

# Sustainable food waste practice among small medium enterprise (SME) restaurant operators in peninsular Malaysia

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## Abstract

This study empirically investigates restaurant operators' role to implement sustainable food waste practices. Food waste is mostly associated with behaviours such as negligence or conscious decisions to throw out food. Restaurants have a credible share in municipal waste as one of the significant waste sources globally and in Malaysia. Therefore, this increases the necessity of studying waste management practices among restaurants. This study is structured through a self-administered survey with the east coast restaurant operators directly involved in SME related businesses. Data from 250 respondents were analysed using multivariate analysis using structural equation modeling (SEM) via PLS. An exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were executed to validate the scales. These findings can be used by restaurant operators, through its dimensions, influence the adaptation mediating effects and create sustainable food waste practices.

## Keywords:

Food Waste; Sustainable Food Waste Practice; Intention; Behaviour.

## 1 Introduction

Malaysia has expected a significant change towards 2020 and it still faces the waste management problem, which is the country's most prominent environmental issue (Moh, 2017). The environmental issue is the most crucial aspect to look out for the country to become a fully developed country. Since the manufacturing and service-based industries show a positive growth towards the economy, the government has inspired to shift the economy to these sides. The drive to target food waste stems from increasing concerns about hunger, resource conservation, the environmental and economic costs of food waste, and a general trend in the waste management industry to transition to more sustainable practices. With the increasing number of Malaysian populations, which is at the rate of 2.4% per annum or about 600,000 per annum since 1994, the municipal solid waste generation also increases, making Municipal Solid Waste Management (MSWM) crucial (Manaf et al., 2009). Malaysia has developed The National Strategic Plan (NSP) for Solid Waste Management and acts as the basic solid waste policy and practice in Peninsular Malaysia up to the year 2020. The development of NSP gets support from the Ninth Malaysia Plan, which addresses the adoption of sustainable waste management through reduction, reuse, and recycling (UNDP, 2008). Since the hospitality industry keeps growing in the country, the waste management practice in the hotels becomes a concern as solid waste management is a significant challenge for Malaysia to address in the light of Vision 2020, which lays out the direction for Malaysia to become a fully developed nation by 2020 (UNDP, 2008). It has been reported that the hospitality industry contributed about 75% of environmental pollution caused by over-consuming energy, water, and materials from business operations (Ashrafi, 2014). The rising cost of managing waste disposal forces the hospitality managers to find a new strategy to deal with solid waste.

The poor waste management practice and excessive waste caused 19% of the waste to end up in the inappropriate place such as drain, river, and roadside (Kathiravale, et al., 2003). This scenario will cause bad results such as flash floods and drainage blockage, reducing our environment capacity to sustain life. This problem is serious and should be taken seriously by the government, organization, and individually. Food serving, drinks, and all material used in the foodservice industry generate a tremendous amount of waste (Nath, 2014). Services delivered from the hospitality industry are accessible, but proper management before and after delivered service is essential for sustainability and profitability. The increasing number of foodservice sectors will eventually increase food waste (Parfitt et al., 2010). In the food industry, food waste is a common thing. For example, the food prepared incorrectly unnecessary becomes waste (Roffmann, 1992). With that, the studies are to examine the mediating effect of attitude between motivation and knowledge on intention towards sustainability

## 2 Literature Review

The consumers have been evolving their significant eating habits and growing consumption of imported food and beverages (Eburon, 2016). The young generation,

especially, is always seeking unique, sophisticated, and modern lifestyles that demand western food and imported food and beverages from western countries. In line with consumer demands, Malaysia's food service sector is becoming more popular and recorded about US\$10 billion in 2012 in the market.

Food waste is any waste product or by-product of food, processing, production, and distribution. Westendorf (2000) claimed that farms, processing plants, manufacturers, commercial establishments, and households are producing the food waste at any level within the food chain. It can be utilized to evaluate the environmental effect of the entire natural way of life (Ohlsson, 2004). Most of this waste can be reused, treated the soil, utilized as alternative energy sources, or changed over to alternative food sources (Davies & Konisky, 2000; Ferris & Shanklin, 1993). Essentially, there is a fundamental classifications of strong waste created by the foodservice business. For instance, food waste incorporates drinks containing sugar, uneaten portion, planning waste, oil, dairy items, and dressings. It is indispensable to look at the environmental effect of food operation chains, for example, how it can be turned into the evolved way of life and how food waste is produced (Ohlsson, 2004). Such an effect could influence the country environmentally as well as increase the disposal costs. Moreover, food waste will increase the cost of water treatment, producing greenhouse gases at disposal facilities and contributing to odour. Environmental Protection Agency (2006) suggested that food waste recovery hierarchy of importance furnishing foodservice suppliers with a guide in uneaten food and extrication excess. The food waste recovery hierarchy is comprised of six steps: (1) source reduction, reducing the volume of food waste generated; (2) feeding hungry people, donating excess food to charities; (3) feeding animals by providing food to farmers; (4) industrial uses, providing fats for rendering and food discards for animal feed production; (5) composting, converting food waste into a nutrient-rich soil additive; and (6) landfill/incineration as the final option (EPA, 2000).

The sustainable term is used to describe the environmental issues that affected economic growth in the past. Different from the current understanding, sustainability now also describes the sociocultural factors (Dempsey et. al., 2011). Oxford Dictionaries (2012) describe sustainability as "conserving an ecological balance by avoiding depleting natural resources. The meaning of sustainability is based on the issues that sustainable development is commonly dealing with, such as clean water, resource availability, climate change, pollution, and loss of biodiversity (Peet, 2008). The growing tourism industry and its potential impact on the environment become a hot topic within the global hospitality industry (Björnefors and Kjellsson, 2014). The focus in sustainability now is the way into most aspects of society and sustainability and it has become more practical consideration that is noticeable in the hospitality and tourism industry (Jayawardena, 2013). Therefore, sustainable hospitality can be defined as "hospitality industry development and management that meet the needs of today's guests, hoteliers and stakeholders without compromising the ability of future guests, hoteliers and stakeholders to enjoy the benefit from the same services, products and experiences" (Legrand et. al., 2016).

Knowledge and skills specific to food management are also essential to food waste diversion (Graham-Rowe et al., 2014). Food management skills have been the focus of various food waste diversion campaigns and interventions (Quested et al., 2013). Presumably, having specific food-related knowledge and food management skills decreases the actual and perceived costs of food preparation and waste management. Thus, the operator's perception towards their ability to affect systems is very important to determine the action. Motivation can be defined as "a reason or reasons for acting or behaving in a particular way" or "desire or willingness to do something enthusiasm" Van Geffen et al. (2016) claims that lack of motivation is one of the biggest barriers to reduce food waste. Based on the causes and implications of food waste, literature has suggested different things that increase consumers' motivation to reduce food waste. In this literature review, motivators are divided into four categories: environmental, economic, social, and moral motivators.

Consumer behaviour is interpreted by the intention to perform. In this regard, the attitude toward the behaviour is "the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question" Ajzen (1991). According to Blackwell et al., (2001), attitudes determine behavioural intentions, representing what people like and dislike, and in general, people are willing to do what they like and reject what they dislike. Schiffman & Kanuk (2004) argue that attitude is a learned psychological disposition that is intended to be a lasting assessment of a subject. Hence, it is reasonable to conclude that behaviour is impacted by internal factors, such as one's attitudes, and external factors, such as norms.

This study has developed a research framework (Figure 1) through the numbers of reading from previous works and literature. This study is to examine the mediating effect of attitude between motivation and knowledge on intention towards sustainability.

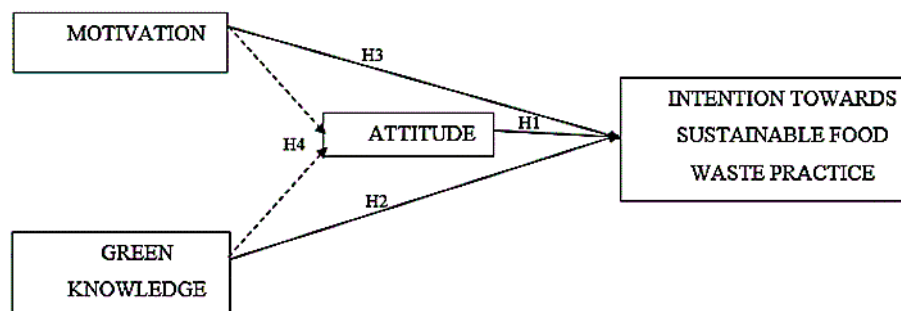


Figure 1: Conceptual framework

Source: Adapted from Peet (2008) & Legrand, Sloan, and Chen (2016), Vermeir and Verbeke (2006) and Beck and Ajzen (1991)

### 3 Methodology

This study used cross-sectional design and quantitative data through a structured questionnaire to measure the effect of selected variables on food waste behaviour

among the restaurant in Peninsular Malaysia. The population of this study are the small and medium-size restaurants in Kelantan, Pahang, and Terengganu. The sample size for this study was calculated using G-Power version 3.1. Based on the power of 0.95 (which is more than 0.80, as required in social and behavioural science research) with an effect size of 0.15, this study require a minimum sample size of 166 to test the model. To avoid any possible complications arising from a small sample size, this study intended to collect data from 400 owners & managers of the selected restaurants located in four states in Peninsular Malaysia.

The questionnaire was designed using unbiased and straightforward wording to quickly understand the questions and provide answers based on their perceptions. Questions were adapted from earlier studies, with minor modifications where needed. As a procedural remedy to minimize the effect of common method bias, besides carefully constructing the items, this study also informed the respondent that they would be evaluated anonymously and there are no right or wrong answers. As for statistical remedy, this study intended to test the 'Harman's (1976) one-factor test' and the correlation among the constructs to confirm the lack of common method bias in the collected data. This study intended to test multivariate normality using the Web Power online tool, which calculated through Mardia's multivariate skewness and kurtosis coefficients and p-values. PLS-SEM is a causal modeling approach aimed at maximizing the explained variance of the dependent latent constructs. This study intended to find the variance-based structural equation modeling via a partial least square (PLS-SEM) estimation with the primary objective of maximizing the explanation of variance in the structural equation model's dependent constructs. The findings include the indicator reliability, internal consistency reliability, convergent validity, discriminant validity, Average Variance Extracted, effect size, path coefficient estimates, and predictive relevance, which will be reported in this study.

## **4 Findings**

### **4.1 Analysis and results**

#### *4.1.1 Respondents profile*

Based on the frequency test, the highest proportion of restaurant operators age were between 30 to 39 years of age, which made up 33.6 percent (n =84), followed by 25 to 29 years' old which represented around 23.2 percent (n=58), 40 to 49 years old around 20.8 percent (n=52) and 50 to 59 years old around 14.4 percent (n=36) and 8.0 percent (n=20) were among the 60 years old and above. The majority of restaurant entrepreneurs are independent and sole proprietorship, which represents around 65.2 percent (n=163) followed by partnership around 24.0 percent (n=60), and 10.8 percent (n=27) were among the association either the government or the non-governmental organization (NGO).

#### 4.1.2 *Measurement model*

Before undertaking the path analysis, the data preparation process, which includes the screening steps of checking for problems that might affect the hypothesis testing's legitimacy through Structural Equation Modelling (SEM) with AMOS software, was applied. It specifically examines the quality, validity, and reliability of the study construct measurements through the assessment of the model fit. The measures generated are validated by performing confirmatory factor analysis (CFA) using a two-step model approach. The measurement model for the motivation construct was statistically significant, with a p-value of less than 0.001 ( $p < 0.001$ ). The entire critical ratios associated with each item in the scale were significantly greater than  $\pm 1.96$  at 0.05 levels or 0.01 levels. The standardized factor loadings are more significant than 0.6 or, to be exact, from .67 to .99. The average variances extracted were more significant than 0.5, which is a good rule of thumb, thus suggesting an adequate convergence (Hair et al., 2010). The Cronbach's  $\alpha$  is more than 0.70, and therefore, they are convincingly above the stipulated threshold level of acceptance reliability in compliance with Nunnally (1978). In the two dimensions, the AVE value was higher than .50 (motivation=.732 and knowledge=.687). This is in line with Fornell and Larcker (1981), which stated that the value of AVE for each construct should be at least 0.50 to establish the measurement model's discriminant validity. A similar process was undertaken on the measurement model for intention to practice sustainable food waste. The result shows that the measurement model is statistically significant, with a p-value of less than 0.001 ( $p < 0.001$ ). The measurement model's critical ratios also indicate that the construct's unidimensionality is more significant than 1.96 at 0.01 levels. Both factor loading and critical ratio are evaluated to support the unidimensionality of the scale. Thus, convergent validity is obtained (Hair et al., 2010; Janssen, 2010). The composite reliability of 0.905 and AVE of 0.660, which was calculated manually, are satisfactorily high, hence further validating the existence of convergent validity (Hair et al., 2010). In sum, the ten Goodness-of-Fit Indices values for both measurement models suggest that the fit of the data to the measurement models is adequate. This indicates that the measurement model for motivation and green knowledge and attitude into the mainstream business exhibited strong evidence of unidimensionality, convergent validity, and reliability. Therefore, it has good measurement properties, thus qualified to be used in the second stage of the analytical process, which is the path analysis.

#### 4.1.3 *Path analysis*

Path analysis using SEM was carried out to assess all the hypotheses that looked at direct relationships between independent and dependent variables. To estimate the path coefficients, a standardized parameter with maximum likelihood estimation was used. Maximum likelihood has been the leading estimation method used since the creation of contemporary structural equation methodologies in the middle of the 1960s

(Anderson & Gerbing, 1988). The results illustrated in Table 1 indicated that all path analysis was found to be significant.

Table 1: Summarized path analysis results

Path analysis	Standardized estimates	Critical ratio (t-value)	Results
<b>Attitude &gt; Intention</b>	0.045	3.269	Significant
<b>Knowledge &gt; Attitude</b>	0.044	3.199	Significant
<b>Knowledge &gt; Intention</b>	0.045	3.077	Significant
<b>Motivation &gt; Attitude</b>	0.026	3.167	Significant
<b>Motivation &gt; Intention</b>	0.037	3.453	Significant
<b>Knowledge &gt; Attitude &gt; Intention</b>	0.021	3.234	Significant
<b>Motivation &gt; Attitude &gt; Intention</b>	0.018	3.366	Significant

Note: \*Significant at  $p < 0.05$

## 5 Conclusion

Reducing food waste not only has a positive impact on the environment, but it also reduces associated economic costs. Indeed, restaurant managers' attitudes and behaviour towards food waste can significantly affect the amount of food waste generated. Data suggests that restaurants' attitudes and behaviours around food waste play major roles in the amounts of food discarded in restaurants. Policies and incentives are not likely to fully meet the challenge to reduce food waste (based on inferences from our data) but are needed to facilitate behavioural changes. More initiatives, often free of charge, led by organizations that support the reduction of food waste in dining places would be the most helpful step for restaurants. Redistributing surplus food and giving customers portion size options would reduce waste, as would rewarding or promoting sustainable behaviour in restaurants. The use of smaller landfill bins or reducing the hauling frequency would be a possible solution for reducing the creation of landfills and saving costs for disposal. Inter-governmental goals, such as the Sustainable Development Goals, will help address and tackle food waste and may even force certain stakeholders, such as food retailers, to deal with their leftovers. When handling food, the food operator did not focus solely on waste reduction, but also on the enjoyment of food, its relative healthiness, that become the motivation factor to them. The trade-offs between these priorities apparently determined the food-handling routines that they performed. Interestingly, many participants considered it justified to discard foods because of acting upon a goal with higher priority, particularly if the foods were thrown away routinely for the same reason. In the present study, those who felt confident about their food management skills and knowledge reported that they wasted very little food.

Understanding the causes of waste is important because effective food waste management requires a deeper appreciation of the volume and origin of waste. Overproduction, serving issues, and plate waste were considered to ascertain related causes (Sebbane & Costa, 2018). The key causes were the nature of the food menu, the production procedure, and the use of pre-prepared versus whole food products (McAdams et al., 2019). There exists some level of consciousness to avoid food waste and about the use of waste mitigation practices at restaurants, for instance, different restaurants are quite aware of the need to prevent food waste as it leads to financial benefits arising from savings in food costs (McAdams et al., 2019). Keeping this in mind, most restaurants try to manage waste by ensuring proper chopping and trimming of vegetables and meats, effective purchase planning, and demand forecasting (Aamir et al., 2018; Bharucha, 2018; Principato et al., 2018). Competent and skilled staff and the participatory approach of involving employees in formulating and implementing control measures are also quite useful in reducing waste (Heikkila et al., 2016). The role of government is also considered significant in controlling food waste. Furthermore, targeted policy interventions to increase corporate and consumer commitment are also important (Filimonau et al., 2019), as are free training programs by the government to decrease kitchen waste. The government's role is more crucial because despite knowing that a comprehensive approach to effective waste reduction requires various innovative actions, food service establishments tend only to implement innovations driven by cost-saving criteria (Martin-Rios et al., 2018). Furthermore, proper quantification can also serve as a benchmark for food waste prevention in various foodservice establishments. For instance, automated quantification tools can serve as a cost-efficient way of reducing food waste in establishments, reporting a very high volume of waste (Eriksson et al., 2019).

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