

Knowledge and Attitudes of Hoteliers in Langkawi UNESCO Global Geopark towards Sustainable Food Waste Management (SFWM)

Saraswathy Kasavan*, Ahmad Fariz Mohamed and Sharina Abdul Halim

*Institute of Environment and Development (LESTARI), National University of Malaysia (UKM),
43600 Bangi, Selangor, Malaysia*

ABSTRACT

The main issues of sustainability currently addressed by hoteliers are energy and water saving as well as solid waste management. However more efforts are needed to increase hoteliers' commitment towards addressing sustainable food waste management (SFWM) in their operation. This article aims to examine the level of knowledge hoteliers have regarding the implementation of SFWM, and their attitude towards the effort. The Langkawi UNESCO Global Geopark is the site for the case study. Data was gathered using structured and self-administered questionnaires, completed by 42 hoteliers on the island. In general, the main findings indicated a strong correlation ($r=0.769$) between knowledge and attitude towards SFWM among hoteliers who were mostly influenced by hotel policy to minimize food wastage, particularly by reusing quality leftover food. It was also found that hoteliers were better prepared during the early process of SFWM implementation as they had better control in reducing food waste. However, unsustainable food consumption patterns of customers still pose a challenge in managing food waste. In order to effectively minimize food waste, it is suggested that hoteliers apply the concept of green and sustainable practice for each of the activities related to food waste management. Concerted efforts are needed to seek innovative solutions to food waste management in the island for the sake of present and future sustainability.

Keywords: Attitude, Geopark, Hotel, island, knowledge, sustainable food waste management

ARTICLE INFO

Article history:

Received: 17 April 2017

Accepted: 21 May 2018

Published: 28 September 2018

E-mail addresses:

saraswathy50@yahoo.com (Saraswathy Kasavan)

fariz@ukm.edu.my (Ahmad Fariz Mohamed)

sharinahalim@ukm.edu.my (Sharina Abdul Halim)

* Corresponding author

INTRODUCTION

Island tourism has become a popular attraction according to statistics on the global tourism industry, not only contributing significantly to the local economy but also

providing employment opportunities in many ways (Kasimu, Zaiton, & Hassan, 2012). An island is a site with a highly sensitive area and it also has a unique nature, making it an attractive tourism product. The hotel sector is among the major players for the growing tourism industry in island destinations. It is important that business operations of the hotel sector take responsible measures in being more proactive in minimizing the impact of their operations on the environment for the sake of sustainable economic opportunities. Since the hotel sector is regarded as the largest food consumer that generates large quantities of food waste (Sandaruwani & Gnanapala, 2016), implementing green and sustainable practices for food waste management is crucial.

According to Alexander and Sarah (2002) food waste amounts to more than 46% of the total solid wastes generated by the US hotel sector. Hoteliers should consider the importance of reducing food waste because food and beverage expenses comprise a large portion of the operations cost. Adopting sustainable food waste management (SFWM) from the purchasing until the disposal phase would also increase resource efficiency while reducing food waste. SFWM would significantly reduce any negative impact on the environment, change social views and encourage action on the ground while boosting economic needs. However, hoteliers seem to be focusing merely on sustainable practices in the use of water, electricity, and recycling of solid waste (Pirani & Arafat, 2015; Samdin,

Bakori, & Hassan, 2012). Most the hotel operators do not realize that one of the biggest resource efficiency opportunities lies with SFWM (Sandaruwani & Gnanapala, 2016). For that reason, SFWM for the hotel sector needs to be studied in depth.

Hoteliers' response to SFWM depends on technical and organizational aspects. Different technical and organizational aspects affect people's knowledge and attitudes towards sustainable practices. Previous studies have primarily concentrated on food waste treatment (Li et al., 2013; Seng et al., 2013). However, as pointed out by Refsgaard and Magnussen (2009) most of the studies have emphasized the technological and material aspects, leaving out considerations of the level of knowledge and attitude. The study reported in this article aimed to examine the level of hoteliers' knowledge and their attitudes towards the implementation of SFWM, using the Langkawi UNESCO Global Geopark as a case study. This paper will also focus on assessing the relationship between level of knowledge and attitude towards food waste management. Concerted efforts are needed to seek innovative solutions for food waste management in the island for the sake of present and future sustainability.

LITERATURE REVIEW

Knowledge is one of the important aspects in determining the behaviour of a business organization, and influencing decision making (Samdin et al., 2012). Papargyropoulou et al. (2016) proposed that in the hotel industry, food provisioning, food

waste generation and food consumption should be studied together in order to gain knowledge about how, where, and why food waste is generated. Knowledge regarding of reducing food waste should be studied at every stage, from the purchasing of raw food ingredients, food storage, cooking, consumption, to the disposal of food waste. Attitude is a way of thinking or feeling about something which could lead to changes in behaviour (Rezai, Hosseinpour, & Shamsudin, 2015; Yusof et al., 2016). It also depends on the confidence an individual has about the outcome of his/her actions, either positive or negative. According to Azjein and Fishbein (1980) a person with a positive attitude expects to get a good outcome in implementing certain behaviours, and vice versa.

Furthermore, according to an investigation by Mustafa and Yusoff (2011) knowledge alone was not sufficient to motivate an individual to modify his behaviour, but a strong positive attitude would maintain a certain behaviour in the long term. Interestingly, this was contrary to the findings of a study conducted by Adeolu and Enesi (2014) that argued any activity must begin with assured adequate knowledge, which would be the driving force for the change in attitudes. In general, interesting results indicating the potential of knowledge and attitude on waste management have been reported. However, most of the studies in the literature do not simultaneously examine the knowledge and attitude towards food waste management using hotelier samples

(Adeolu & Enesi, 2014; Akbar et al., 2015; Hakim, Mohsen, & Bakr, 2014; Mustafa & Yusoff, 2011; Talonghari & Jamias, 2010). Hence, knowledge and attitude should be studied together, rather than separately, in order to better understand how food waste is managed.

This would then assist the research in suggesting a strategy for not only reducing food waste but also the operation costs of a hotel. For example, in the United Kingdom, the cost of managing food waste amounts to £318 million each year in the hotel sector, including food procurement, labour, utilities and waste management costs (International Tourism Partnership, 2014). Meanwhile, the Grand Hyatt Hotel in Singapore reportedly saves \$100,000 a year simply by managing food waste and successfully recycling 500kg of food waste to become fertilizer within 24 hours using the Thermophilic Biomax Digester (Tan, 2017). Besides that, Coral Bay Hotel on Phuket Island, Thailand, has managed to reduce the generation of daily food waste from 300 Kg to 175 Kg by implementing sustainable food waste management (Khun, 2011). The case study reported here seeks to address previous research gap related to SFWM by assessing the knowledge and attitude of hoteliers Langkawi.

Research Questions

This paper explores two major factors that are considered important in shaping human behaviour: knowledge and attitude (Azjein & Fishbein, 1980). It is believed that what people know about SFWM will influence

their views and cause them to take action. A quantitative approach is used in this study aiming to answer the following research questions:

1. What is (i) the level of knowledge of hoteliers about sustainable food waste management and (ii) what is their attitude towards it?
2. What is the strength of the relationship between knowledge about sustainable food waste management and attitudes towards it?

RESEARCH APPROACH

Study Area

Langkawi Island is located in the Andaman Sea, around 30 km off the coast of north-western mainland Malaysia. Langkawi is well-known for its Global Geopark status, awarded by UNESCO in June 2007 (Halim, Komoo, Salleh, & Omar, 2011). Langkawi is the 52nd global geopark in the world and the first in Southeast Asia and Malaysia (Ong et al., 2010). It is one of the premier tourist island destinations in Malaysia. The tourist arrivals in Langkawi were 2.4 million in 2010 and this number has increased to 3.6 million in 2016 (Annual Report LADA, 2017). Many new hotels have been built to accommodate the growing tourist traffic.

A study conducted by Shamshiry et al. (2011) found that hotels in Langkawi typically generated large amounts of waste, in particular waste generated by tourists was double the waste per capita as compared to the local population. Food waste was found

to be one of the highest components (43%) produced in Langkawi (Shamshiry et al., 2011). On the other hand, the Malaysian government intends to transform Langkawi into Malaysia's first low carbon island by 2030 (Bernama, 2016). This would contribute to making Langkawi a preferred eco-tourism destination in the global rankings. However, food waste generated from Langkawi's hotels sector potentially contribute to the increase in carbon. This is because the decomposition of food waste in landfills have the capacity to create methane, a greenhouse gas, twenty times more potent than CO₂ (Scotland, 2013). The high component of food waste can create the problem of limited landfill capacity (Fariz, Shaharudin, & Abdul, 2017) and also landfill leachate, which can affect the water quality in Langkawi (Sahabat Alam Malaysia, 2017; Shamshiry et al., 2011). These factors make Langkawi Island the most appropriate location for a case study as there is obviously an urgent need for research on SFWM in the hotels sector there.

Method

The study focused on selected hotels that provided accommodation together with food and beverage services. Data collection for the study was carried out from June to October 2016 from a sample of different categories of hotels within Langkawi Island, ranging from 1-star to 5-star hotels. A list of target respondents was initially taken from the Malaysian Association of Hotels (MAH) website and the Langkawi Municipal Council. The main reason for

using the MAH website was that they provided complete location details of hotels in Langkawi -postal addresses, e-mail addresses and also telephone numbers.

To increase the probability of getting a large sample size and to avoid a low response rate, all of the 56 hoteliers were initially included in the sampling criterion, which is any hotelier that provides accommodation together with food and beverage services. In order to seek cooperation from the hotels, personal visits and telephone calls were made. The early process of data collection was very challenging as some hotels refused to participate in the questionnaire survey and other hotels were under renovation. Most of the completed questionnaires were collected personally by the researchers, while a few others were collected through online surveys. A total of 42 survey forms were finally received from the 42 hoteliers. Respondents for this study consisted of the main persons-in charge of food waste management at each hotel.

A quantitative method was used to identify levels of knowledge and attitudes among hotel staff related to food waste. The questionnaire was a self-administered closed-ended questionnaire. A five-point Likert scale was used to measure the strength of the hoteliers' knowledge and their attitudes to food waste management, ranging from 1 for 'strongly disagree' to 5 for 'strongly agree'. Accordingly, 20 items on knowledge about SFWM were categorized into four types of construct items, namely knowledge about i) reducing spoilage of food waste, ii) waste from preparation of food, iii) leftover food

waste, and iv) customer plate waste. Each construct had five items as its components. In addition to the construct items (20 items) about attitudes to SFWM, an analysis was also conducted on waste hierarchy pyramid focusing on prevention, reuse, composting, energy recovery, and disposal. Table 1 below explains these construct items in detail regarding knowledge and attitude towards SFWM.

Before the actual data collection commenced, the questionnaire was pilot-tested on a population that had characteristics similar to the sample population in other study areas, and based on the ambiguities noted, necessary revisions were made. The questionnaire was conducted by reviewing the literature for consistency and construct validity. The reliability test was carried out using the internal consistency approach, yielding a value of 0.92. This value meets the acceptance criteria of 0.70 and was considered acceptable (Pallant, 2005). The statistical methods used in this study were descriptive statistics of frequency, percentage, mean, standard deviation, and Pearson's *r* statistical analysis. All these were used to identify the correlation between knowledge and attitude. To assess the level of knowledge and attitude towards SFWM, the interpretation of mean score by Jamil Ahmad (2002) was used. If the mean score falls between the range of 1.00 to 2.33, the knowledge and attitude is considered as low level; between 2.34 to 3.66, the knowledge and attitude is at a moderate level; and between 3.66 to 5.00, the knowledge and attitude is at a high level.

Table 1
Construct items: details regarding knowledge and attitudes towards SFWM

Factors	Construct Items	Description
Knowledge	• Spoilage of food waste	• Knowledge regarding storage and purchasing food ingredients towards reducing food waste.
	• Waste from food preparation	• Knowledge regarding preparation of food in the kitchen.
	• Leftover food waste	• Knowledge regarding serving food and managing leftover food at buffet point.
	• Customer plate waste	• Knowledge regarding managing and reducing customer plate waste at dining.
Attitude	• Prevention	• Willing to participate in training and education on waste separation
	• Reuse	• Willing to reuse quality leftover food (by donating, letting staff take home, storing at right temperature) and low quality leftover food (fed to pets or animals).
	• Composting	• Willing to participate in composting activities in hotel
	• Energy Recovery	• Willing to practise future planning for energy recovery from food waste (useable form of energy such as electricity, heat or transportation fuels (e.g. diesel)
	• Disposal	• Attitude regarding food waste management before disposal (separation and keeping record of generation of food waste)

RESULTS AND DISCUSSION

Socio-demographic Characteristics of Respondents

Table 2 presents the socio-demographic characteristics of the respondents (gender, age, level of education, current position in the hotel, and work experience in the F&B department). The total number of respondents was 42 (28 males and 14 females). The majority of the respondents (71.4%) were within the age range of 31 to 50 years. About 21.4% of respondents were below 30 and 4.8% between 51 to 60. Based on the questionnaire, 40.5% of respondents had only up to secondary school education, and 9.5% had completed sixth form (STPM); while 23.8% had a diploma in hospitality and tourism, 14.3% of the

respondents had a diploma in an unrelated area of study. Only 7.1% of the respondents had a bachelor's degree in hospitality and tourism, while the 4.8% of them had a degree in some unrelated field.

The survey results show that 31% of the respondents were owners of the hotels and 69% were staff in management or operations (Table 2). The sample of respondents were from several different positions because of the different star ratings of hotels. The hotels had different operating systems for food waste management and the persons responsible for food waste management in each of the hotels were also different. Besides that, the respondents' work experience in the food and beverage department varied. While only 38.1% of

Table 2
Demographic characteristics of the respondents

		Frequency (N=42)	Percent (%)
Gender	Male	28	66.7
	Female	14	33.3
Age	Below 30	9	21.4
	31 Until 40	15	35.7
	41 Until 50	15	35.7
	51 Until 60	2	4.8
	60 Above	1	2.4
Level of Education	Completed Secondary school	17	40.5
	High School Certificate (STPM)	4	9.5
	Diploma in an unrelated field	6	14.3
	Diploma in hospitality and tourism	10	23.8
	Bachelor's Degree in an unrelated field	2	4.8
	Bachelor's Degree in hospitality and tourism	3	7.1
Current Position in hotel	Hotel staff (managerial/operations)	29	69.0
	Owners of hotel	13	31.0
Experience	Below 1 year	3	7.1
	1 year until 5 years	16	38.1
	6 years until 10 years	8	19.0
	11 years above	15	35.7

Source: Author, 2016

the respondents had worked 1 to 5 years in the industry, 19% had worked 6 to 10 years and 35.7% had worked more than 11 years.

Types of Food Waste from Hoteliers

Previous studies (Papargyropoulo et al., 2016; Sustainable Restaurant Association, 2010) have identified four types of food waste: 'Spoilage food waste caused by spoilage' is waste created from purchase of spoiled food ingredients and poor storage; 'Food waste during preparation' is waste produced during the food preparation stage, due to overproduction of food, peeling, cutting and over-cooking; 'Customer plate waste' is wastage caused by food left uneaten by customers after the food has been sold or served to them; and 'Leftover waste' is excess food that has been prepared

but has not been touched by customers, thus, left on the buffet line and later discarded. As shown in Figure 1, the majority of hoteliers found that customer plate waste constituted the highest proportion of generated food waste (76%), followed by food waste during preparation (14%), leftover food waste (7%), and spoilage food waste (3%). Most of the hotels in Langkawi offered three main meals (breakfast, lunch and dinner) with a mix of different cuisines and types of food services (a combination of buffet style and *a la carte*). However, the offerings for the buffet depended on the number of customers. In other words, hoteliers provided buffet services according to the hotel's occupancy rate which was influenced by the holiday seasons or the presence of a high number of customers.

A study conducted by Papargyropoulou et al. (2016) argued that a hotel would generate high customer plate waste and leftover food waste if hoteliers followed the buffet style food service. On the other hand, a hotel would produce higher preparation food waste if it adopted the *a la carte* food services. The results of that study seem to resonate with the results of this research on hotels in Langkawi. Most of the hotels in Langkawi adopted the buffet style food service for breakfast and *a la carte* for lunch or dinner. This is the reason why hoteliers stated that their hotel produced more customer plate food waste and preparation food waste relative to other types of food waste. Buffet services in hotels in Langkawi depend greatly on the functions that take place every festive season and the types of individual events, and they cause daily differences in the quantity of food waste. According to 7% of the hoteliers, leftover food waste was still low because the quality

of leftover food was given to staff for their meals, but not allowed to be taken home. Most hotels in Langkawi prepare food for their guests and hotel staff separately. Any excess of untouched customers' food was allowed to be consumed by their hotel staff.

Only 3% of hoteliers found spoilage food waste generated the highest proportion of food waste. According to Saraswathy, Fariz and Sharina (2017) usually for small hotels, the hoteliers purchase the ingredients needed and they do not require specific suppliers because they only need to prepare meals for a small number of guests. The larger hotels have their own suppliers bringing raw food ingredients that they need. The suppliers are selected according to criteria such as timely delivery, product quality, consistent product, ability to support the required amount and price (Tan, 2002). The hoteliers also have to ensure that the raw food ingredients delivered are in good condition to prevent spoilage food waste.

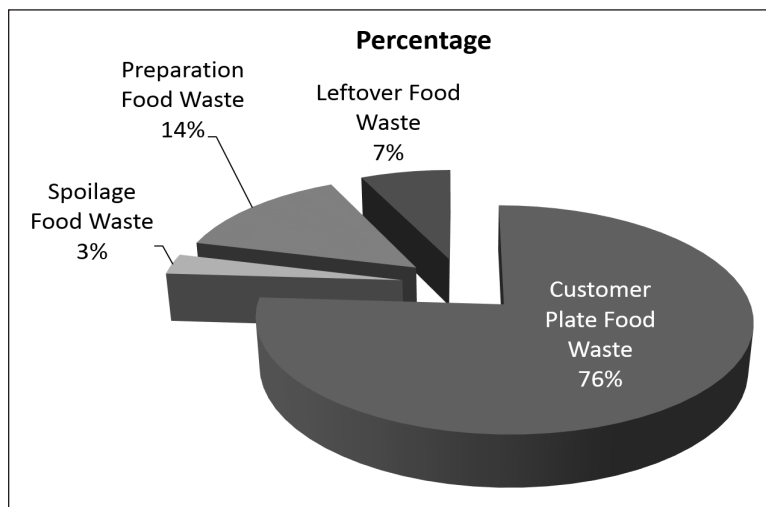


Figure 1. Types of food waste according to the perceptions of hoteliers (n=42). Source: Author, 2016

Hoteliers' Knowledge of SFWM

The results indicate that the mean score for knowledge on reducing spoilage food waste and preparation food waste was high where (M=3.98, SD=0.46) and (M=4.13, SD=0.57). Most of the hoteliers had their own internal systematic management from the purchasing to the food preparation stage to reduce operating costs for F&B management. Generally, the entire process from purchase, storage to food preparation is controlled by the hoteliers to prevent food spoilage waste and preparation of food waste at an early stage.

However, mean score for 'knowledge on reducing leftover food waste was moderate (M=3.34, SD=0.54). Usually, the quantity of food prepared is estimated based on the reservations made. However, hoteliers would prepare a larger quantity of food in case extra customers turn up that day without any reservations. Hoteliers make an excessive quantity of food to avoid last minute cooking but this would lead to leftover food waste. Therefore, accurate estimation on the number of customer arrivals is vital to avoid preparation of extra food. In other words, pre-booking is required so food could be prepared according to the actual number of customers. This could minimize food waste.

Besides that, the mean score for 'knowledge on reducing customer plate waste' was also moderate (M=3.48, SD=0.70). Usually, the generation of food waste from the stage of purchasing the ingredients, food storage and cooking would be influenced by the internal operations management of the hotel. However, customer plate waste was beyond the control of hoteliers because this kind of waste was influenced by the food consumption pattern of the guests. In other words, hoteliers are better prepared during the early process of SFWM implementation as they have better control in reducing food waste, but managing food waste due to unsustainable food consumption patterns of customers is beyond their control. Nonetheless, customer plate waste could be reduced by the hoteliers if they gave special and effective attention on serving style and timing, and type of food served, and if they could accurately predict the number of expected customers (Pirani & Arafat, 2015). The findings of the present study suggest that hoteliers should proceed with relevant actions to encourage their customers to reduce customer food waste. Kallbekken and Saalen (2013)'s study in Norway found that hoteliers were able to reduce customer plate food waste by 19.5% with the use of smaller plates.

Table 3
Hotelier's knowledge about SFWM

Construct items (n=42)	No items	Mean	SD	Interpretation
a. Knowledge about reducing Spoilage food waste	5	3.98	0.46	High
b. Knowledge about reducing Preparation food waste	5	4.13	0.57	High
c. Knowledge about reducing Leftover food waste	5	3.34	0.54	Moderate
d. Knowledge about reducing customer plate food waste	5	3.48	0.70	Moderate

*Five-point Likert type scale (1=strongly disagree and 5=strongly agree); =Mean, SD=Standard Deviation. *Source:* Author, 2016

Hoteliers' Attitudes to SFWM

Table 4 displays the results of analysis on the attitudes to SFWM in response to five types of construct items which were prevention, reuse, compost, energy recovery and disposal. The mean score for 'attitude to prevention' was high ($M=4.06$, $SD=0.68$). Many hoteliers adopting the prevention attitude were implementing strategies to minimize food waste: applying the first-in first-out system on food inventory, providing various portions to customers to choose from by the size of the dishes, requiring planning to cook dishes according to the number of customers, and so on. Birne (2010) found two main reasons for preventing food waste in the hospitality sector: one was considerable cost savings and the other was compliance with environmental laws. Preventing food waste is an action that can be considered at an early stage and is also one of the best and easy options to reduce waste compared to treatments or other options such as reuse, composting, and energy recovery. The prevention attitude could change the way business is conducted and help reduce problems arising from food waste from the start.

The mean score for 'attitude to reusing' was moderate ($M=3.17$, $SD=0.64$). This was because the attitude of hoteliers to reusing food was influenced by the strict hotel policy regarding the maximum time food could be left on the buffet line. The policy is that food items should not be left on the buffet line for more than four hours (Papargyropoulou et al., 2016). Usually, breakfast leftover food cannot be served again for lunch and would

have to be disposed of for reasons relating to safety and hygiene. Even though the policy's aim was to ensure that the food served was fresh and harmless for the customers, it generated buffet leftover waste (Pirani & Arafat, 2015). In fact, leftover foods could be reused to prepare other foods but it depended on the type of food, packaging and storing. For example, certain foods that have a greater proportion of water, or foods that have been handled cannot be reused because they would spoil faster.

The mean score for 'attitude to energy recovery for reducing food waste' was also moderate ($M=3.66$, $SD=0.64$). This means hoteliers still have reservations about future plans to make food waste into a useable form of energy such as electricity, heat or transportation fuels (e.g. diesel). Kumaran, et al. (2011) found that approximately 78.5% of wasted cooking oil collected in Langkawi has the potential to be used for producing biodiesel with high yield percentage.

Finally, the mean score for 'attitude to composting' and 'attitude to disposal' was high, with $M=3.69$, $SD=0.64$ and $M=3.71$, $SD=0.66$, respectively. This indicates that the hoteliers realise the benefit of composting as a sustainable way of using disposed food waste to maintain the green image of their businesses. Besides that, the activity of composting could sustain soil conditions that would be cheaply available for landscaping purposes. According to Sandaruwani and Gnanapala (2016) hotels in an island produce more food waste because the huge strain on foodstuff resources is consistent with increase in tourist arrivals

on the island. Most of the food waste from hotels is likely to be recycled into fertilisers through composting activities (Majid, 2007). The Environment Protection Agency (2010) found that the composting systems at hotels have the ability to reduce 44% of waste costs. A study by Mishra (2016) found that 74% of Thailand hotels have been involved in food waste composting

activities. However, separation of waste was required for successful composting and disposal processes. The findings of the present study suggest that hoteliers should provide sufficient training or education to encourage their staff to reduce food waste in their hotel using the waste hierarchy pyramid.

Table 4
Hoteliers' attitudes to SFWM

Construct items (n=42)	No. items	Mean	SD	Interpretation
a. Attitude to prevention of food waste	5	4.06	0.68	High
b. Attitude to reusing food	5	3.17	0.64	Moderate
c. Attitude to composting food waste	5	3.69	0.64	High
d. Attitude to Energy Recovery from food waste	5	3.66	0.66	Moderate
e. Attitude to disposal of food waste	5	3.71	0.66	High

*Five-point Likert type scale (1=strongly disagree, and 5=strongly agree); M=Mean, SD=Standard Deviation. *Source:* Author, 2016

Relationship between Knowledge and Attitude

The relationship between knowledge about and attitude towards SFWM is significant. This is because the inter-correlation analysis shows a strong correlation between knowledge and attitude ($r=0.769$). The positive relationship indicates that in the study population, the knowledge that hoteliers had on food waste management influenced their attitude to sustainable food waste management. Knowledge is an important step in changing behaviour. However, knowledge alone is insufficient to change behaviour, the right attitude is required to bring about the desired behaviour in the long run. Previous studies have

shown that having knowledge is not always consistent with adopting the desired attitude, those who have sufficient knowledge will not necessarily change their attitude to waste management (Aminrad et al., 2013; Refsgaard & Magnussen, 2009). In contrast, in Udomporn (2015)'s study, even though the level of waste management knowledge was moderate, their attitude level was high. The present findings also support the results of studies conducted by Adeolu and Enesi (2014); Mustafa and Yusoff (2011) that found a strong correlation between knowledge and attitude towards SFWM. An adequate knowledge would be the driving force for changing attitudes towards SFWM and vice versa.

CONCLUSION

Briefly, the different levels of education and types of position of hoteliers correlate positively with the level of knowledge and attitude to SFWM in hotels. However, no significant correlation was found between gender, age and experience with the level of knowledge and attitude to SFWM in hotels. The key findings from this study indicated a lack of concern in hotel policy for food wastage, in which influenced the knowledge and attitude towards sustainable food waste management, particularly to reuse quality leftover food. Most of the hoteliers strictly follow hotel policy regarding food safety standards but they feel the policy is inadequate in expressing concern about food waste reduction. Based on this finding, hoteliers need firstly to seriously consider improving current food waste management policy with clear objectives, procedures, and goals towards reduction of food waste, while still protecting food safety standards and hygiene requirements. The overall hotel policy must be balanced and holistic to consider the process of food waste management from purchasing to disposal.

Secondly, hoteliers' need to think more seriously about providing innovative action in managing unsustainable food consumption patterns of customers. The innovative action taken could consist of proactive steps to achieve SFWM that takes into account their customers' different cultural backgrounds, and their personal preferences. Reducing the amount of food waste is crucial in developing a sustainable food waste management. In other words,

food waste could be minimized effectively if the hoteliers truly apply the concept of green and sustainable practices for each of the activities carried out related to food waste. The scope of this paper is limited to the assessment of knowledge and attitude of hoteliers' towards food waste management in Langkawi, Malaysia. Further research could examine the knowledge and attitude of hotel guests in an effort to reduce food waste in an integrated and holistic manner.

ACKNOWLEDGEMENTS

Authors would like to thank all of the participating hotels for assisting them with the questionnaire survey for our study, the results of which are reported in this paper. The authors also acknowledge Dr. Azlina Abdullah from the Faculty of Social Sciences and Humanities (National University of Malaysia (UKM), 43600 Bangi, Selangor, Malaysia) for her assistance with the data analysis and for her useful comments. Our sincere appreciation goes to Langkawi Research Centre, UKM for providing field support and assistance. Thank you to research project Developing Environmental Management System for Green Resort GGPI-2016-011 Project and KRA-2017-020 for providing fund for documentation work for this chapter.

REFERENCES

- Adeolu, A. T., & Enesi, D. O. (2014). Assessment of secondary school students' knowledge, attitude and practice towards waste management in Ibadan, Oyo State, Nigeria. *Journal of Research in Environmental Science and Toxicology*, 3(5), 66–73.
- Akbar, A., Alavi, N., Goudarzi, G., & Teymouri, P. (2015). Household recycling knowledge, attitudes and practices towards solid waste management. *Resources, Conservation & Recycling*, 102, 94–100. <http://doi.org/10.1016/j.resconrec.2015.06.014>
- Alexander and Sarah. (2002). Green hotels: Opportunities and resources for success. *Journal of Management*, 8(April), 691–699. <http://doi.org/10.1300/J149v08n02>
- Aminrad, Z., Zarina, S., Sayed Zakariya, B., Hadi, A. S., & Sakari, M. (2013). Relationship Between Awareness, Knowledge and Attitudes Towards Environmental Education Among Secondary School Students in Malaysia. *World Applied Sciences Journal*, 22(9), 1326–1333. <http://doi.org/10.5829/idosi.wasj.2013.22.09.275>
- Annual Report LADA Langkawi*. (2014).
- Azjein, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice Hall.
- Bernamea. (2016). *Langkawi Akan Jadi "Pulau Rendah Karbon" Pertama Malaysia - PM*.
- Environment Protection Agency. (2010). *Case Studies of Organisations Managing Food Waste Properly*. Retrieved March 10, 2017, from <http://www.envirocentre.ie/includes/images/Case-Studies-of-Organisations-Managing-Food-Waste-Properly.pdf>
- Fariz, A. M., Shaharudin, I., & Abdul, S. H. (2017). Challenges of urban space for sustainable solid waste management in the Langkat Basin. *International Journal of the Malay World and Civilisation (Iman)*, 5(1), 59–66. <http://doi.org/http://dx.doi.org/10.17576/IMAN-2017-05S11>
- Hakim, S. A., Mohsen, A., & Bakr, I. (2014). Knowledge, attitudes and practices of health-care personnel towards waste disposal management at Ain Shams University Hospitals, Cairo. *Eastern Mediterranean Health Journal = La Revue de Sante de La Mediterranee Orientale = Al-Majallah Al-Sihhiyah Li-Sharq Al-Mutawassit*, 20(5), 347–54. Retrieved March 10, 2017, from <http://www.ncbi.nlm.nih.gov/pubmed/24952293>
- Halim, S. A., Komoo, I., Salleh, H., & Omar, M. (2011). The Geopark as a potential tool for alleviating community marginality: A case study of Langkawi Geopark, Malaysia. *The International Journal of Research into Island Cultures*, 5(1), 94–113.
- International Tourism Partnership. (2014). *Know How Guide To Reducing and Managing Food Waste in Hotels*. Retrieved March 10, 2017, from <http://www.greenhotelier.org/know-how-guides/reducing-and-managing-food-waste-in-hotels/>
- Kallbekken, S., & Sælen, H. (2013). "Nudging" hotel guests to reduce food waste as a win-win environmental measure. *Economics Letters*, 119(3), 325–327. <http://doi.org/https://doi.org/10.1016/j.econlet.2013.03.019>
- Kasimu, a. B., Zaiton, S., & Hassan, H. (2012). Hotels involvement in sustainable tourism practices in Klang Valley, Malaysia. *International Journal of Economics and Management*, 6(1), 21–34.
- Khun. (2011). *The Coral Bay Hotel: Case Study on Phuket Island*. Retrieved March 10, 2017, from https://ecampus.itcilo.org/pluginfile.php/13681/mod_page/content/24/hotel1.pdf
- Kumaran, P., Mazlini, N., Hussein, I., Nazrain, M., & Khairul, M. (2011). Technical feasibility studies for Langkawi WCO (waste cooking oil). *Energy*, 36(3), 1386–1393. <http://doi.org/10.1016/j.energy.2011.02.002>

- Li, Z., Lu, H., Ren, L., & He, L. (2013). Experimental and modeling approaches for food waste composting: A review. *Chemosphere*, 93(7), 1247–1257. <http://doi.org/10.1016/j.chemosphere.2013.06.064>
- Maired C., Dermont, C., & James H. (2010). *Less Food Waste More Profit*. Rossa Avenue, Cork, Ireland: *Clean Technology Centre, Cork institute of Technology* (p. 32). Retrieved March 10, 2017, from <https://www.foodwaste.ie/web-images/Food-Waste-Prevention-Guide.pdf>
- Majid, M. R. (2007). Sustainable solid waste management for island resorts: Potential for Perhentian Island, Terengganu. In *International Conference on Built Environment in Developing Countries* (p. 16), *Pulau Pinang, Malaysia*.
- Mustafa, H., & Yusoff, R. M. (2011). Measuring the long-term effectiveness of a compulsory approach to behaviour change. *Journal of Education for Sustainable Development*, 5(2), 233–244. <http://doi.org/10.1177/097340821100500213>
- Pallant, J. (2005). *SPSS Survival Manual. A step by step guide to data analysis using SPSS for Windows (version 12)*. Open University Press: London.
- Papargyropoulou, E., Wright, N., Lozano, R., Steinberger, J., Padfield, R., & Ujang, Z. (2016). Conceptual framework for the study of food waste generation and prevention in the hospitality sector. *Waste Management*, 49, 326–336.
- Pirani, S. I., & Arafat, H. A. (2015). Reduction of food waste generation in the hospitality industry. *Journal of Cleaner Production*, 132, 129-145.
- Refsgaard, K., & Magnussen, K. (2009). Household behaviour and attitudes with respect to recycling food waste - experiences from focus groups. *Journal of Environmental Management*, 90(2), 760–771.
- Rezai, G., Hosseinpour, M., & Shamsudin, M. N. (2015). Effects of go-green campaigns on changing attitude towards green behaviour. *Journal of Social Sciences & Humanities*, 23, 77–92.
- Sahabat Alam Malaysia. (2017, August 22). Waste dumping affect beauty of Pulau Langkawi – New Straits Times.
- Samdin, Z., Bakori, K. A., & Hassan, H. (2012). Factor influencing environmental management practices among hotels in Malaysia. *International Journal of Social, Education, Economic and Management Engineering*, 6(5), 5–8.
- Sandaruwani, J. A. R. C., & Gnanapala, W. K. A. C. (2016). Food wastage and its impacts on sustainable business operations: A study on Sri Lanka tourist hotels. *Procedia Food Science*, 6, 133–135.
- Saraswathy K., Fariz. A. M., & Sharina A. H. (2017). Sustainable food waste management in hotels: Case study Langkawi Unesco Global Geopark. *Planning Malaysia Journal*, 15(4), 57–68. <http://dx.doi.org/10.21837/pmjournal.v15.i4.317>
- Resource Efficient Scotland. (2013). *Managing food waste in the hospitality and food service industry*. Resource Efficient Scotland: Sterling, UK.
- Seng, B., Hirayama, K., Katayama-Hirayama, K., Ochiai, S., & Kaneko, H. (2013). Scenario analysis of the benefit of municipal organic-waste composting over landfill, Cambodia. *Journal of Environmental Management*, 114, 216–224. <http://doi.org/10.1016/j.jenvman.2012.10.002>
- Shamshiry, E., Nadi, B., Bin Mokhtar, M., Komoo, I., Saadiah Hashim, H., & Yahaya, N. (2011). Integrated Models for Solid Waste Management in Tourism Regions: Langkawi Island, Malaysia. *Journal of Environmental and Public Health*, 2011, 1–5. <http://doi.org/10.1155/2011/709549>
- Sustainable Restaurant Association. (2010). *Just too good to waste. Restaurant Food Waste Survey*

- Report*. London.
- Tatlonghari, R. V., & Jamias, S. B. (2010). Village-level knowledge, attitudes and practices on solid waste management in Sta. Rosa City, Laguna, Philippines. *Journal of Environmental Science and Management*, 13(1), 35-51.
- Tan, S.-A. (2017). Hotel recycles 500kg of food waste into fertiliser within 24 hours using food-waste digester. *The Straits Times Singapore*, p. 1.
- Tan, K. C., Lyman, S.B. and Wisner, J. D. (2002). Supply chain management: A strategic perspective. *International Journal of Operation & Production Management*, 22(6), 614–631.
- Udomporn, T. (2015). Resident's knowledge, attitude and practice towards solid waste management in Joho Sub-district administrative organization, Mueang district, Nakhon Ratchasima, Thailand. *International Journal of Technical Research and Applications*, 24(24), 2320–8163.
- Yusof, N. S. H. C., Yap, B. W., Maad, H. A., & Hussin, W. N. I. W. (2016). Relationship between emotional intelligence and university students' attitude. *Journal of Social Sciences & Humanities*, 24, 119–130.

