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# Determinants of Food Waste: TPB and Moderating Impact of Demographics & Guilt

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**Abstract**

Increase in number of people dining out significantly contributes to food waste in restaurants. It is crucial to understand the determinants of food waste. Such determinants are influenced by demographics as well as emotional factors. The present study is meant to understand such factors through the lens of the Theory of Planned Behavior (TPB). Participants' intentions are influenced by guilt and this study was conducted to examine the moderating role of guilt. Hypotheses were tested with analysis of data collected from 423 participants. Constructs of extended model were analyzed with AMOS (V.21) for structural equation modeling whereas moderations were tested with Process Macro (V.4). Research findings suggest positive relationship of intention with its predictors (attitude, subjective norms, perceived behavioral control), and moderating impact of demographic factors on these relationships. Results also show positive relationship of intention and food waste behavior as well as positive impact of guilt in their relationship. All tested hypotheses were found supported. Theoretically, this study contributes by extending the TBP model and this model can be used in future studies. The present study provides practical implications for policy makers, owners, managers and other staff members of hotels, restaurants or food outlets. The implications, limitations and future research opportunities are discussed at the end.

**Keywords:** attitude, food waste behavior, intention, perceived behavioral control, theory of planned behavior (tpb), subjective norms

## Introduction

Food waste prevails in different forms from harvesting to the ultimate consumption of the commodity and leftovers augment this waste. Before reaching restaurants, food waste occurs at different stages. These stages include agriculture stage (production and harvesting duration), post-harvest stage (sorting out, grading, cleaning packing), loading and transportation, unloading and handling, distribution, unloading and handling at restaurant premises, preparing and then consumption as the last stage. Food waste in restaurants includes food wasted during receiving the supplies, food handling, food processing, food cooking, saving and serving. Significant portion of food contents are wasted during initial processes such as unpacking and peeling. At the end of this food continuum, food is wasted as consumers can not finish what they order. Whether it is a quick-service, buffet, take-away or eat-in, each service generates food waste though their volumes may differ from each other. Each service or function involves efforts, cost of material, labor and energy. If consumers perceive food a cheap commodity and tend to waste

it, all costs and efforts prove to be fruitless. The present research focuses on food wasted by consumers in restaurants and other food outlets. Its purpose is to address question, "what are factors or determinants of food waste by consumers in food outlets and hotels/ restaurants?"

United Nations (UN), sensitive to the food waste issue, drew special attention to the issue in 2015. UN set seventeen Sustainable Development Goals (SDGs) including *"responsible production and consumption".* This goal addresses the food waste issue at production and consumption levels targeting the 50 % reduction of food waste at retailer and consumers levels by 2030. The food waste issue is coupled with various environmental and socioeconomic challenges (Dhir et al., 2020). Hospitality sector constitutes 12% of the total waste (Filimonau et al., 2019). Food waste results not only in wasting all efforts and resources put to grow, transport and distribute food (Thyberg & Tonjes, 2016), it is linked with prominent social issues (Gao et al., 2018). Programs to prevent food waste are matters of great interest (Thyberg & Tonjes, 2016). Understanding the issue's sensitivity, it is critical to comprehend the determinants of food waste.

There have been limited studies conducted on food waste in the hospitality industry. These studies on the topic are from the perspective of either owners or the staff members of food outlets and restaurants. These studies include but not limited to – waste caused by employee of restaurant (Okumus, 2020); food waste perspectives (Okumus et al., 2020). There are limited studies on food waste by dining out consumers (Coskun & Ozbuk, 2020). TPB has been used to understand behaviors related to food consumption (Stefan et al., 2013). TPB is the most used theory in studies of human behaviors (Ajzen, 2015). It provides understanding of how to induce and change behavior (Steinmetz et al., 2016). The present study adopted TPB on aforesaid grounds.

### *Significance of the Present Study*

According to Food and Agricultural Organization (2020), tremendous amount of food is being wasted due to lack of socially responsible food consumption. Widespread hunger and food scarcity attracted the attention of researchers, scholars and governments around the globe. Food scarcity results in malnutrition as well as the waste of resources deployed to grow and preserve the food. Prevention of food waste reduces risks to environment and it also paves the way towards a sustainable food system (Priefer et al., 2016). Maximum food waste can be prevented at consumption level by modifying the behaviors regarding food consumption (Stancu et al., 2016). The Theory of Planned Behavior (TPB) is the most suitable to understand, explain and predict human behavior (Ajzen, 2015). TPB also studies factors that induce changes in such behavior (Steinmetz et al., 2016). Scarcity of studies on food waste during dining-out has been highlighted by scholars (Coskun & Ozbuk, 2020). The present research can be justified as it is an attempt to examine predictors of TPB with moderators of guilt and demographics that is expected to make additions to the existing knowledge.

The present research focused on the restaurants on account of numerous findings from previous studies. In the series of food chain (from field to the ultimate consumption by consumers) most of the food waste occurs at food points or restaurants (Author's Research Findings). These findings strengthen the research findings of Parfitt et al. (2010). According to them, major portion of food waste occurs at food services, food points or retailers where food waste can be

reduced. Restaurants are significant contributors towards food waste and greenhouse gases paving the ways for increase in costs and wastage of resources (Hall & Gössling 2013; 2016; Martin-Rios et al., 2018). Research findings highlighted the exorbitant amount of food being wasted at food outlets every year. For example, food waste of 920,000 ton at food points in UK (Priestley, 2016). Food is wasted when consumers can not finish the food they ordered (leftovers and over-ordering). It leads to food waste during consumption at food points or restaurants (Martin-Rios et al., 2018; Wang et al., 2017). Increase in number of people dining out leads to increased food waste (Wang et al., 2017). There is limited research on food waste related behavior of consumers who dine out (Coskun & Ozbuk, 2020). Lack of research on such food waste behaviors left the research gap. There is need to study what are the determinants of food waste behavior at food points and restaurants.

This study is significant in a variety of ways. It extended the basic model of the Theory of Planned Behavior (TPB) by augmenting three demographic factors (age, gender, education) as moderators in the relationship of independent variables (attitude, subjective norms, perceived behavioral control) and intention to behavior. Moderating impact of guilt in relationship of intention to behavior and food waste behavior is another contribution to the original model. In this way, the study provides foundation theoretical framework for future researchers. This study is also important from perspectives of consumers and restaurants. Study will enhance the comprehension of consumers regarding their roles in reducing food waste. This study can be helpful for restaurants in introducing new tools and programs to educate their staff and consumers about the issue of food waste and its detrimental impacts on profits, environment and sustainability. Study will be a milestone in enhancing the quality of life of residents because less food waste leads to cleaner environment. Cleaner environment makes life better. In nutshell, purpose of the study makes it beneficial: it studies TPB in food industry in developing world; it incorporates demographic factors and guilt as moderators; it is novel study as such extension to the fundamental model of TPB has not been tried so far; and it offers theoretical framework for future studies.

### *Purpose of the Study and Research Questions*

Primary purpose of this research was to address the aforementioned gap by studying how TPB is helpful in understanding the intention to behavior and actual behavior towards food waste. This study was also meant to investigate the impact of moderators (age, education, gender) on relationship between components of TPB and intention to behavior. It also studied the moderating impact of guilt on relationship between intention to behavior and actual behavior.

Following research questions were set to investigate these relationships and impacts of relevant moderators:

- What are the individual impacts of components of TPB on intention to behavior?
- What is the impact of age, education and gender as moderators on relationship between components of TPB and intention to behavior?
- What is the impact perceived behavioral control on food waste behavior?
- What is the impact of intention to behavior on actual behavior?
- What is moderating impact of guild feeling on relationship between intention to behavior and actual behavior?

## Literature Review

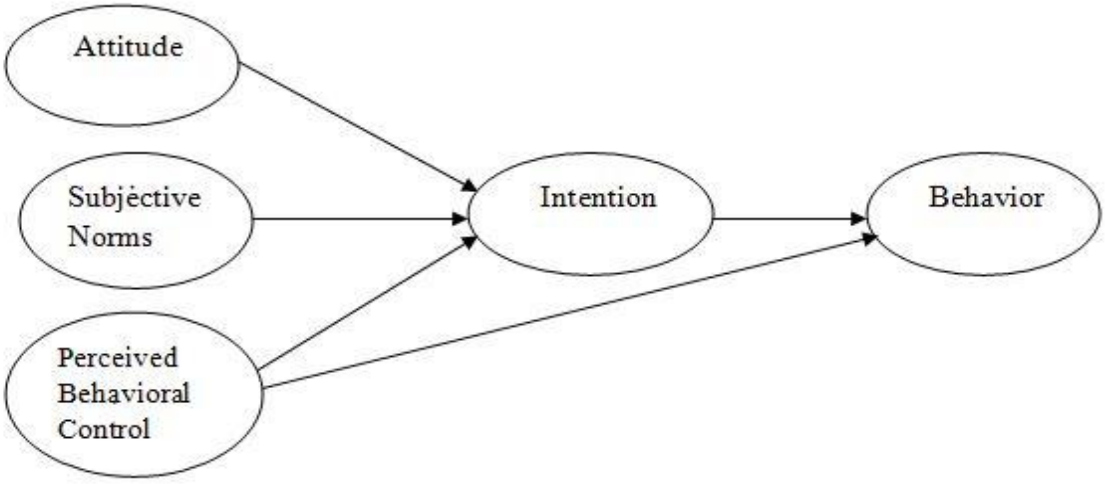
Food services contribute to third-highest food waste (European Environment Agency, 2015). According to Gunders (2012), restaurants lose 4 to 10 % of their food purchased. Such food waste can be categorized as avoidable (parts of food separated during the preparation of ingredients to be cooked) and unavoidable (unnecessary parts of food such as peels, outermost leaves of lettuce, stems) (Derqui & Fernandez, 2017). It is crucial to manage the wasted food effectively (Dhir et al., 2020) because it is a consequential matter in tourism and hospitality industry (Okumus et al., 2020). Issue of food waste is accompanied by threats such as emission of greenhouse gases and climate change (Kallbekken & Sælen, 2013; Katajajuuri et al., 2014). Food waste in Finland was 1% of annual gas emissions (Katajajuuri et al., 2014). Food security (Wang et al., 2018) and financial losses (Hennchen, 2019) are also associated perils.

Food consumption stage constitutes a significant amount food waste (Martin-Rios et al., 2018). This food waste can be prevented at consumption level (Stancu et al., 2016; Zhou & Wan, 2017). Stancu et al. (2016) argued that efforts to prevent food waste can be made effective by understanding the food consumption behavior and factors influencing it. Behavior of consumers is one of the critical causal factors (Martin-Rios et al., 2018; Wang et al., 2017). Such food related behaviors have been studied with lens of the Theory of Planned Behavior (TPB) (Stefan et al., 2013). TPB is among the most well-known and paramount socio-psychological theories for comprehending, forecasting, and elucidating human behavior (Ajzen, 2015). This theory has potential to instigate and shepherd behavioral changes (Steinmetz et al., 2016). On such grounds, the present research is applying Ajzen's Theory of Planned Behavior (TPB).

The Theory of Planned Behavior (TPB) emerged from the Theory of Reasoned Action (TRA). TRA (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) is based on assumption of rationality and posits that behavior of individuals is influenced by the realization of implications of actions by individuals. According to TRA, combined impact of subjective norms and attitude influences the intention of an individual to perform a specific behavior.

Subjective norms are social pressures on individuals that influence the performance of behavior. Subjective norms coupled with attitude towards behavior stimulate intention to behavior. Intention to behavior is central factor and it influences the actual performance of behavior. The TRA Model does not include the perception of difficulty or ease of performance of behavior. To address this, concept of *"perceived behavioral control"* was introduced in Theory of Planned Behavior (TPB). Model of TPB is drawn as under as Figure 1.

**Figure 1:** Model of the theory of planned behavior




**Source:** Ajzen, 1991

The TPB proposes that attitude, subjective norms and perceived behavioral control have impact on intention and intention influences actual behavior. According this theory, there is a direct impact of perceived behavioral control on actual behavior. The TPB predicts and explains behavior of individuals in particular contexts (Ajzen, 1991) and it became social-psychological model to predict and understand the behavior of an individual (Ajzen, 2015). Individuals perform their actions after understanding the implications influenced by social pressures, willingness and understanding of ease or difficulty of control. Stronger intention means more likely to behave or perform an action. Intention leads to behavior if an individual perceives that the behavior is under control (Ajzen, 1991). In TPB subjective norms, attitude and perceived behavioral control apply direct effects on intention and intention has direct impact on behavior. Attitude is the understanding of behavior as favorable or unfavorable whereas subjective norms are social pressures on an individual regarding the performance of behavior. Perceived behavioral control refers to perception of difficulty or ease of performance of an action that is related with past experience and obstacles. PBC influences behavior directly as well as indirectly, through intention (Ajzen, 2005). It means behavior is directly predicted by PBC and intention. The present research was conducted to study the determinants of behavior of consumers in connection with food waste. Behavior is influenced by intention that is influenced by attitude, subjective norms, and perceived behavioral control. Researcher of the present research studied the consumers, dining out, during data collection. Consumers' intentions are affected by what they perceive as favorable or unfavorable (attitude), they consider what others, near and dear to them think about food waste (subjective norms), and their intentions to behave in a certain way are also affected by the degree of difficulty or ease to perform the action (perceived behavioral control). Independent variables of the Theory of Planned Behavior lead to intention and actual behavior. Literature review of existing literature on the topic highlights the extensive use of TPB in food service industry. TPB has evinced its capacity of assessing the consequences of attitudes, subjective norms and perceived behavioral control of consumers.

Food waste behavior is well explained with the help of TPB due its generic approach (Mondéjar-Jiménez et al., 2016) and it is theoretical framework that is suitable to investigate food waste

behavior (Van der Werf et al., 2020). Studies used TPB for predicting intentions in context of restaurants that are environment-friendly (Tommasetti et al., 2018), organic menu and restaurant visits (Shin et al., 2018), and behavior of management in connection with consumption of food (Soorani & Ahmadvand, 2019). Literature on waste of food highlights the extensive use of TPB but there is limited use of TPB in food waste in restaurants. The present research is an attempt to fill the gap. Along with TPB, this study included demographics (age, gender, education) as moderators in the relationships of predictors (attitude, subjective norms, perceived behavioral control) and mediator (intention to behavior). It also added feelings of guilt as moderator in relationship of intention to behavior and food waste behavior.

TPB successfully predicts the behaviors and intentions to behavior and it has propensity to include predictors in other contexts (Ajzen, 1991). Capability of the model to predict is enhanced with inclusion of additional predictors (Yuriev et al., 2020). Acknowledging the complexity of food waste behavior (Mondéjar-Jiménez et al., 2016; Russell et al., 2017), it is said that numerous relations and behaviors contribute to food waste behavior (Quested et al., 2013). Such behavior can be perceived better by integrating factors affecting the choices (Stefan et al., 2013). Therefore, the present study contributes to the existing knowledge by adding demographic variables (age, education, gender) and guilt feelings as moderators in TPB Model. It is to explain the food waste behavior of consumers in restaurants and food points. Hypotheses developed for this purpose are elaborated in next sections.

### *Attitude, Subjective Norms, Perceived Behavioral Control, and Intention to Behavior and Food Waste Behavior*

*"An attitude is a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related"* (Fishbein & Ajzen, 2010, p.76). Individuals consider their actions either favorable or unfavorable that refer to their attitude (Ajzen, 1991). Attitude, in relation to food waste behavior, refers to understanding of a consumer regarding food waste. Consumers may think that food waste is either unfavorable or favorable. If consumers evaluate that food waste is unfavorable, they intend to reduce the waste (Barone et al., 2019; Visschers et al., 2016). Plenty of researchers refer attitude as reliable predictor of intention (Ajzen & Madden, 1986; Arvola et al., 2008; Cox, 2012). It can be believed that consumers do not intend to waste food if they assess the food waste an unfavorable act. Subjective norms and attitudes positively affect the intention to food waste (Barone et al., 2019). Intention of individuals is influenced by what their near and dear think, do, and wishes them to do. It means these are social pressures modifying our intentions. Such social pressures that individual perceive while behaving are termed as subjective norms.

Subjective norms in context of food waste are social pressures perceived by consumer while wasting food. Intention to reduce food is enhanced by individual's perception of social pressure (Aktas et al., 2018; Barone et al., 2019; Graham-Rowe et al., 2015). Subjective norms, even not having impact like attitude, are still an important predictor and are used to predict the intentions. Research shows the influence of subjective norms on people's intentions (Trafimow & Finlay, 1996). A number of studies suggest subjective norms as important predictor of intentions (Cox, 2012; Johnston & Warkentin, 2010; Knapp et al., 2006). The review of studies on TPB highlights strong relationship of intentions and subjective norms (Armitage & Conner, 2001).

Present research is a try to study the impact of subjective norms on intentions. It is expected that people have intentions to waste food if this is the practice of people important to them.

Perceived behavioral control (PBC) is perception of people regarding the ease or difficulty of control they can exercise to avoid food waste. If they perceive that food waste factors are under their control, they intend to reduce more food waste (Aktas et al., 2018; Russell et al., 2017). Such individuals not only intend to reduce, they actually behave to reduce food waste (Mondéjar–Jiménez et al., 2016; Soorani & Ahmadvand, 2019). On the basis of these research findings, following are the hypotheses to be tested in relation of food waste behavior in context of food points and hotels:

***H1:*** *Attitude has positive relationship with intention to behavior.*

***H2:*** *Subjective norms have positive relationship with intention to behavior.*

***H3:*** *Perceived behavioral control has positive relationship with intention to behavior.*

***H4:*** *Perceived behavioral control has positive relationship with food waste behavior.*

***Intention to Behavior, Food Waste Behavior and Mediating Role of Intention to Behavior***

TPB focuses on intentions of people to engage in behavior and is considered very helpful in forecasting or predicting the actual behaviors (Sheppard et al., 1988). TPB suggests that intention and perceived behavioral control predict the actual behaviors (Ajzen, 1991). Certain behaviors and actions in a number of situations can be predicted with the help of TPB where actual behaviors are influenced by intention to behavior (Beck & Ajzen, 1991). From the extended model of TPB and above discussion, it is expected that intention to behavior influences food waste behavior.

Relationship of intention to behavior with its predictors (attitude, subjective norms and perceived behavioral control) has been discussed in connection with the hypotheses H1, H2, and H3, in previous section. TPB establishes these relationships as shown in the original model of TPB. TPB suggests that intention is well predicted by attitude, subjective norms and perceived behavioral control. Actual behavior is influenced by these predictors via intention. It can be seen from the model of TPB that determinants of intention (attitude, subjective norms and perceived behavioral control) have impact on food waste behavior via intention to behavior. First these determinants influence intention to behavior and then intention to behavior influences food waste behavior. These relationships would be tested under hypotheses H5, H6a, H6b, H6c. Present research is meant to investigate how intention to behavior mediates in their relationships because TPB also posits indirect impact of these three determinants of intention, on food waste behavior. While investigating the mediation, it is advisable to check the direct relationships as well (Baron & Kenny, 1986). It is argued that attitude and subjective norms have positive direct relationships with food waste behavior. For the purpose, following hypotheses are to be tested:

***H5:*** *Attitude has positive relationship with food waste behavior.*

***H6:*** *Subjective norms have positive relationship with food waste behavior.*

***H7:*** *Intension to behavior has positive relationship with food waste behavior.*

***H8a:*** *Intention to behavior mediates the relationship between attitude and food waste behavior.*

***H8b:*** *Intention to behavior mediates the relationship between subjective norms and food waste behavior.*

***H8c:*** *Intention to behavior mediates the relationship between perceived behavioral control and food waste behavior.*

### *Moderating Role of Age, Education and Gender*

Social and demographic characteristics are very important in relation to TPB (Ajzen & Fishbein 1980). In spite of integration of these demographics and predictors of TPB, such relationships have not been much studied. Researchers consider demographic factors very important where consumer behaviors are much influenced by gender after age and education (Olli et al., 2001; Wolters, 2014). Following these research findings, age, education and gender are being taken as moderator in this study. It is to investigate if determinants (attitude, subjective norms and PBC) of TPB are moderated by Age, education and gender.

Younger consumers decide to purchase on the basis of information they gain through various sources. Contrary to it, older people decide on the basis of heuristic processing (Yoon, 1997). Aged and younger people have been the matter of interest for researchers. While buying goods or services, aged or older people make decisions based on their experiences whereas younger tend to decide on the basis of available information (Homburg & Giering, 2001). People gain understanding or the knowledge of problem over period of time which moderates their decisions (Sorce, 1995). In addition to gained knowledge and experience, ethics play an important role in making rational decisions. Relationship between level of ethics and age can be studied through lens of the Theory of Moral Development. The theory posits that age plays key role in relation of ethics where aged people exhibit more ethical decisions (Kohlberg, 1975). This was supported by number of researches. Their studies concluded that ethical decisions are influenced by age. External factors do not influence older people (Peterson et al., 2001). Role of age regarding ethical decisions was studied in various researches. They concluded that age is a significant predictor in making ethical decisions (Honeycutt et al., 2001; Moores & Chang, 2006). In simple, it can be argued that behaviors are moderated by age of consumers. Education and gender are next two influential moderators (Olli et al., 2001; Wolters, 2014).

Education is another predictor regarding decision making. It is generally believed or expected that the more the people are educated, the more they are ethical (Deshpande, 1997). Scholars suggest that education level has impact on behavior (De Bildt et al., 2005; Peterman & Kennedy, 2003). It is expected that education affects the behavioral intentions. Intention to behavior and food waste behavior are strongly related with ethics. This notion is supported by studies. More educated people are deemed more ethical (Deshpande, 1997). Education level impacts behavior (WHO, 2012; Peterman & Kennedy, 2003). So education is taken as moderator in present research to study if it moderates in relationships of predictors of TPB and intention to behavior.

Gender influences the acts, behaviors and values of consumers and helps in understanding their behavior (Büyükdag et al., 2020; Vicente-Molina et al., 2018). Gender is a significant predictor

and it has been tested in various studies (Adam & Ofori-Amanfo, 2000; Mohamed et al., 2012). Relationship of gender with variables such as buying habits (Silvennoinen et al., 2014) and knowledge of environment (Vicente- Molina et al., 2018), has been studied. Study of prevailing researches on the topic of food waste suggests that gender can be listed among much used variables. According to Gender Socialization Theory, male and female possess varied levels of values (Calabrese et al., 2016). Individuals of different gender may behave differently. For example ethical beliefs of females are stronger than males (Peterson et al., 2001). Ethical behaviors are affected by gender (Kavuk et al., 2011). In addition to ethical behaviors, males and females react differently while consuming (Roux et al., 2017). People of opposite genders show different emotional behaviors and food preferences. Kim and Jang (2017) argued that their food consuming behavior under stress is also different. Males and females have different food selections or priorities (Lassen et al., 2016) and female consumers strive to minimize the amount of food wasted (Graham-Rowe et al., 2015). Gender and food waste are related significantly (Visschers et al., 2016). Findings of these previous studies suggest that gender can be anticipated as moderator among variables in the research model of present research. Hence, the following hypotheses are established:

***H9a:*** *Age moderates the relationship between attitude and intention to behavior.*

***H9b:*** *Age moderates the relationship between subjective norms and intention to behavior.*

***H9c:*** *Age moderates the relationship between perceived behavioral control and intention to behavior.*

***H10a:*** *Education moderates the relationship between attitude and intention to behavior.*

***H10b:*** *Education moderates the relationship between subjective norms and intention to behavior.*

***H10c:*** *Education moderates the relationship between perceived behavioral control and intention to behavior.*

***H11a:*** *Gender moderates the relationship between attitude and intention to behavior.*

***H11b:*** *Gender moderates the relationship between subjective norms and intention to behavior.*

***H11c:*** *Gender moderates the relationship between perceived behavioral control and intention to behavior.*

### *Moderating Role of Guilt Feelings*

Guilt is non-persistent characteristic (Lewis, 1971) and is related to callous thought or wrongdoing. An unfavorable behavior resulting from aversive situation causes guilt (Smith et al., 2010). Guilt causes feeling bad about the behavior (Tangney et al., 1996) and individuals behave in pro-social way. Guilt intriguers sense of wrongdoing or failure to meet the standards of living of others (Tignor & Colvin, 2019). Perceptions of wrongdoing or injustice cause guilt (Tracy & Robins, 2006). Individuals modify their behaviors to nullify the negative consequences and correct their actions. For example a consumer feels, “My conscious bothers me if I bin the food”

(an item of guilt construct in the present study). A consumer with such understanding or perception strives to modify the food waste behavior in future. Guilt is not only a compelling motivator (Ausubel, 1955), it also predicts behavior in terms of morality and ethics (Cohen et al., 2013).

Guilt has the ability to enhance the behavior where perceived problematic behaviors can be modified by corrective actions (Wang, 2011). Awareness of problematic situations gives rise to guilt when people face cognitive dissonance which is in fact is discrepancy or gap between actual behavior and the right behavior (Festinger, 1957). This cognitive dissonance is very useful in assessment and modification of behaviors (Kelman & Baron, 1974). For example, consumers feel the discrepancy between their actual food consumption behavior and the normal or actual behavior. This dissonance (gap between the behavior people believe to be normal and actual behavior) causes guilt. They feel guilt and try to modify their behavior regarding food consumption and try to save food from being wasted.

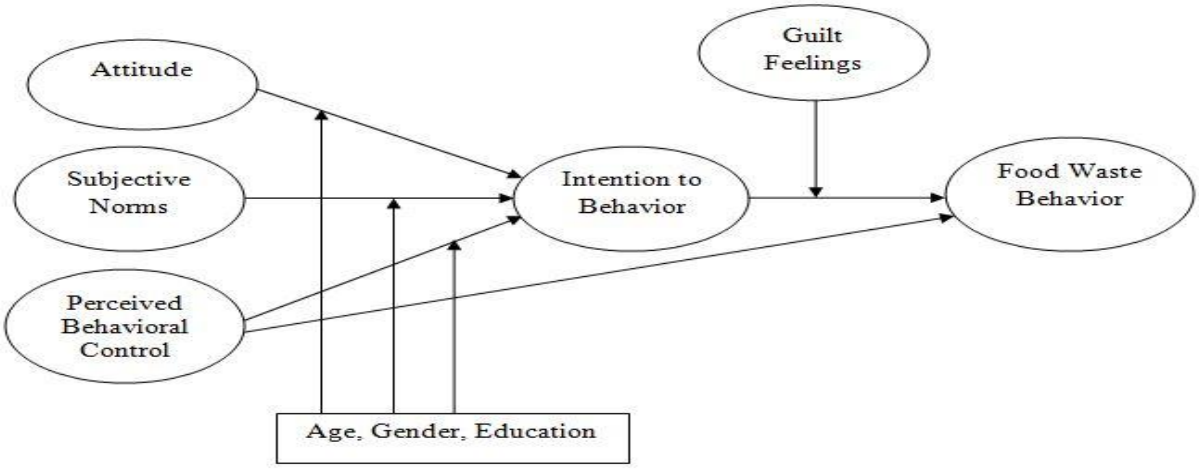
Present research studies the moderating impact of guilt feelings in relationship of intention to behavior and food waste behavior of consumers in TPB framework. It is meant to conclude that by including guilt feelings would expand TPB. Guilt feelings variable is chosen as consumers experience such feelings on regular basis while dining out or eating at their own space. Guilt feelings restrain an individual from wrong behavior (Wang, 2006) and this intrinsic deterrent reduces the food waste behavior (Baumeister et al., 1994). Wasteful behavior causes guilt feelings in consumers and it induces them to reduce food waste and alleviation of negative feelings in them (Quested et al., 2013). From the discussion it can be concluded that guilt feelings modify the behavior. Moderating impact of guilt feelings in relation of intention to behavior and food waste behavior is being studied in this research where intention to behavior is predictor of food waste behavior.

***H12:*** *Guilt feeling moderates the relationship between intention to behavior and food waste behavior.*

### *Research Model*

The present study extended the TPB by using demographic factors as moderators in relationships of predictors of TPB (attitude, subjective norms and perceived behavioral control) and intention. Guilt feelings are used as moderator in relationship of intention and behavior. The following model is proposed on basis of literature review and established hypotheses as shown in Figure 2.

**Figure 2:** Research Model




## Methods

The purpose of this study is to understand or test the determinants of food waste behavior of customers in food industry. These determinants were studied with the modified TPB model. Collected data were analyzed to find respondents profiles, reliability of the instrument, relationships, mediating and moderating impacts among variables.

## Data Collection

### *Questionnaire*

A structured closed-end questionnaire was used to collect data from participants by visiting restaurants and food outlets in Rahim Yar Khan District, Punjab province of Pakistan. First page of the questionnaire introduces the research, purpose of research, data collection and affirmation of confidentiality of the data and information of respondents. Questionnaire was divided into seven sections containing variables and background information of the respondents. Questionnaire includes measurements of attitude, subjective norms, perceived behavioral control, intention to behavior, guilt and food waste behavior, covered under sections one to six. Section seven is the last section of the questionnaire which covers age, gender and education of the respondents. The items of each construct were taken from previous studies as shown in Table 1.

**Table 1.** Research Measures and Sources

| Research Measures | Source |
|---|---|
| Attitude | Coskun & Ozbuk, 2020; *Soorani & Ahmadvand, 2019* |
| Subjective Norms | *Soorani & Ahmadvand, 2019* |
| Perceived Behavioral Control | Coskun & Ozbuk, 2020; *Soorani & Ahmadvand, 2019* |
| Intentions to Behavior | Coskun & Ozbuk, 2020 |
| Guilt | Chang H, 2021; *Soorani & Ahmadvand, 2019* |
| Food Waste Behavior | *Soorani & Ahmadvand, 2019* |

These items were modified or edited according to the needs and understanding of the respondents. Each section contains closed-end questions giving the choice to select only one option in each question. The five-point Likert scale (1= Strongly Disagree, 2= Disagree, 3=

Neutral-Neither agree nor disagree, 4= Agree, and 5= Strongly Agree) was used in the questionnaire.

### *Participants*

Data were collected during the months of September and October, 2021. Researcher distributed the questionnaires by visiting the food outlets and restaurants. Visiting consumers were requested to spare time for discussion and filling the questionnaires. The questionnaires were printed on the paper and respondents were requested to fill them with pens only. Respondents utilized their own understanding and their responses were not under the influence or control of the researcher. There was no participants' incentive involved as no respondent was rewarded with any sort of cash, food voucher or any other form of incentive. Researcher endeavored to get unbiased responses. First 145 correctly filled questionnaires were used in pilot study that indicated reliability of constructs ranging from 0.873 to 0.981 after which further questionnaires were distributed. The researcher distributed 450 questionnaires in total, among randomly selected consumers from restaurants and food outlets. The researcher got 431 properly filled questionnaires (96% response rate), out of which 8 questionnaires were incomplete. These responses were discarded and 423 questionnaires were used for data analysis. The questionnaire is annexed at the end of present research paper.

## Findings

### *Demographic Details*

Frequencies and percentages of demographics (age, education and gender) are presented in Table 2 below. There are 423 respondents in total. 193 of them (45.6%) fall under age group 23-27 whereas respondents in the 18-22 age groups are the least. Most of the respondents got bachelor degrees and those with secondary education were the least. Demographic summary also reveals the gender distribution of participants where 274 (64.8%) are males and 149 (35.2%) are females.

**Table 2.** Demographic Summary of Respondents

| Demographics | Frequency | Percentage |
|---|---|---|
| **Age** | | |
| 18 – 22 | 47 | 11.1 |
| 23 - 27 | 193 | 45.6 |
| 28 and above | 183 | 43.3 |
| Total | 423 | 100 |
| **Education** | | |
| Secondary | 16 | 3.8 |
| Higher Secondary | 164 | 38.8 |
| Bachelors | 187 | 44.2 |
| Masters and above | 56 | 13.2 |
| Total | 423 | 100 |
| **Gender** | | |
| Male | 274 | 64.8 |
| Female | 149 | 35.2 |
| **Total** | 423 | 100 |

### *Reliability and Validity Assessment*

Reliability of the construct was measured with Cronbach's alpha. According to Hair et al. (2010), these reliability values are considered satisfactory if they are greater than 0.70. Minimum value of the Cronbach's alpha coefficient must be 0.70 (Nunnally, 1978). All values of Cronbach's alpha are greater than 0.70. Average variance extracted (AVE) and factor loadings (FL) were used to estimate convergent validity of scale items. Their values are above 0.50 and are acceptable as per criteria (Fornell & Larcker, 1981; Hair et al., 2010). Calculated values of composite reliability range between 0.813 and 0.895, which are greater than minimum value of 0.70 (Hair et al., 2012). Confirmatory Factor Analysis (CFA) was performed with AMOS 21. Chi-square test was applied to assess goodness-of-fit. The goodness of fit indices from structural model analysis indicated acceptable results. Chi-square value was 12.078 with 3 degrees of freedom. Ratio of chi −square to degrees of freedom ($\chi 2/df$) was 4.026. This ratio is acceptable because it should be below 5.0 (Bagozzi et al., 1991, Lee & Tsai, 2005). Other values from model fit indices were also acceptable. These values are: CFI= 0.987, AGFI= 0.923, GFI= 0.985, IFI= .981, RMSEA= .065, SRMR= 0.083, TLI=0.957. Analysis of each construct indicated acceptable level. Results of measurement model analysis are given in Table 3 as under. After these satisfactory results (Kline, 2011; Wu & Chang, 2005), relationships among variables were tested.

**Table 3.** Results of Measurement Model Analysis

| Construct | M | SD | Cronbach's α | FL | CR | AVE |
|---|---|---|---|---|---|---|
| **Att** | | | 0.904 | | 0.813 | 0.677 |
| Att_1 | 3.50 | 0.939 | | 0.858 | | |
| Att_2 | 3.52 | 0.958 | | 0.879 | | |
| Att_3 | 3.48 | 0.915 | | 0.767 | | |
| Att_4 | 3.43 | 0.920 | | 0.875 | | |
| Att_5 | 3.49 | 0.936 | | 0.876 | | |
| **SN** | | | 0.902 | | 0.852 | 0.814 |
| SN_1 | 3.22 | 1.048 | | 0.823 | | |
| SN_2 | 3.25 | 0.962 | | 0.785 | | |
| SN_3 | 3.12 | 1.001 | | 0.791 | | |
| SN_4 | 3.15 | 1.011 | | 0.825 | | |
| SN_5 | 3.22 | 1.048 | | 0.813 | | |
| **PBC** | | | 0.893 | | 0.825 | 0.659 |
| PBC_1 | 3.18 | 1.102 | | 0.765 | | |
| PBC_2 | 3.08 | 1.012 | | 0.796 | | |
| PBC_3 | 3.01 | 1.071 | | 0.789 | | |
| PBC_4 | 3.14 | 1.084 | | 0.847 | | |
| PBC_5 | 3.53 | 0.955 | | 0.849 | | |
| **IB** | | | 0.872 | | 0.846 | 0.627 |
| IB_1 | 3.38 | 1.086 | | 0.768 | | |
| IB_2 | 3.39 | 1.034 | | 0.830 | | |
| IB_3 | 3.31 | 1.085 | | 0.792 | | |
| IB_4 | 3.52 | 0.928 | | 0.778 | | |
| IB_5 | 3.46 | 0.902 | | 0.796 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **G** | | | 0.913 | | 0.895 | 0.783 |
| G_1 | 3.52 | 0.968 | | 0.843 | | |
| G_2 | 3.55 | 0.917 | | 0.876 | | |
| G_3 | 3.59 | 0.939 | | 0.754 | | |
| G_4 | 3.51 | 0.916 | | 0.837 | | |
| G_5 | 3.44 | 0.959 | | 0.809 | | |
| **FWB** | | | 0.885 | | 0.837 | 0.811 |
| FWB_1 | 3.40 | 1.103 | | 0.850 | | |
| FWB_2 | 3.33 | 1.062 | | 0.852 | | |
| FWB_3 | 3.25 | 1.078 | | 0.761 | | |
| FWB_4 | 3.52 | 0.950 | | 0.791 | | |
| FWB_5 | 3.37 | 0.930 | | 0.868 | | |

**Note:** Att=Attitude, SN= Subjective Norms, PBC= Perceived Behavioral Control, IB= Intention to Behavior, G= Guilt Feelings, FWB= Food Waste Behavior, FL= Factor Loadings, CR= Composite Reliability, AVE= Average Variance Explained. Values represented at significance of $p < 0.05$.

Discriminant validity was tested by comparing square root of AVE with inter-correlation of constructs. Inter-construct correlation is, "*the correlations between the items in any two constructs"* (Wang & Hazen, 2016 p.5). Square root of AVE should be greater than inter-construct correlations. (Fornell & Larcker, 1981; Park et al., 2014). In other words, the values of inter-correlations of constructs should not exceed the values of square roots of AVE. As shown in Table 4, all values of square roots of AVE are greater than the values of inter-correlations of constructs.

**Table 4.** Discriminant Validity Analysis

| Construct | M | SD | Age | Edu | Gender | Att | SN | PBC | IB | G | FWB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | 2.32 | 0.664 | **1.000** | | | | | | | | |
| Education | 1.35 | 0.478 | 0.290** | **1.000** | | | | | | | |
| Gender | 2.67 | 0.750 | 0.008 | 0.002 | **1.000** | | | | | | |
| Att | 3.48 | 0.797 | 0.021 | -0.002 | 0.008 | **1.000** | | | | | |
| SN | 3.19 | 0.859 | -0.009 | -0.049 | 0.061 | 0.474** | **1.000** | | | | |
| PBC | 3.19 | 0.875 | -0.059 | -0.067 | -0.006 | 0.429** | 0.748** | **1.000** | | | |
| IB | 3.41 | 0.814 | -0.002 | 0.021 | 0.091 | 0.487** | 0.371** | 0.395** | **1.000** | | |
| G | 3.52 | 0.781 | -0.005 | 0.060 | -0.029 | 0.747** | 0.379** | 0.408** | 0.576** | **1.000** | |
| FWB | 3.37 | 0.812 | 0.009 | -0.011 | 0.071 | 0.423** | 0.343** | 0.383** | 0.862** | 0.592** | **1.000** |

**. Correlation is significant at the 0.01 level (2-tailed).
a. Listwise N=423

### *Hypothesis Testing*

Direct and indirect relationships among variables were checked with structural equation modeling (SEM) technique. Analysis of direct relationships of attitude (Att), subjective norms (SN) and perceived behavioral control (PBC), with food waste behavior (FWB) indicate significant positive influences with p-values < 0.001. Intention to behavior has also direct significant and positive influence on food waste behavior with p-value < 0.001. Intention to

behavior mediates in relationships of attitude, subjective norms and perceived behavioral control, with food waste behavior. Standardized beta coefficients were individually used to assess the effect size of independent variables on relevant dependent variable. $R^2$ tells about over all variance, in target variable, caused by predictors. $R^2 = 0.512$ is variance in food waste behavior as result of direct influence of attitude, subjective norms and perceived behavioral control where as these predictors bring 48.1 % variance in intention to behavior ($R^2 = 0.481$). There is overall 17.5% variance in food waste behavior with mediation of intention to behavior (shown as indirect relationship $R^2 = 0.175$). Values for the standardized path coefficients (β) between the constructs, and the coefficient of determination ($R^2$) are given in Table 5.

**Table 5.** Summary of Relationships of Independent, Mediating, and Dependent Variables

| Hypothesis | Structural Path | Beta Values (β) | R-Square ($R^2$) | Significance (p< 0.01) | Result |
|---|---|---|---|---|---|
| H1 | Att → IB | 0.321 | | 0.000 | Supported |
| H2 | SN → IB | 0.125 | | 0.000 | Supported |
| H3 | PBC → IB | 0.229 | | 0.000 | Supported |
| H4 | PBC → FWB | 0.320 | | 0.000 | Supported |
| H5 | Att → FWB | 0.217 | | 0.000 | Supported |
| H6 | SN → FWB | 0.179 | | 0.000 | Supported |
| H7 | IB → FWB | 0.852 | | 0.000 | Supported |
| H8a | Att → IB → FWB | 0.168 | | 0.000 | Supported |
| H8b | SN → IB → FWB | 0.131 | | 0.000 | Supported |
| H8c | PBC → IB → FWB | 0.183 | | 0.000 | Supported |
| FWB | Direct relationship | | 0.512 | | |
| IB | Direct relationship | | 0.481 | | |
| FWB | Indirect relationship | | 0.175 | | |

**Note:** Att=Attitude, SN= Subjective Norms, PBC= Perceived Behavioral Control, IB= Intentions to Behavior, G= Guilt Feelings, FWB= Food Waste Behavior. Values represented at significance of $p < 0.01$.

### *Moderating Role of Age, Education, Gender, and Guilt Feeling*

Remaining hypotheses (H9a, H9b, H9c, H10a, H10b, H10c, H11a, H11b, H11c) in connection with moderating effects of age, education and gender respectively and moderating effect of guilt feeling (H12) were tested with the help of PROCESS (V4), 5000 bootstrap sample under 95% confidence intervals. Results showed that age, education and gender of the respondents significantly moderate the relationships of predictors (attitude, subjective norms, and perceived behavioral control) and intention to behavior. Further, moderating role of guilt feeling in relationship of intention to behavior and food waste behavior was tested which showed the moderation of guilt feeling. Model summaries are given in Table 6.

**Table 6:** Summary of Impacts of Moderating Variables

| Hypothesis | Structural Path | Coefficient Values | R-Square | F | Significance (p<.05) | Result |
|---|---|---|---|---|---|---|
| H9a | (Age x Att) → IB | - 0.328 | 0.279 | 43.76 | 0.000 | Supported |
| H9b | (Age x SN) → IB | 0.385 | 0.395 | 45.17 | 0.000 | Supported |
| H9c | (Age x PBC) → IB | 0.456 | 0.471 | 44.65 | 0.000 | Supported |
| H10a | (Edu x Att) → IB | 0.307 | 0.382 | 33.90 | 0.000 | Supported |
| H10b | (Edu x SN) → IB | 0.391 | 0.370 | 38.45 | 0.000 | Supported |
| H10c | (Edu x PBC) → IB | 0.347 | 0.318 | 31.29 | 0.000 | Supported |
| H11a | (Gndr x Att) → IB | 0.391 | 0.304 | 41.57 | 0.000 | Supported |

| | | | | | | |
|---|---|---|---|---|---|---|
| H11b | (Gndr x SN) → IB | 0.316 | 0.391 | 42.30 | 0.000 | Supported |
| H11c | (Gndr x PBC) → IB | 0.319 | 0.413 | 39.97 | 0.000 | Supported |
| H12 | (G x IB) → PBC | 0.320 | 0.452 | 46.39 | 0.000 | Supported |

**Note:** Att=Attitude, SN= Subjective Norms, PBC= Perceived Behavioral Control, IB= Intentions to Behavior, G= Guilt Feelings, FWB= Food Waste Behavior. Values represented at significance of $p < 0.05$.

All hypotheses are supported as they have significance levels below 0.05. Coefficient values indicate the medium moderation impacts. Age negatively moderates the relationship of attitude and intention to behavior which moderation reduces as age increases. Age positively moderates the relationship of subjective norms, perceived behavioral control, and intention to behavior. It means age of older respondents causes higher moderation. Similarly there are higher levels of moderations as education levels of respondents increase (hypotheses; H10a, H10b, H10c). Guilt also positively moderates the relationship of intention to behavior and food waste behavior.

Gender positively moderates among the relationships of attitude, subjective norms, and perceived behavioral control, with intention to behavior. It indicates that the relationship is stronger for males. It suggests that males are found relying more than females on opinions and suggestions of others. One reason can be their greater awareness of feelings and needs of others as compared to females. Males might be easily motivated by others' affiliations and suggestions, and by social pressures.

## Discussion and Conclusions

### *Conclusions*

To answer the research questions, the present research studied the relationship of variables of the Theory of Planned Behavior (TPB) by extending the model with moderating roles of age, education, gender, and guilt feelings. It is extended the Theory of Planned Behavior (TPB) in terms of guild feelings and demographics as moderators. Results indicate the significant positive relationship among these variables suggesting the ways for reducing food waste at restaurants. Positive moderating effect of guilt feelings regarding food waste behavior suggests the feelings of guilt affects food waste behavior. Guilt feelings has potential to influence and stimulate consumers to modify their food consumption and food waste behavior. Attitude, subjective norms and perceived behavioral control positively affect the behavioral intentions (used as Intention to Behavior in this study). These relationships are positively moderated by demographics of respondents (age, education, and gender). Perceived behavioral control influences food waste behavior the most. It suggests that food waste behavior can be modified by focusing on perceived behavioral control of the consumers. Consumers can be persuaded that food waste is under their control and food waste can be controlled or minimized if they exercise their control over actions. In simple words they can do, if they wish to do so. Findings of present research validate the components of TPB according to which attitude, subjective norms and perceived behavioral control are good predictors of intention. Perceived behavioral control has direct and the greatest impact on food waste behavior. Attitude and subjective norms indicated positive impact on intention to behavior that is in accordance with the research findings (Aktas et al., 2018; Barone et al., 2019; Graham-Rowe et al., 2015). Actual behaviors are highly influenced by intentions (Beck & Ajzen, 1991; Sheppard et al., 1988). These findings are

validated by present research as intention to behavior positively influenced the food waste behavior.

The Present study strengthened the findings of study by Stefan et al. (2013) where effects of perceived behavioral control and attitude were tested. Furthermore, findings of this study mirror the results of research of Stancu et al. (2016) except the later showed that intention has low impact on food waste behavior. The findings also supports the results of study by Graham-Rowe et al. (2015) in terms of effects of attitude and PBC but not in terms of effects of subjective norms on intention to behavior. Perceived behavioral control is an influential determinant of intention to behavior and food waste behavior. PBC, as an independent determinant in TPB, is significant driver for reducing food waste (Mondéjar–Jiménez et al., 2016; Russell et al., 2017). Research experienced that respondents with higher perceived behavioral control envision more intentions to control their food waste behavior. It implies that if consumers perceive or believe that food waste is in their control, they tend to reduce food waste. Present results support the findings of previous research (Soorani & Ahmadvand, 2019; Visschers et al., 2016).

The Theory of Planned Behavior is open to the augmentation of demographic characteristics or variables (Ajzen & Fishbein 1980) which have not been studied frequently. Demographic variables are significant moderators in influence of attitude, subjective norm, and PBC on behavioral intention (M.G. Morris et al., 2005; Venkatesh et al., 2000). Among demographics, age, education and gender are more significant (Olli et al., 2001; Wolters, 2014). Moderating role of demographic variables (age, education and gender) in relationship of intention to behavior and its predictors (attitude, subjective norms, perceived behavioral control) was tested in this research. Results suggest positive moderating influence of these demographics in relationship of TPB determinants (attitude, subjective norms and perceived behavioral control) and intention to behavior. These results (as shown in Table 6) indicate that age moderates in aforesaid relationships. Older people utilize their experiences while making buying decisions (Homburg & Giering, 2001). They gain problem specific knowledge with the passage of time which moderates their decisions (Sorce, 1995). Another reason could be the level of ethics seen in accordance with Theory of Moral Development positing more ethical decisions by aged people (Kohlberg, 1975). Moderating impact of age is greater in relationship of perceived behavioral control and intention to behavior (H9c) as compared with and subjective norms. In relationship of attitude and intention (H9a) to behavior, there is negative moderation.

After age, education and gender are significant moderators (Olli et al., 2001; Wolters, 2014). Education and gender also moderated the relationship of intention to behavior and its selected predictors. Moderating influence of education can be perceived by the relationship of education and ethics as behavior is highly influenced by education levels (Peterman & Kennedy, 2003). These ethics control the attitude, subjective norms and perceived behavioral control while influencing the intentions of consumers. Gender under hypotheses 11a, 11b, and 11c, positively moderated the relationships. Gender Socialization Theory suggests that males and females have different value levels (Calabrese et al., 2016) and they react in different ways while consuming (Roux et al., 2017). Findings of the present study validate such claims.

Moderating impact of guilt feelings in relationship of intention to behavior and food waste behavior of consumers was tested under hypothesis 12. Guilt showed significant positive moderating impact in this relationship. Augmentation of guilt to enhance TPB was already

proposed (Wang, 2011) and has been validated in the present study. Guilt arises when people perceive that their actions are wrong (Tracy & Robins, 2006), they try to discontinue bad behavior (Wang, 2006) and ultimately tend to modify food waste behavior (Baumeister et al., 1994). Guilt positively moderated the relation of intention and actual food waste behavior as guilt stresses the people to modify their intentions (wrong intention to act or behave) to take correct actions.

### *Theoretical Implications*

Novelty of this study is the simultaneous induction of demographics and guilt feelings as moderators. Extended TPB model helps in understanding the intentions and behaviors of consumers in food industry. Demographic factors of age, education and gender help in understanding how they moderate the influence of attitude, subjective norms and perceived behavioral control on behavioral intention. Understanding of momentous role of guilt feeling is another theoretical implication. Theoretical lens of guilt feeling and demographics has rarely been applied in context of food industry. This extended model and research findings contribute towards the existing knowledge in academia as well as in the field of hospitality and tourism.

### *Practical Implications*

Findings of the present study have a number of practical implications on how to reduce food waste in food outlets and restaurants. Perceived behavioral control has significant impact on the intention (Table 5). These findings can be prelude to efforts for reducing food waste. Staff members can assure the consumers that they can exercise control over food waste. Restaurants and food outlets can follow strategies to enhance consumers' perceived behavioral control on intention and actual food waste. It can be done by persuading the consumers that they have ability to reduce food waste if they wish to do so. Food outlets and restaurants can disseminate the ideas via press, awareness sessions, providing brochures, through mass media and social media. This objective can be achieved by affixing labels on food packages and posters at various places in the premises. Such tools can also be effective to modify the attitude of consumers regarding their behavioral intentions. Most of the respondents strongly agreed to questions, "I always think to reduce food waste", "Everyone has responsibility to prevent food waste" and "Discarded food makes me sad". It is evident that change in attitude has impact on intention. Efforts should be made to modify attitude with the help of aforementioned media tools. Concerning staff can assist the guests in ordering the relevant and suitable food quantity by indirectly persuading them to reduce food waste as well. Attitude, subjective norms and perceived behavioral control contribute towards 51% overall variance in food waste behavior (Table 5, $R^2 = 0.512$).

In the "Guilt" section, most of the respondents selected option 5 (strongly agree) while responding to the questions; "I feel guilty for food waste" and "I feel sorry if I order unnecessary food". It suggests that consumers feel guilt while wasting food. Food outlets and restaurants can adopt strategies to apprehend the guilt emotions of consumers. They can do so by conducting awareness sessions and via media and displaying messages in the premises. Restaurants can take practical measures to provide awareness that a large number of people around the globe have no proper access to food. Consumers can be informed about the environmental issues associated with food waste. In response to question, "I always take leftover food with me" in the section of

"Food Waste Behavior", all of the respondents selected either "Agree" or "Strongly Agree". It depicts the willingness of consumers to carry the food which they cannot finish (leftovers). This behavior reduces the burden of disposing off the leftovers. Food outlets and restaurants can offer free packaging of leftovers and make it convenient by designing spill-proof containers which are easy to carry as well.

In practice, this study provides significant information for researchers, practitioners, academic staff, owners, managers and other stakeholders in food, beverage and other identical industries. Owners, managers and policy makers can take practical steps to reduce food waste by devising policies. They can introduce reasonable food portions to reduce leftovers. Consumers can be encouraged to take leftovers with them. Staff members can play role regarding perceived behavioral control (PCB) of consumers. Signaling or message displays within the premises can influence consumers' attitude and PCB. It will affect intentions and food waste behavior of consumers.

### *Limitations and Future Research*

Present stepping stone study has potential limitations that other researchers can address in future studies. First, this cross-sectional study was conducted in context of one district only. It covered food consumers' industry. Future research can cover wider geographical areas to cover variety of contexts. Research in extended geographical area will help to study food waste in cross-culture settings as well. This model can be used in other industries. Future researchers can use this extended model in longitudinal study to have better understanding in different time periods. This research was conducted by getting primary data with help of questionnaire. Judgment process, with different stimuli, can change or modify behaviors and attitudes of consumers (Doherty & Kurz, 1996). Researcher could not conduct study in terms of consumers' judgment and pretest- posttest group designs due to lack of resources. Interventions through consumers' judgment process can modify behaviors of consumers (Field & Hole, 2002). Future research can address this issue. Rahim Yar Khan District has variety of restaurants and food points. Female tend to dine out at established restaurants especially with other family members. At casual food points, majority of the consumers are male. There are 274 (64.8%) male respondents in the present study whereas female respondents constitute 35.2 % (149 in numbers). Future research can address this issue by doing study in culture where either more female dine out or at least, they constitute 50% of total consumers.

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## ANNEXURE 1: Questionnaire

**Section 1: Attitude**

**Please share your feelings and opinion regarding food waste.**
Please indicate each item on the following scale and select only one number from 1 to 5.

| 1= Strongly Disagree | 2= Disagree | 3= Neutral (Neither agree nor disagree) | 4= Agree | 5= Strongly Agree |
|---|---|---|---|---|

| **Particulars** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| I always think to reduce food waste | | | | | |
| I think reducing food waste is beneficial for all | | | | | |
| Everyone has responsibility to prevent food waste | | | | | |
| Discarded food makes me sad | | | | | |
| Wasting food is very bad and harmful | | | | | |

**Section 2: Subjective Norms**

**To what extent you think that you should follow the beliefs of others regarding food waste.**
Please indicate each item on the following scale and select only one number from 1 to 5.

| 1= Strongly Disagree | 2= Disagree | 3= Neutral (Neither agree nor disagree) | 4= Agree | 5= Strongly Agree |
|---|---|---|---|---|

| People, important to me are sensitive to food waste and tend to avoid food waste | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Most people who are important to me think that I should reduce food waste | | | | | |
| My family members and friends support me in reducing food waste | | | | | |
| Most of my family members think reducing food waste is very good | | | | | |
| Most people who are important to me advocate reducing food waste | | | | | |

**Section 3: Perceived Behavioral Control**

**To what extent you perceive that ……...**
Please indicate each item on the following scale and select only one number from 1 to 5.

| 1= Strongly Disagree | 2= Disagree | 3= Neutral (Neither agree nor disagree) | 4= Agree | 5= Strongly Agree |
|---|---|---|---|---|

| **Particulars** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Food waste is avoidable | | | | | |
| I have control over reducing food waste | | | | | |
| Reducing food waste is very easy to me | | | | | |
| I have control over predicting portion size fit to my needs | | | | | |
| I can order food that I can finish | | | | | |

**Section 4: Intentions to Behavior**

**To what extent you intend to reduce food waste**
Please indicate each item on the following scale and select only one number from 1 to 5.

| 1= Strongly Disagree | 2= Disagree | 3= Neutral (Neither agree nor disagree) | 4= Agree | 5= Strongly Agree |
|---|---|---|---|---|

| **Particulars** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| I intend to use food that I order | | | | | |
| I intend to reduce food waste | | | | | |
| I intend not to bin the food | | | | | |
| I intend to reduce food waste in future | | | | | |
| I intend to persuade others to reduce food waste | | | | | |

**Section 5: Guilt Feelings**

**To what extent you feel guilt regarding food waste**
Please indicate each item on the following scale and select only one number from 1 to 5.

| 1= Strongly Disagree | 2= Disagree | 3= Neutral (Neither agree nor disagree) | 4= Agree | 5= Strongly Agree |
|---|---|---|---|---|

| **Particulars** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| I feel guilty for food waste | | | | | |
| I feel guilty if I do not reduce food waste | | | | | |
| My conscious bothers me if I bin the food | | | | | |
| I feel guilty if I do not induce others to reduce food waste | | | | | |
| I feel sorry if I order unnecessary food | | | | | |

**Section 6: Food Waste Behavior**

**Please indicate your actual behavior regarding food waste**
Please indicate each item on the following scale and select only one number from 1 to 5.

| 1= Strongly Disagree | 2= Disagree | 3= Neutral (Neither agree nor disagree) | 4= Agree | 5= Strongly Agree |
|---|---|---|---|---|

| Particulars | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| I order small quantity of food | | | | | |
| I do not order more food in case of reduced prices | | | | | |
| I make list of needed food if dining out in group | | | | | |
| I always take leftover food with me | | | | | |
| I contribute in all efforts to reduce food waste at restaurants | | | | | |

**Section 7: Background Information**

Age: _____years Gender: Male/ Female

Education: _____

**(End of Questionnaire; Many thanks for your time and patience)**