

Determining Factors Affecting Food Waste Behavior Among Young Adults in Bangkok

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Abstract—Many countries are actively pursuing sustainable development goals (SDGs), yet they continue to struggle with persistent issue of food waste. Food is lost or wasted in various stages of food supply chains, but household food waste is seen as a significant contributor of total food waste. Food waste is largely researched but earlier research is still very limited in understanding food waste behavior among Asian young adults despite they tend to waste more food than any other age group. Therefore, the current study addresses this critical issue of food waste among Thai young adults by building a hypothesized research model based on Theory of Planned Behavior (TPB). A questionnaire survey, administered in Bangkok, collected a valid sample of 160 questionnaires. A partial least squares based structural equation modelling approach was used to test hypothesized relationships. Key results show that health consciousness, injunctive norms, attitude, and Impact of Covid-19 are factors that shape consumer intention not to waste food. However, consumer intention not to waste food as well as household management skills found to have no significant impact on their food waste behavior. Consumer past behavior was the only factor having a meaningful impact of consumer food waste behavior. We hope findings of this study can help academicians and practitioners.

Keywords— Household Food Waste, Partial Least Squares, Theory of Planned Behavior, Thailand, Young Adults.

I. INTRODUCTION

One of the most prevalent problems in our daily lives that are frequently ignored is Food waste. Since it is everywhere and staggering, food waste has already become a pressing global issue. The cruel fact is that our society is having huge levels of food waste and food crisis (e.g., hunger, malnutrition) simultaneously (Stenmarck et al, 2016). Previous research suggests that a major portion (about 30%) of the food globally produced is wasted (Gustavsson et al., 2011). Undoubtedly, such huge food wastage is of critical concern for multiple reasons. The most visible issue is the association with hunger and starvation that affects roughly 820 million people worldwide (FAO, 2019). The other major, albeit hidden issue, is the resources consumed to produce all this food waste corresponds with a carbon footprint of approximately 3.3 billion tons of carbon dioxide. If we envision food waste as a country, it would rank as the world's third-largest greenhouse gas contributor, following the United States and China (FAO, 2013).

Food losses occur across various phases of food supply chains such as primary production, processing, wholesale and retail, and consumption (food-service and household). According to earlier research (Stenmarck et al, 2016), the household sector contributes over 50% of food waste while service sector (schools, restaurants, elderly homes, hotels, prisons etc.) accounts for about 12% of total food waste in Europe. Recent research by Eurostat (2023) shows European household food waste surpassed 50% of the overall food waste in 2021, leading to estimated food wastage of 70 kg per individual.

Altogether there are 17 Sustainable Development Goals (SDGs) in the United Nations Department of Economic and Social Affairs (UNDESA) which are seen as the world's best plan to build a better world for people and the planet earth by 2030 (United Nations, 2015). The 17 goals include no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation and infrastructure, reduced inequalities, sustainable cities and communities, responsible consumption and production climate action, life below water, life on land, peace justice and strong institutions and partnerships (United Nations, 2015). It is important to note that goals such as zero hunger, good health and well-being, responsible consumption and production, climate action, and life on land have a direct connection with food waste issues. As mentioned earlier, the unfortunate irony is that while some people are suffering from hunger and malnutrition, others are wasting food (Stenmarck et al, 2016). Therefore, investigation of factors that affects food waste becomes a sensible topic for research. Goals such as climate action and life on land could relate to food waste because of increasing portions of foodstuff landfills and production of greenhouse gases such as methane (EPA, 2023). Overall, alarming food waste levels poses a significant challenge to our society. Therefore, it is crucial to investigate the emerging issue of consumer food waste behavior.

Like a lot of other places, Southeast Asia is dealing with a serious issue of food waste. The food waste index report by the United Nations Environment Programme (UNEP) (2021) showed the average household food waste in South-eastern Asia to be 82 kg/capita/year. In Thailand, food waste is widely regarded as an important issue due to its significant contribution to the total amount of waste. Household food waste in Thailand has become a serious concern because its volume doubled between 2003 and 2018 with proportionate growth in food waste per capita (Bunditsakulchai and Liu, 2021). UNDP (2021) reported Thailand's estimated household

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food waste to be 79 kg/capita/year, i.e., about 5.4 million tons per year.

Wasting food is a common practice across all age groups, but it should be conceived that young adults shown to have a stronger tendency to waste food than other age groups (Nikolaus et al, 2018). Several studies such as Clement et al (2023) have concentrated their efforts for investigating food waste in younger adults as they are significant contributors to food waste. Considering significant household food waste in Southeast Asia and tendency of young adults to waste food, researching on Southeast Asian young adults is sensible. Although some studies (Thamagasorn and Pharino, 2019; Liu et al, 2020; Thanomnim et al, 2022) have explored food waste in Thailand to a certain degree, the research is still limited in the context of young adults. While Covid-19 has made a worldwide impact, its impact on food waste behavior by young people is seldom explored (Burlea-Schiopoiu et al, 2021). Among the several definitions of food waste, we think the definition given by FAO's (2013) is suitable for this study—*“food appropriate for human consumption being discarded, whether or not after it is kept beyond its expiry date or left to spoil”*.

Given the above discussion, the fundamental *objective* of this proposed research is to determine factors affecting Thai young adults' household food waste behavior. To answer the abovementioned objectives, this study develops a theoretical model based on the Theory of Planned Behavior (TPB). Further, for the sake of completeness, a range of related variables such as cooking skills, past behavior, consumer health consciousness and Covid-19 are incorporated in the research model. A questionnaire survey was developed to collect data from Thai young adults. Data was further screened and analysed with the help of Smart PLS 4.0, a tool for partial least squares based structural equation modelling. We expect that the results of this research can offer valuable implications for various stakeholders such as consumers, retailers, distributors, governments, and other key members of the food ecosystem.

II. THEORY AND MODEL DEVELOPMENT

A. A Brief Review of Previous Research on Food Waste in Thailand

Research on food waste in developing countries is relatively new. However, some research on food waste is still done in the case of Thailand. For instance, Thamagasorn and Pharino (2019) investigated the contemporary food waste situation in the flight catering business. They further determine the hotspots in Thailand's halal food production process. They reported 40-50% of vegetable wastage during food production operations. Thanomnim et al (2022) developed a method to evaluate food waste generation based to the available data. Liu et al (2020) researched overall food waste in Bangkok and explored contemporary situations, trends and key challenges. Manomaivibool et al (2016) employed an action research approach to investigate the impacts of awareness campaign on food waste reduction on university students living on campus in

Chiang Rai province of Thailand. They concluded that awareness campaigns are a useful tool for food wastage reduction. Iwasaki et al (2021) also researched food waste behaviors among university students living on university dormitories. One of the key findings of their study shows that avoidable food waste by female students is much more than that of male students.

B. Theoretical Background and Hypotheses Development

Theory of planned behavior (TPB) (Ajzen, 1991) is comprised of three main constructs including attitudes, subjective norms, and perceived behavioral control, which when modelled have been shown to accurately predict behavioral intention (Ajzen, 1991). Several earlier studies have relied on both TPB and extended TPB to understand and explain food waste behavior (Lavén, 2017; Stancu et al, 2016; Stefan et al, 2013; Visschers et al, 2015). In these studies, researchers have used the TPB's central framework of attitudes, subjective norms, and perceived behavioral control to explain the behavioral intentions of consumer food waste (Bell, 2020). In many studies, extended TPB frameworks have incorporated and measured additional factors such as the effects of climate change awareness (Kim and Hall, 2019), environmental attitudes (Lavén, 2017), habitual factors and past behavior (Honkanen et al, 2005; Stefan et al, 2013) as well as cafeteria and vendor related factors such as perceptions of food quality, hygiene and service quality (Chavarría et al., 2017; Konuk, 2019; Bell and Khire, 2020). In previous studies (Stancu et al, 2016; Stefan et al, 2013; Visschers et al, 2016), the TPB framework has been expanded to predict several household food waste behaviors. Several recent studies such as Werf et al (2019) have also employed TPB for investigating consumers' food waste behaviors. Some studies such as Srivast et al (2023) employed a meta-analysis approach investigating TPB in the context of consumer food waste behavior. Research also reveals that Covid-19 has increased consumer awareness about environmental consequences of waste (Burlea-Schiopoiu et al, 2021). Consistent with earlier work, this study also uses TPB as the foundation of building a theoretical framework. The following hypotheses determine relationships between independent variables that shape consumer intention to not waste food.

H1: Moral attitude positively affects consumer intention not to waste food

H2: Perceived behavioral control positively affects consumer intention to not waste food

H3: Impact of Covid-19 positively affects consumer intention to not waste food

H4: Injunctive norms positively affect consumer intention to not waste food

H5: Health consciousness affects consumer intention to not waste food

The following hypotheses determine relationships between variables affecting food waste behavior

H6: Consumer household management skills impact overall food waste

H7: Consumer past behavior impacts overall food waste

H8: Consumer intention to not waste food impacts overall food waste

III. RESEARCH METHODOLOGY

A. Questionnaire Development and Data Collection

To test the abovementioned hypotheses, a questionnaire survey was developed and administered to collect data from Thai young adults. A draft questionnaire was originally developed in English, and then was translated into Thai. Further, both, English and Thai versions of the questionnaires and their translational equivalence were reviewed by a Thai academic expert. A pilot test was performed with the help of 25 subjects for testing translation quality and overall questionnaire design. The questionnaire was improved based on the comments received by the respondents. The updated questionnaire was once again reviewed by an academic expert prior to its distribution. A printed version of the questionnaire was distributed among young adults in Bangkok, Thailand.

B. Measures

The questionnaire contains measures for all variables used in

the research model (Fig 1). Items representing nine constructs, namely, attitude, injunctive norms, impact of Covid-19, perceived behavioral control, health consciousness, intention to not waste food, past planning, household management skills and food waste were included in the questionnaire. The original items were adopted from earlier related literature. We used a 5-point Likert scale for the measurement of each of the constructs. Additionally, demographic variables such as gender, age, education, etc., were also included in the questionnaire.

We found 160 valid usable samples among collected surveys. Amongst the collected sample, 53% were male while 47% were females. About 5% of the sample was collected from respondents of age below 25 years. About 63% of the sample was in the age range of 25-30 while remaining was in the age range of 31-35. Roughly, 23% and 13% of the respondents had completed high school and college level education while 53% and 11% were university and master's degree graduates, respectively. Many of the subjects (61%), i.e., were married. Approximately 60% of respondents reported an income of less than 500 USD/month while the remaining 40% earned over that amount. Just fewer than 75% of the respondents were from urban areas, while 20% and 5% were from suburban and countryside areas, respectively.

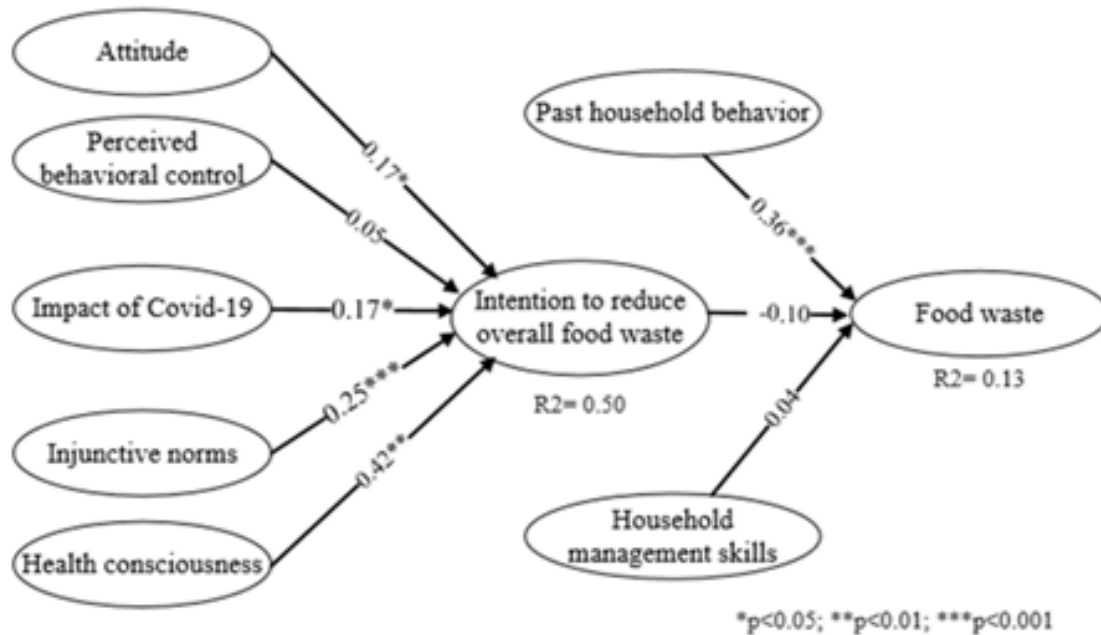


Fig.1 Path Analysis of the Hypothesized Relationships

C. Data analysis

The data analysis was performed in two stages. First, a measurement model using confirmatory factor analysis (CFA) was developed using SmartPLS 4.0.9.5 version (Ringle et al, 2022). It was ensured that all factor loadings exceed a threshold value of 0.5. Average variance extracted (AVE) and composite reliability (CR) for each of the constructs surpassed a threshold value of 0.5 and 0.7, respectively. Finally, discriminant validity was ensured by checking if HTMT ratio is below 85%

(Henseler et al, 2015). Cronbach's alpha for all perceived behavioral control, injunctive norms and health consciousness was found to be slightly less than the value of 0.7 but still considered acceptable (Ursachi et al, 2015). After the reliability and validity assessment of the measurement model, a structural equation model (SEM) analysis was performed with the help of SmartPLS 4.0.9.5 version for testing the hypotheses. To ensure the stability of the results, a bootstrapping procedure with 5,000 subsamples was used (Ringle et al, 2022)

IV. CONCLUSIONS

A. Results and Discussion

The main goal of this study was to determine factors that impact household food waste among young adults in Thailand. In doing so, a research framework was proposed based on TPB and extended it to the given context of the research. A questionnaire survey was developed and distributed among target subjects in Bangkok. Data collected from 160 responses was used to determine the hypothesized relationships using a partial least squares based structural equation modelling approach.

We found that consumer attitude, injunctive norms, health consciousness and the impact of Covid-19 are significant factors that influence their intention not to waste food. While the impact of health consciousness was the strongest, followed by injunctive norms, and consumer attitude, the impact of Covid-19 on intention to not waste was weakest. Perceived behavioral control, on the other hand, was found to have no significant impact. Interestingly, we found that both intention to not waste food and household management skills did not have a statistically significant relationship with food waste. However, consumer past behavior was significantly linked with consumer food waste behavior. Also, we found no significant indirect effects. In short, results indicate that all hypotheses except H2, H6 and H8 were supported. Impacts of demographic variables such as age, gender, income, etc. on the food waste were not significant.

Previous literature on consumer behavior related to food waste offer mixed findings possibly due to variations in the research settings across different studies. For instance, some studies have found a significant impact of intention not to waste on food waste behavior (Stancu et al, 2016) while some studies haven't (Stefan et al, 2013). The lack of significance of this key relationship in this research implies that consumers may have an intention not to waste food, but they still end up wasting food. Overall, our findings are partially consistent with previous research. Recent research (Iranmanesh et al, 2022) also evidenced that Covid-19 has significantly influenced consumer behavior, resulting in a decrease in household food waste. Five variables, consumer attitude, injunctive norms, impact of Covid-19, perceived behavioral control and health consciousness, were able to explain 50% of the variance for consumer intention not to waste. However, prominent variables such as intention not to waste food, household management skills and past behavior only explained 13% variance for food waste behavior. This shows that there is a need to find key variables that can explain consumer household food waste behavior.

B. Research Limitations and Future Research Scope

Like any research, this work also has a few limitations. The results of this study are based on only 160 samples collected in Bangkok. Although data validity and reliability criteria were satisfied, it is important to use these results carefully. As only 13% of the variance for food waste behavior was explained, future research should consider incorporating more relevant variables in the research model. It is also recommended for

future researchers to collect more data samples from different places in Thailand.

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