.0772	.1380	.8900
Prevention behavior	-.0330	.0839	-.3930	.6950

* *p*-value = 0.05

Table 1 shows the path coefficients of all hypotheses and its *t*-values with the associated *p*-value. From the results, using a 0.05 level of significance, we can support the hypothesis that there is a significant and negative association between food conservation and food waste generation. There is also a significant and positive association between the freshness of the food and food waste generation.

Table 4 *Moderating Role of Demographic Variables using PLS-Multiple Group Analysis*

Demographics	Link	Path Coefficients Diff	*p*-value
Age level			
Group <=40 Group >40	Food conservation and FWG	0.41	0.02*
Group <=4 Group >4	External cues to FWG	0.41	0.04*

* *p*-value = 0.05

The PLS-MGA results on age level show that the path coefficients for respondents who are over 40 years old are significantly higher than the respondents who are 40 years old and below for the link between food conservation and food waste generation using 0.05 level of significance. For the number of household members, the results indicate that the path coefficients for respondents who have more than 4 members in the household are significantly higher than the respondents who have 4 and below household members for the link between external cues (price and packaging) to food waste generation.

The PLS-MGA results revealed that none of the path coefficients between females and males; between those married with children and those single/married but without a child; between those households with income above P33,300 and those with incomes of P33,300 and below.

CONCLUSION

In view of the foregoing, the researcher concludes that food habits such as food conservation, and the acceptance of expiration date-based priced and suboptimal food as indicators of food condition are very important to determine the extent of food waste generation. Food conservation, in terms of knowledge on food storage and preservation, has an effect on the amount of food waste generated. This, however, is moderated by age such that the older age group are more knowledgeable about food conservation.

On a separate note, although materialistic values have an effect on environmental concern, the expected and

actual results did not coincide. Environmental concern was hypothesized to negatively correlate with materialism. The expected negative correlation turned out to be positive, which supports other literature positing that people who expressed high environmental concern do not necessarily have low materialistic values and vice versa. In the research findings of (Gatersleben, White, Abrahamse, Jackson, & Uzzell, 2010), almost a quarter of the respondents expressed both deep environmental concern and high materialism. The research findings suggest that though people can be motivated by an environmental concern to do their share in reducing energy or material consumption, they still have material concerns, needs or wants that motivate or allow them to acquire goods.

In addition, the environmental concern could be a normative belief. A normative belief becomes an individuals belief, since this is the extent to which other individuals who are important to him/her think he/she should or should not perform a certain behavior. These beliefs are the individuals perception of peoples expectations, which are socially accepted and desirable. Waste management behavior which springs from environmental concern can be influenced by societys expected behavior (Williams et al., 2012), and the findings of Falasconi et al. (2019) revealed that normative belief had a positive and direct effect on attitudes and social norms, which ultimately created an impact on behavioral intentions. But going back to the findings, albeit the respondents may have an environmental concern because this is the right behavior, this does not refrain the individuals in the pursuit of material life domain satisfaction.

Environmental concern as an antecedent to food waste generation was not supported by the results. In the research conducted by Cicatiello et al. (2019), the finding suggests that food waste receives less consideration and is not practically or directly associated with environmental issues, hence, the household behavior. Nevertheless, environmental concern is a factor that could influence prevention and recycling behavior. The environmental concern could translate to prevention behavior, such as repairing before buying, buying reusables than disposables and bringing a bag when shopping. The attitude could also translate to recycling practices such as recycling glass, paper, packaging and organic waste. The relationship between environmental concern and recycling behavior is moderated by age and educational attainment such that the older age group and/or those who have not finished college are more inclined to recycling activities.

The general rule in the theory of planned behavior is that the more favorable the attitude toward behavior and the subjective norm, and the greater the perceived behavioral control, the stronger the person's intention is to perform that behavior. Although Russell, Young, Unsworth, and Robinson (2017) argue that there is "automaticity" to food-wasting behavior that is irrational or habitual, in the article of De Vries, Aarts, and Midden (2011), habits are intentional when it is goal-directed. The instigation of the whole set of habitual acts may often be intentional, whereas the further execution of the acts may be unintentional.

TPB is predominantly used as a framework in the study of food waste generation since the behavioral antecedents to household food waste generation could be linked to the three components of the theory of planned behavior, which could explain how the dimension would lead to attitude, subjective norms and perceived behavioral control towards food wastage.

RECOMMENDATIONS

The following recommendations which are linked to the findings and conclusions are hereby presented:

1. Stronger effort in creating awareness-raising campaigns and policies that promote responsible consumerism in the business/retail sector. Given that expiration date-based pricing and suboptimal food pricing were found to influence the amount of food waste generated in households, this draws attention to businesses/retailers to create or strengthen awareness-raising campaign about responsible consumerism targeting buyers or purchasers of every household as its audience. In the retail sector, promotional discounts or incentives on perishable products mean that consumers could purchase more than they need. Albeit acceptance of sub-optimal food and expiration date-based priced products are evident, reminder advertising to cut back on food waste can be implemented since the increasing acceptance of such leads to over-purchase and eventually, in the garbage bin. Another angle that the business sector can look into is inventory regulation system with the objective of controlling stocks and volume of goods delivered by suppliers. This can minimize suboptimal food and near-expiration date goods. Further, the emerging food banks can be partnered with for distribution of the goods at lower prices to target recipients. This also draws the attention of food establishments, SMEs and restaurants to consider the usage of suboptimal and near-expiry goods when buying ingredients for their product/meal offering.

2. Encouragement of personal advocacy for food security within the residential community. Food conservation exhibited a negative influence on food waste generation. In reducing personal/household food waste, browsing through the cupboard and refrigerator to avoid rebuying food that is on hand; and freezing or preserving fruits and vegetables of oversupply can be considered as part of the personal advocacy, which can be promoted in the residential community with the objective of reducing food waste collectively.

3. Promoting voluntary participation in the donation of sub-optimal food in residential communities. There are emerging food banks in some districts of Metro Manila. The food collected in food banks are distributed for feeding program in communities and are sold at relatively low prices. This can be encouraged and promoted in residential communities and coordinated with barangay authorities to support programs relative to reducing hunger in the community.

4. Emphasizing in institutions such as schools, community and the business sector that food waste predicament as a critical environmental issue. The research finding which reveals an insignificant relationship between environmental concern and food waste generation may be explored further. As previously mentioned, an article by Falasconi et al. (2019) posited that food waste receives less consideration and is not practically or directly associated with environmental issues.

5. Conducting further research on the relationship between materialistic values and environmental concern, as well as environmental concern and food waste generation, and extend the study to socio-cultural dimensions that could influence food waste generation. Although the findings in the present study relative to the aforementioned variables are supported by extant literature, there is no consensus as to the relationship between materialistic values and environmental concern, as well as environmental concern and food waste generation. This needs further investigation to address conflicting results in various literature.

6. Moreover, since the household-respondents were obtained from a subdivision in Quezon City, Metro Manila, research can be expanded by covering other areas like provinces of varying culture in the country to encompass socio-cultural dimensions which are suggested to influence the amount of food waste generated in the household.

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