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Food Waste motivational factors: The theory of planned behavior and the role of Big-Five personality traits on Malaysians Generation Z

Hamiza Jamaludin *
Hamiza@uniten.edu.my

Bahari Mohamed
bahari@widad.edu.my

Nor Azizah Noorashid
azizah@widad.edu.my

Abstract
Purpose: This study conducted purposely to determine the behavior and personality traits of an individual's behavioral intention on food waste minimization among generation Z in Malaysia.
Design/methodology/approach: Students from universities in Pahang were selected to participate in this study, especially those born between 1995 and 2000. The data were analyzed using the Partial Least Square Structural Equation Modeling (PLS-SEM). The model of this study was an integration of Theory of Plan Behavior (TPB) and The Five-Factor Model (FFM) of personality traits.
Findings: The result clearly show that the TPB is useful in predicting and explaining human behaviors, and extraversion and agreeableness led to higher intention to reduce food waste among generation z.
Research limitations/implications: This study offers significant implication on theoretical part which adds to the growing body of literature on food waste management,
Practical implications: Due to the importance of FW-related studies, this study is able to provide recommendations on FW policies and creatives measures to achieve more successful FW management.

Keywords: Food waste, Generation Z, TPB, FFM personality traits, Food waste management

Introduction

The food waste (FW) includes food and food preparation leftovers generate from various sources such as residences, restaurants, and school and university cafeteria (FOA, n.d.). FW is defined as any by-product or waste product from the production, processing, distribution, and consumption of food which is not consumed by human (Okazaki et al., 2008). However, majority of FW occurs on the consumption stage. FW has become a world environmental issue due to its large amount produce. Accordingly, one-third of all food produced in the world is going to waste, and the amount is increasing for each year (Stancu et al., 2016; FOA, 2011). It has received growing interest from local, national and international stakeholders concerning on food security and environmental impacts. In facts, FW problematic is a persistent and valid issue facing by the governments and industries globally (Goh & Jie, 2019; Mondéjar-Jiménez et al., 2016). Increase in food waste would decrease the environmental quality due to factors such as increase in soil erosion, deforestation, water and air pollution, and greenhouse gas emissions and also associated with lost of money (Schanes et al., 2018; Mourad, 2016; Stancu

et al., 2016; FOA 2013). The FW composition varied little from country to country or season to season and normally comprise of fruits, vegetables, starchy food and meat. Latifah et al. (2009) in their research concluded that each major city in Malaysia is expected to produce 31,000 tonnes of municipal solid waste (MSW) per day in the year 2020. MSW contains a significant amount of FW and was reported to reach 63.1% in 2008 (Siwar, 2008). This is not included FW that enters the sewage system via kitchen sink. In Hong Kong FW consisting of 50% fruits, 20% vegetables, 20% starchy food and 10% meat (Zan et al., 2018).

FW is a significance arising in Malaysia where consumers more often live in an abundance of food supply and couple with new eating habits among the different genders, ages, levels of education, and disposable income. It is found that some Malaysian used food to express their identity, lifestyle as well as their financial status. MySaveFood (2018) reported that food wastage amongst Malaysian is increasingly alarming, but at a critical stage (The Star, 2018). In fact, data released by the Solid Waste Management and Public Cleansing Corporation (SWCorp) last year showed food waste was the highest solid component disposed of at the landfill site (The Star, 2018). In this sense, Malaysians reportedly threw at least 3,000 tonnes of food that could still be eaten daily and that amount increased during the festive seasons. This statement supported by an exploratory analysis conducted in Egypt during the month of Ramadan (Muslim fasting month) confirming that FW increased substantially (Elmenofi et al., 2015).

The changing in the relationship between people and food, thus, the issue of FW is critical; however awareness of the situation amongst the public is very weak. This circumstance may be happening due to the cultural and social factors of Malaysia that have less emphasis on food wastage. Though the government has been trying various efforts to curb this problem, but the problem still persists. In fact, Food Wastage Act will be tabled in parliament, as one of the mode and an effort to prevent this problem (The Star, 2018). This wastage behavior involves all layers of life, including the generation Z or the youth segment of the population. A study conducted by Mondéjar-Jiménez et al. (2016) in Italy and Spain proved that youths are the most inclined segment of the population to waste food. The lack of recognition and consideration by youths that FW is unethical is a worrying trend. This is especially true because the food waste among Z generation will have a profound effect on the sustainability of the nation in the future. It has happened due to the level of awareness among Malaysians; especially Z generation is very worrying. Thus, understanding the behavior and personality traits of individuals is extremely important to manage FW crisis. Despite a growing number of studies on FW in developed countries, however, very few studies on an individual's behavioral intention of food wastage were conducted in Malaysia. Moreover, Graham-Rowe et al. (2015) suggested more researches should be conducted to understand the consumer behaviors on FW and the essential factors that encourage, drive or impede FW minimization behaviors and practices. Therefore, the main objective of this study is to determine the behavior and the personality traits of an individual's behavioral intention on FW minimization. Specifically, this study was to identify and evaluate the ethical behavior and personality traits of Malaysian Z generation towards FW minimization intentions.

Literature Review

(i) Theoretical framework

There is a need to test and conduct theory-based studies to understand the individual's behavior on FW minimization intention. There are several conceptual models that attempt to explain how and why individuals behavioral intention to waste foods. The theory of planned behavior (TPB) (Ajzen, 1991) is a popular framework used by researchers to examine behavioral

intention. The researchers have examined the operationalization and potential multidimensionality of its constructs on various domains: for example, in food wastage (Goh and Jie, 2019; Mondéjar-Jiménez et al., 2016); household waste separation behavior (Xu et al., 2017); and physical activity (Hamilton & White, 2008). TPB has been recognized as an effective and the most frequently used theoretical frameworks to predict behavior. However, many researchers have suggested adding or changing variables for additional benefits (e.g., Picozo-Vela et al., 2010; Hoyt et al., 2009). Accordingly, Ajzen (2011, 1991) allows the inclusion of additional variables for further improvement of the TPB.

Therefore, this study integrated the TPB with the five-factor model (FFM) of personality traits. Behavior and personality traits have a close relationship (Steg & Vlek, 2009), it is likely that individuals who differ in their personalities also differ in the ways they form beliefs, attitudes and how readily they adopt social norms (Ajzen, 2011). The role of personality in general, and the five-factor model (FFM) of personality traits in particular, had remained largely unexplored in FW researches. Moreover, FW is a complex and multi-faceted issue that involves many variables and factors (Schanes et al., 2018). Thus, this study was linking the components of FFM to the behavioral intention within the conceptual framework of TPB. The integration of TPB and Five Factor Model (FFM) of the personality trait into theoretical framework could yield good results. Furthermore, the FFM personality traits are chosen for the purpose to understand how and if these personality traits affect behavior intentions towards FW minimization. The constructs from TPB and FFM are inferred through a mathematical model whereby their relationship was further examined. Empirically, the integration of the TPB and FFM of personality traits appears to be a useful strategy for researchers to study broad domain of behavior and personality. According to Funder (1994) an individual's behaviour is determined by individual's personality. For example, Picozo-Vela et al. (2010) study the behavioral intention of online review, incorporating the five-factor model (FFM) traits of conscientiousness, extraversion, agreeableness, neuroticism, and openness to experience as predictors of TPB behavioral intention construct, finding that attitude, neuroticism and conscientiousness are associated with the individual's intention to provide online review. In the exercise domain, studies on exercise behavior are conducted by integrating FFM and the TPB to examine the relationship between personality and behavior (e.g., Hoyt et al., 2009; Rhodes et al., 2004). In keeping with Picozo-Vela et al. (2010) and Hoyt et al. (2009), both TPB constructs and FFM traits are element that potentially can motivate ethical behavior intentions of youth when it comes to FW minimization. The current study is to determine the behavior and personality traits of Malaysian Z generation on food waste minimization at the consumption stage. Thus, the current study has the potential to find new perspectives of individuals' behavior and personality traits as a result of integrating the TPB and FFM theoretical framework.

(ii) Theory of planned behavior

The Theory of Planned Behavior (TPB) (Ajzen, 1991) is a theoretical framework to underpin the understanding of the FW individual's behavioral intention by the Malaysian generation Z. The literature showed the theory is useful in predicting and explaining human behavior (e.g., Mondéjar-Jiménez et al., 2016; Pakpour et al., 2014; Hoyt et al., 2009). According to the TPB, an individual's behavior is based on his/her readiness to perform a target behavior and the strong motivation and willingness to act (Ajzen, 1991). The individuals who have strong intentions to perform the target behavior are having positive attitudes, and given adequate normative support, and perceived that they can easily participate in the activity. The TPB which specifies the cognitive antecedents of behaviour, is the predominant framework used to explain

an individual's behavior, as supported by a meta-analysis (Schanes et al., 2018). The TPB constructs consist of attitude, subjective norms, perceived behavioral control, and behavioral intention (Ajzen, 1991). The TPB theorizes that attitude, norms, and volitional behavior of an individual affect the intended behavior. The relationship between the TPB constructs attitudes, subjective norms and perceived behavioral control to the behavior intention and has been intensively investigated in the literature (e.g., Armitage and Connor, 2001).

Behavioral Intention

Behavioral intention is the degree to which performance of the behavior is positively or negatively valued. That is, the intention is based on attitudes toward the behavior. Intentions refer to how hard individuals are trying and planning to put particular deeds into their behaviour (Ajzen, 1991). Intentions are in turn influenced by three factors, namely attitude, subjective norms, and perceived behavioral control.

Attitude

Attitude is defined as an individual's positive or negative feeling towards certain behaviors (Ajzen, 1991) According to Fishbein and Ajzen (1975) attitudes are developed by individuals from the behavioral belief they hold about the target behavior. An attitude also refers to an individual's beliefs about the likely outcomes of the behavior and the evaluations of these outcomes, and is also based on previous experience (Hoyt et al., 2009). Thus, the result of the target behavior very much depends on an individual belief, if they believe positive/negative outcomes from performing the target behavior the result will be a positive/negative attitude toward the behavior (Montana & Kasprzyk, 2008).

Based on literature, the following hypothesis has been projected;

H1: The attitude towards FW minimization is positively related to behavioral intentions

Subjective Norm

Subjective norms are the perceived social pressure to engage or not to engage in a behavior. The subjective norm is guided by normative beliefs which depend on approval or disapproval of the referenced individuals in relation to a target behavior (Ajzen, 1991). However, it is subject to individual motivation to comply with the referents (Montana and Kasprzyk, 2008). The subjective norm is regarded as an exogenous construct in TPB and posits directly affect behavior intention (Ajzen, 1991).

Qi and Roe (2016) suggested installing feelings of guilt in an effort to motivate individuals in reducing FW which later becomes as a moral norm among society to handle food less wastefully. Conversely, it must be noticed that individual behaviour normally follow the norm and ritual practice in a society. Therefore, based on literature, the following hypothesis has been proposed.

H2: Subjective norms positively influence FW minimization behavioral intentions.

Perceived behavioral control (PBC)

Perceived behavioral control (PBC) is individual's perceptions of his/her ability to perform a given behavior (Ajzen, 1991). The PBC is an individual factor that shape the behavioral intention grounded on reflection of past experience and anticipation of impediments or obstacles (Ajzen, 1991). PCB is to enhance the TPB from the factors outside individual control that may affect intentions and behaviors (Montana and Kasprzyk, 2008). According to Hoyt et

al. (2009) PBC associated with individual perception of easy or difficult to perform the behavior and it may have effects directly or indirectly toward the behavior.
For instance, individuals who trust in their ability and consider reducing FW under their control, are more likely have a positive intention to reduce FW (Mondéjar-Jiménez et al., 2016; Stancu et al., 2016; Graham-Rowe et al., 2015). Therefore, based on literature, the following hypothesis has been anticipated.

> H3: Perceived behavioral control has positive influences on the FW minimization behavioral intentions.

(iii) The five-factor model (FFM) of personality traits

Personality traits are defined as the dimensions of individual characteristics that differences in tendencies to show consistent patterns of thoughts, feelings, and actions (McCrae & Costa Jr, 1999). Accordingly, personality traits are potential as external constructs in the TPB (Conner & Sparks, 2005). The five-factor model (FFM) is regarded as the most comprehensive taxonomy of personality traits which researchers have proven the reliability, validity and generalizability of the traits with varying demographic sample (e.g., Zhao et al., 2010; Mastor et al., 2000). For example, in entrepreneurial researches the FFM of personality traits have been used as factors to predict entrepreneurial intentions by many; it is a robust indicator of individual personality traits (e.g., Zhao et al., 2010; Wang 2010).
The five personality traits consist of five broad independent personality dimensions which provide a significant classification for studying individual differences (Wang, 2010). The FFM comprises of the respecting personality dispositions: emotional stability (neuroticism), extraversion, openness to experience, agreeableness, and conscientiousness. According to Zhao et al. (2010) the development of FFM or the Big Five personality dimensions in the 1990s has provided a framework for organizing personality variables into a meaningful, parsimonious, and yet relatively comprehensive set of broad personality constructs. McCrae and Costa (1997) posited that the FFM of personality traits is found in all cultures. In case of Malaysia, in particular the Malay personality is accurately explained by FFM (Mastor et al., 2000).
Literature has also shown that several of the FFM personality dimensions are related to behavioral intention in many domains of research (e.g., Picozo-Vela et al. (2010); Zhao et al. (2010); Hoyt et al. (2009; Rhodes et al., 2004). Thus, derive from the statement; all the five dimensions of personality traits logically have an impact on the FW minimization behavioral intention. In practice, individual behaviour has a considerable impact on FW production. Personality traits may impact on individual's likelihood to produce behaviour to minimize FW. Personality traits as being such a core part of what motivates beliefs, values, and attitudes, it seems reasonable to expect that basic differences in personality may influence FW minimization behaviour. It is clear that awareness of personality traits helps shape positive FW minimization behaviors in individuals. Table 1 lists the five factor personality traits with their respective descriptive traits and/or components. The individual dimension and potential relationships between each of the personality traits and the behavioral intention of FW minimization was discussed in the following paragraphs.

Table 1: The Big Five Factors, Traits, and Components

Big Five Factor	Traits	Components
Extraversion (surgency)	Sociable, gregarious, assertive, talkative, active	*Ambition* - initiative, surgency, impetuous, like to be in charge, seeks leadership role, persuasive *Sociability* – talkative, gregarious, enjoys meeting people I*ndividuality* – shows off, enjoy taking chances and stirring up excitement
Emotional stability	Calm, even-tempered, self-satisfied, unemotional, hardy, stable, confident, effective	*Steady* – even-tempered, steady emotionally *Security* – feels secure about self, not bother with criticism
Agreeableness (likability, friendliness)	Being courteous, flexible, trusting, good-natured, cooperative, forgiving, soft-hearted, tolerant	*Cooperative* – likes to help others and does things for friends, trusting of others *Considerate* – good-natured, cheerful, forgives other easily
Conscientiousness (conformity, dependability)	Responsible, well-organized, planful, hard working, achievement-oriented, persevering	*Dependability* – thorough, careful *Industriousness* – strives to do best, does more than planned, hardworking, persistent *Efficiency* – neat and orderly, plans in advance, rarely late for appointments
Openness to experience (intellect)	Being imaginative, creative, cultured, curious, original, broad-minded, intelligent, artistically sensitive	*Intellect* – imaginative, likes abstract ideas and concepts, analytical and introspective, enjoys philosophical debates *Open* – cultured, likes to try new and different things, enjoys art, music, literature

Source: Ciavarella et al., (2004)

i) Extraversion

Extraversion associated with the quantity and quality of relationships. It implies an energetic approach toward the social situations and describes someone who is warm, gregarious, outgoing, positive emotions and is optimistic (Zhao et al., 2010). Furthermore, people with extraverts personality traits are more friendly and have more friends, and have good interpersonal relationship, thus enjoy workplace activities and satisfied in their job (Judge, Heller, and Mount, 2002). It is a crucial trait for individuals to engage in FW minimization, because they must interact and established external networks with significant others in efforts to minimize FW, therefore those who score higher on extraversion are more likely to participate in FW minimization behavioral intention. Extraverts are more self-determining and ready to accept the leadership role; therefore the extraverts individual can lead others in efforts to reduce FW. A study conducted in the US on environmental behaviour of reducing greenhouse gas emissions found that extraversion correlate with behaviour intention (Brick & Lewis, 2016). The extravert personality always desired to find novel ways to solve any problem they face

(Zhao et al., 2010). Thus, it is reasonable to expect that individual with high in extraversion are desired and enjoyed participating in FW minimization since they are sociable, energetic, talkative and enthusiastic. Therefore, this study hypothesizes that:

H4a: Extraversion positively related to the FW minimization behavioral intention.

ii) Emotional Stability (neuroticism)

Participation in FW minimization necessitated for individuals to be responsible for all aspects of new behavior that they handling within uncertainty environment. Therefore, they need a stable emotional to face any setbacks during building the behavior. Emotional stability trait represents the quality of calm, even-tempered, self-satisfied, unemotional, hardy, stable, confident and effective (Ciavarella et al., 2004). For example, entrepreneurs are someone with a high level of emotional stability and able to face physical and emotional inconveniences, social pressure, stress, and uncertainly with ease (Zhao et al., 2010). In case of online review, individuals with high emotional stability easily perform the task as compared to low emotional stability individuals who are often easily frustrated and have a tendency to be hypersensitive to negative events (Picozo-Vela et al., 2010). Thus, individuals with high on emotional stability are capable to take on the personal responsibilities and this type of trait associated with the motivation in FW minimization. The individuals with low on emotional stability are more likely to be in unfavorable situations. This suggests that individuals who are high in emotional stability are more likely to involve in FW minimization and ensure their involvement is more successful than are individuals who are low in emotional stability. In other words, the tendency toward emotional instability may reduce a low emotional stability individual's intention to be involved in FW minimized because of the potential complexity of the task.
Therefore, this study hypothesizes the following:

H5b: High emotional stability individuals have a positive effect on intention for FW minimization.

iii) Agreebleness

The agreebleness represents the quality of being courteous, flexible, trusting, good-natured, cooperative, forgiving, soft-hearted, and tolerant (Ciavarella et al., 2004). Agreeableness is a personality trait that judges a person attitude and behaviour toward other individuals. The individuals with high on agreeableness can be characterized as trusting, unselfish, cooperative, and modest as compared to low on agreeableness who are manipulative, self-centered, suspicious, and ruthless (Zhao et al., 2010). Individuals who are highly agreeable have much easier to build relationships and likely to have a larger social network. According to Swami et al. (2011) in waste management behaviors, the agreeableness personality trait has a positive relationship with waste management behaviors recycling and reduction. The finding is aligned with Hirsh (2010) who conducted a study to determine the relationship between personality characteristics and environmental concerns of German adults and found that agreeableness was strongly related to environmental concern. For these reasons, it is predicted that individuals with high on agreeableness will be positively associated with FW minimization behaviour intention. Therefore:

H4c: The agreeableness personality trait individuals have a positive effect on intention for FW minimization behaviour

iv) Conscientiousness

Conscientiousness refers to the degree to which an individual is responsible, well-organized, planful, hard working, achievement-oriented, persevering (Ciavarella et al., 2004). People with conscientious personality trait possess high levels of achievement motivation and have a strong strength to pursue their objectives until they accomplish. Some of the traits under the conscientiousness dimension, such as work goal orientation, persistence, and perseverance have been associated with the entrepreneurial role (Zhao et al., 2010). In FW behavior, Swami et al. (2011) conducted a study in the UK household waste management behaviors found a positive relationship between personality trait conscientiousness with waste management behaviour recycling and reduction. In addition, Brick and Lewis (2016) in their study of environmental behaviour of reducing greenhouse gas emissions found that the behaviour strongly predicted by conscientiousness. Accordingly, Abdelradi (2018) conducted a study on the FW behaviour at household level in Egypt found that conscientiousness has a strong contribution to FW behaviour. Given that conscientiousness individuals are strong in their motivation and interpersonal relationship, they are likely to enjoy and desire to participate in FW minimization. Therefore, it is reasonable to expect that conscientiousness has a positive relationship with the FW minimization behavioral intention.

H4d: The conscientiousness personality trait individuals have a positive effect on intention for FW minimization behavior.

v) Openness to Experience

Openness to experience is a personality trait that describes someone who is being imaginative, creative, cultured, curious, original, broad-minded, intelligent, and aesthetic sensitive (Ciavarella et al., 2004). Individuals who are high on the openness to experience dimension are adapted to the new surroundings and challenges. Accordingly, the higher the individuals possess the openness to experience personality trait, the more likely they are willing to try new challenges improve themselves (Wang, 2010). They are often very creative. In pro-environmental behaviour study, openness to experience was found strongly related to greenhouse gas emission behaviour (Brick & Lewis, 2016). A study conducted by Hirsh (2010) in Germany, found that openness to experience highly related to environmental issues. Accordingly, the openness has a component of counterculture, thus, individuals with strong openness to experience personality trait have a tendency to rectify the inappropriate values in society such as wastage food behaviour (Brick & Lewis, 2016). Thus, this study would expect that individuals who are higher on openness to experience will lead to desire and has a positive relationship with the FW minimization behaviour intention. Therefore:

H4e: The openness to experience personality trait individuals have a positive effect on intention for FW minimization behavior.

Method

Population

The present study was conducted in two universities in the State of Pahang, Malaysia. The respondents were identified are Generation Z students that were born between 1995 and 2000. This sample can be concluded as a good representation of the theoretical population because the respondents come from different localities.

Sample and procedure

In the absence of population lists from which a random sample could be drawn, the current study utilized the convenience sampling procedure. This study used Partial Least Square Structural Equation Modelling (PLS-SEM) for data analysis. Thus, the rule of thumb for PLS-SEM in establishing a minimum sample size is equivalent to ten times the greater of the number of indicators comprising the most complex formative construct or the largest number of exogenous constructs leading to an endogenous construct (Hair et al., 2011). In the study, the largest group of exogenous constructs leading to an endogenous construct was seven. Thus, this indicates that the minimum sample requirement for statistical analysis was 70 usable responses.

The study employed a survey design conducted on a cross-sectional basis. The population of this study comprised university student in the State of Pahang, Malaysia. An intercept method was used to administer the questionnaire. Participation by the respondents was absolutely voluntary. There were 273 responses received out of the 500 the questionnaire form administered. However, only 230 classified as useable. This translates into a response rate of 46 percent. The demographic profiles of the respondents are listed in Table 2.

Table 2: The demographic profile of the respondents

Measure	Item	Frequency	Percent
Gender	Male	80	24.8
	Female	150	65.2
Education	Under Gratuate students	230	100
Age	19-25	230	100
Parent	1000- below	85	37
Income	1001-3000	46	20
	3001-5000	53	23
	5001-above	46	20

Measure

This study utilized a process of structured questionnaires, based on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Basically, all constructs and indicators in the questionnaires were adapted from previously-validated scales and were modified to operationalize the constructs in our research model. To test the research model, the questionnaire consists of 37 indicators that form the exogenous and endogenous constructs. The indicators are grouped into nine (9) latent constructs (see Table 3).

Table 3: Constructs and Sources

Construct	Number of items	Source
1. Behavioral Intention (BI)	3	Picazo-Vela et al., (2010
2. Attitudes (AT)	5	Mak et al., (2018)
3. Subjective Norm (SN)	3	Mak et al., (2018)
4. Perceived behavioral control (PBC)	3	Mak et al., (2018)
5. Extraversion (EX)	3	Wang et al., (2012)
6. Openness to experience (OE)	5	Wang et al., (2012); Zhao and Jung (2018)
7. Emotional Stability (ES) (neuroticism)	6	Wang et al., (2012); Zhao and Jung (2018)
8. Agreeableness (AG)	5	Wang et al., (2012); Zhao and Jung (2018)
9. Conscientiousness (CO)	4	Wang et al., (2012)

Findings

Statistical method

The data were analyzed using the Partial Least Square Structural Equation Modeling (PLS-SEM). The testing of the research model was performed with Smart PLS 3.2.3 software (Ringle et al., 2016). The choice of PLS is because of the following reasons (Roldán and Sánchez-Franco, 2012). Firstly, this study focuses on the endogenous construct prediction. Second, the analysis is based on previous models, but incorporates new measures and structural paths (Chin, 2010).

The model of this study was an integration of TPB and FFM. The model consisted of one endogenous construct (behaviour intention) and eight exogenous constructs. The exogenous consructs were combination of three constructs from TPB that includes of attitudes, subjective norms and perceived behavioral control and five constructs from the FFM comprises of the respecting personality dispositions: emotional stability (neuroticism), extraversion, openness to experience, agreeableness, and conscientiousness. However, during analysis emotional stability (neuroticism), conscientiousness, and openness to experience constructs were deleted due to cross loadings. Thus, hypothesis H4b, H4d, and H4e could not be tested.

Measurement model

In this current study, a Mode A reflective design was used to model the food waste motivational factors. The analysis was conducted on the measurement model in which a series of tests were performed for the reliability and convergent and discriminant validity of the reflective constructs (Hair et al., 2014). Due to the low loading value, one indicator from each Perceived Behavior Control (PBC), Extraversion (EX), and Agreeableness (AG) was removed. Table 4 showed all path loading were significant and reached the required threshold value (0.70) (Hair et al., 2010). In addition, the average variance extracted (AVE) and composite reliability (CR) of all constructs reaches the defined threshold values of 0.50 (Fornell and Larcker, 1981) and 0.70 (Gefen et al., 2000) respectively. Thus, proper convergent validity and reliability was established.

Table 4: Convergent validity and reliability

Construct	Item	Loading	t-Value	AVE	CR
Behavior Intention (BI)	BI1	0.889	35.984	0.727	0.888
	BI2	0.884	34.792		
	BI3	0.781	32.889		
Attitude (AT)	AT1	0.850	15.93	0.828	0.950
	AT2	0.704	22.374		
	AT3	0.845	15.396		
	AT4	0.780	17.093		
	AT5	0.860	17.163		
Subjective Norm (SN)	SN1	0.960	109.967	0.864	0.950
	SN2	0.955	98.425		
	SN3	0.871	42.338		
Perceived Behavior Control (PBC)	PBC1	0.920	86.002	0.796	0.886
	PBC2	0.863	20.832		
Extraversion (EX)	EX1	0.991	355.082	0.983	0.991
	EX3	0.992	427.647		
Agreeableness (AG)	AG2	0.962	133.921	0.828	0.950
	AG3	0.963	138.697		
	AG4	0.968	151.869		
	AG5	0.721	13.611		

The discriminant validity was tested using the Fornelle Larcker Criterion (Fornelle and Larcker, 1981) Tables 04 showed the results of the discriminant validity test using the Fornell Larcker criterion. All diagonal elements in Table 5 were appreciably greater than off-diagonal elements, thereby satisfying the Fornell–Larcker criterion. Thus, providing ample evidence of discriminant validity of the constructs.

Table 5: Discriminant validity (Fornell-Larcker criterion)

	AG	AT	BI	EX	PBC	SN
AG	**0.910**					
AT	0.492	**0.810**				
BI	0.605	0.651	**0.853**			
EX	0.567	0.515	0.702	**0.991**		
PBC	0.417	0.438	0.526	0.468	**0.892**	
SN	0.584	0.662	0.769	0.848	0.513	**0.929**

Structure Model

The statistical significance of path coefficients was assessed by the 500 resamples bootstrapping (Henseler et al., 2009). Figure 2 and Table 6 showed that a positive relationship between: Attitude (AT) and Behavior Intention (BI) ($\beta = 0.214$, $p< 0.01$), Subjective Norm (SN) and BI ($\beta = 0.336$, $p< 0.01$), Perceived Behavioral Control (PBC) and BI ($\beta = 0.0117$, $p< 0.01$), Extraversion (EX)and BI ($\beta = 0.158$, $p< 0.01$), and Agreeableness (AG) and BI ($\beta = 0.158$, $p< 0.01$). The overall relationship explaining 67.1% variance. These results support H1, H2, H3, H4a, and H4c respectively. However, hypothesis H4b, H4d, and H4e not tested because the constructs were deleted in the early stage of analysis due to cross loadings.

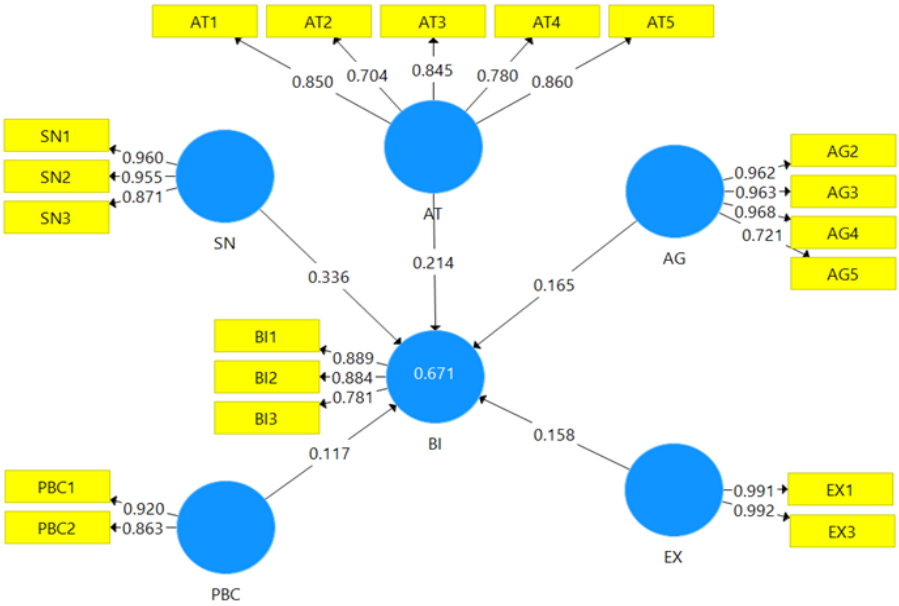

Figure 2: Structural model

Table 6: Hypothesis Testing for Direct Relationship

No	Relationship	Std Beta	t-Value	P Value	Decision
H1	AT →BI	0.214	4.490	0.000	Supported
H2	SN →BI	0.336	4.110	0.000	Supported
H3	PBC →BI	0.117	2.641	0.009	Supported
H4a	EX→BI	0.158	2.147	0.032	Supported
H4c	AG→BI	0.165	3.239	0.001	Supported

Discussion and Conclusion

Overall, FW management remains a global topic of concern, with increased relevance and numerous impacts on culture, the climate, food security, and health, as specific activities and policies are involved at all levels (Schanes et al., 2018). The problem of FW is multifaceted and complex; studies focused on a collective synthesis of various disciplinary perspectives on FW management are therefore important. Thus, to reduce the human propensity to waste food, this study aims to investigate the food waste motivational factors by connecting behavior intention (BI) with three exogenous TPB constructs and five exogenous FFM constructs. The TPB constructs are attitudes (AT), subjective norms (SN), and perceived behavioral control (PBC), and the five FFM constructs include the emotional stability (neuroticism) (ES), extraversion (EX), openness to experience (OE), agreeableness (AG), and conscientiousness (CO).

The study established a significant relationship between attitude (AT), subjective norm (SN), perceived behavioral control (PBC), and behavior intention (BI). Thus, evidence showed that the TPB is useful in predicting and explaining human behavior as suggested by many reseachers (e.g., Mondéjar-Jiménez et al., 2016; Pakpour et al., 2014; Hoyt et al., 2009). The study also demonstrated that extraversion (EX) and agreeableness (AG) led to higher intention to reduce food waste. Thus, showed that participants with traits such as sociable, gregarious, assertive, talkative, active, being courteous, flexible, trusting, good-natured, cooperative, forgiving, soft-hearted, and tolerant are exhibit higher levels of intentions to reduce food waste. Many research hypothesis remain unanswered because FW 's pattern and scale remain poorly

understood by respondents. It was thus impossible to define the relationship between emotional stability (neuroticism) (ES), openness to experience (OE), conscientiousness (CO) and behavioral intent (BI). The model implemented in this study shows that the five exogenous constructs (i.e., attitude (AT), subjective norm (SN), perceived behavioral control (PBC), extraversion (EX), agreeableness (AG)) can account for 67.1% of the variance in behavior intention (BI). This result shows that the model has relatively good predictive power on the food waste motivational factors.

This result offers important implications for both theoretical and practical developments. Theoretically, this study adds to the growing body of literature on food waste management, particularly in food waste motivational factors. Practically, this study provides suggestions for FW policies and creative measures that address the whole group in order to achieve more successful FW management. Such as, the results of this study can be utilized by various parties which dealing with generation Z. Among them, the Ministry of Higher Education should oblige all higher education institutions to create awareness among generation Z regarding the importance of prudent use of food and avoid food wastage. Among the activities that can be done are holding campaigns such as "*hate waste campaign*", waste awareness and others. In addition, the determination of punishment for those who like to waste should also be given consideration to prevent this problem from getting worst. Thus, it is hoped that this study will be used to support decision-making and further strategy development as well as offer guidance for future research.

Several limitations and future research opportunities must be acknowledged from the results obtained in this study. First, the data for this study were collected from undergraduate students of a few universities in Pahang. Future research could replicate this research and extend it to other populations from different locations to improve its validity. Second, although the sample size for this analysis was sufficient for the analytical technique, replicating this study with a larger sample would provide an incentive for further analyzes using a different technique. Finally, this study focused on the development of theory, thus using the reflective indicators of the latent constructs, researchers might prefer formative models for the future.

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Appendix: questionnaire

Food Waste motivational factors: The theory of planned behavior and the role of Big-Five personality traits on Malaysians Generation Z

Behavioral Intention (BI)

BI1. I intend to reduce food waste in the near future

BI2. I will try to reduce food waste in the near future

BI3. I will make an effort to reduce food waste in the near future

Attitudes (AT)

AT1. Less food waste would be generated if I had a more physical support (e.g. Equipment) from the university

AT2. Less food waste would be generated if I had more management support from the university

AT3. Less food waste would be generated if there are more financial incentives (e.g., charge/rewards)

AT4. Less food waste would be generated if there is more education of food waste reduction

AT5. It upsets me when there is a large quantity of wasted food.

Subjective Norm (SN)

SN1.Wasting food makes me feel guilty about others who have insufficient food

SN2.My colleagues find my attempts to reduce food waste necessary

SN3.My colleagues think that they should be more involved in the food waste reduction

Perceived Behavioral Control (PCB)

PCB1.I have complete control in the decision to reduce food waste

PCB2.It is easy to reduce food waste generation from my university campus

PCB3.It is avoidable to load environment with disposal of food waste from my university campus

Extraversion (EX)

EX1.I really like most people I meet

EX2.I really enjoy talking to people

EX3.I like to have a lot of people around me

Openness to experience (OE)

OE1.I have excellent ideas

OE2.I am quick to understand things

OE3.I have a vivid imagination

OE4.Once I find the right way to do something, I stick to

OE5.I have a lot of intellectual curiosity

Emotional Stability (ES)

ES1.I am not a worrier

ES2.I rarely feel fearful and anxious

ES3.I rarely feel lonely and blue

ES4.I am seldom sad and depressed

ES.I rarely get upset

ES6.I rarely get irritated

Agreeableness (AG)

AG1.I generally try to be thoughtful and considerate

AG2.Most people I know like me

AG3.I would rather cooperate with others than compete with them

AG4.I feel concern for others

AG5.I feel others' emotions

Conscientiousness (CO)

CO1.I am efficient and effective in my work

CO2.I am pretty good about pacing myself so as to get things done on time

CO3.I have a clear set of goals and work toward them in an orderly fashion

CO4.I work hard to accomplish my goals