

“Can Food Waste Be Reduced? An Investigation into Food Waste Management in Hospitality Sector”

Dr.Girish Nair¹, Dr.Nidhi Choudhary², Swati Prasad³

^{1&3}Stenden University Qatar, ²Banasthali University India

Abstract: *The scope of food wastage is wide. The current paper discusses the aspect of avoidable food wastage in hospitality sector in Qatar. Food is the backbone of the hotel industry playing a vital role for international as well as domestic visitors. The study seeks to find if the hotels can avoid food wastage through considering their food transportation infrastructure or by considering their food portioning while serving the food to the customers. It even seeks to find if the problem of food wastage in hotels can be trimmed if the consumers change their behavior in terms of buying, preparing and storing food. The study is conducted in three grand hotels of Qatar and structured equation modelling is used to derive the conclusion.*

Keywords: *Food wastage; Logistic issues; Individual behaviour; Food portioning; Hospitality industry*

1. Introduction

In the course of recent years, sustenance waste has received vast consideration in both societal and scholastic levels. Since it has negative impact on the economic, environment and society, food wastage is considered as a one of the sustainability issue. As we see, disparity in national wealth, across different countries, has directly impacted the capability in terms of capital infrastructure, innovation and dependence on agricultural, manufacturing or knowledge economies. Food waste in the foodservice business is one of the most decipherable areas of food waste. Food is defined as something “.....intended to be or reasonably to be ingested by humans” by WRAP (WRAP, 2015).” Food wastage implies when food is not used for appropriate end, but for the other uses within the waste grading (Bernstad, et al., 2017). In such a situation, it is not only the food itself but also the means utilized in its production, transportation or disposals are used uneconomically. This has damning impact on the environment, economy and society.

The Food and Agriculture Organization of the United Nations (FAO, 2011) has categorized the food wastage into following categories:

Avoidable – food that was edible at some point prior to disposal (e.g. slice of bread, apples, meat).

Possibly avoidable – food that some prefer to eat and others do not (e.g. bread crusts), or food that can be consumed when it is prepared in one way but not in another (e.g. potato skins).

Unavoidable – waste arising from food preparation that is not edible under normal circumstances and it was never edible (e.g. meat bones, egg shells, pineapple skin, tea bags).

Therefore, the scope of food wastage is wide. The present paper will take food wastage which can be avoided. The avoidable food wastage is primarily referred to the edible (avoidable) food goods, which are made for human intake, but it has been wasted, lost, tarnished or consumed by pests. It does not include the inedible or avoidable portions of foodstuffs. Unavoidable food losses include shells, peels, stalks, cheese rinds, etc .

Food is the backbone in hotels. Its plays a vital role in the hospitality in Qatar hotels for the international tourists as well as the domestic visitors. For minimizing the problem of food wastage, it is important for

consumers to change their behaviour in terms of buying, preparing and storing food (Roodhuyzen, et al., 2017) (McCarthy & BoLiu, 2017) (Richter, 2017). The hotels can avoid food wastage through considering their food transportation infrastructure and also by considering their food portioning while serving the food to the customers (Tatàno, et al., 2017) (Christ & Burritt, 2017). The present study will look into the details of these aspects.

2. Objective

The key purpose of this paper is to examine and evaluate the reasons behind food wastage in hospitality industry in Qatar, with special reference to food transportation, food portioning and individual behavior. The study investigates the problem makes some recommendations to reduce wastage food in hospitality in Qatar. The study is important contribution towards management of food wastage which is a tremendous problem in Qatar.

3. Literature Review

3.1 The Problem of Food Wastage

As per a report by WRAP (Quested & Johnson, 2009) on food waste issue, wasting food is not a conscious decision. i.e. there is a break concerning the action triggering it and the consequence of wasting food. Meanwhile food and eating is considered to be led by a convolution of customs and habits (Torpoco, 1997), the wastage of food is mostly unseen and, thus it has an impact on social behaviour. Further, another study (Shift, 2014) pointed out the generational difference in food wastage and also emphasize the significance of considering, the historical developments shaped on today's condition. Morath (2017) discusses the costs arises from the multifaceted and expensive procedure of producing food only for it to end up as garbage. The literature review is divided into two sections. The first section discusses the existing literature on causes of food wastage with special reference to transportation, individual behaviour and food portioning. The second section discusses the existing literature on impacts of food wastage.

3.2 Cause of Food Wastage in Hospitality Sector

The existing literature indicates that there are various causes of food wastage in hospitality sector (Koivupuro, et al., 2012) (Richter, 2017) (Shift, 2014). However, the current study restricts itself to three primary causes:

3.2.1 Logistics Issues and Food Wastage

“Food losses take place during agricultural production, post-harvest, and processing stages in the food supply chain”, while “food waste occurs at the end of the food chain (distribution, sale and final consumption)” the prior is due mainly to logistical and infrastructural limitations, while the latter is primarily related to behavioural factor (Gustavsson, et al., 2011)

According to existing literature, vast majority of food is wasted over various courses of food supply management even though the supply system has witness a lot of technological up gradation at various levels in past few years (Jedermann, et al., 2014) (Thyberg & Tonjes, 2016) (Halloran, et al., 2014). It is a big challenge to improve the structure of food supply chain management to reduce the wastage of food in the hospitality sector (Aung & Chang, 2014) (Dani, 2015, p. 74). A well-developed food storage infrastructure can not only help in maintain the quality of food served in the hotel but also can be very helpful in minimizing the food wastage due to inadequate transportation facility of raw food products (Garrone, et al., 2014) (Dani, 2015, p. 79) (Rushton, et al., 2014, p. 2017). Most of these studies have concluded that logistics management is most effective method of reducing food wastage.

3.2.2 Individual Behaviour and Food Wastage

Several studies about individual behaviour on the wastage food and beverage in hospitality organizations have indicated that the customers at restaurant virtually place order for more food than they need (Ali & Abdullah, 2012). Consequently, they leave large quantities of food on their plate. This quantity is practically thrown in trash and negatively impacts economy, society and environment. (Josiam, et al., 2017) (Pirani & Arafat, 2016)

The social-psychological models indicate that food wastage is associated with effective factors which are situated inside the psyches of individuals and almost build rationality principles (Graham-Rowe, 2015) (Vivianne, et al., 2016). Some people believe that ordering extra food is a sign of generosity. On the other hand, hotels sell food. Therefore, larger the quantity of food sold by hotels, higher the profits. Somewhere it implies that hotels get more benefits from the wastage of food (Radwan, et al., 2010). The hotels can substantially reduce wastage through clients by helping the shoppers create legitimate state of mind towards wastage of nourishment (Ali & Abdullah, 2012) (Pirani & Arafat, 2016). The hotels need to coordinate the behavioural expectation and the states of mind of clients.

3.2.3 Food Portioning and Food Wastage

According to existing literature, smaller portion of food served to each customer can substantially reduce the food wastage in hospitality sector (Pirani & Arafat, 2016) (Reinders, et al., 2017). According to Kallbekken & Sælen (2013) reducing the serving size helped in reducing the food wastage by almost 20%. The study was conducted in 51 hotels across Europe and the participating hotels were happy to implement the change and categorized their experience as ‘no – regret’. In another study conducted for hotels in Hong Kong (Food Wise Hong Kong Campaign, 2013) it was suggested that the hotels should serve food in small and customized qualities to minimize the food wastage in the hospitality industry. This is more applicable in case of serving food in buffets. The hotels should control and manage amount of portioning food like serve in smaller vessels, providing measures like half-refill near end of buffet session, set smaller portion for each type of food, contemplate on providing smaller plates and encourage the refills, refills to smaller portioning can be made cheaper than ordering a large portion all together (Ali & Abdullah, 2012).

3.3 Impact of Food Wastage

The study categorizes the impact of food wastage in three sections:

3.3.1 Social Impact of Food Wastage:

Trung & Kumar (2005) emphasizes on the mounting cost of the resources. They also discuss how the wastage of food affects the environmental performance, income of the hotels and the public image in the hospitality sector. The main resources of the hotels are energy & water and they have also a significant contribution in the tourism sector (International Hotel Association, 2007).

The Food and Agriculture Organization of United Nations published a report (Food and Agriculture Organization of United Nations, 2015) emphasizing that reduction of food waste could be a key player in the world-wide struggles to feed an increasing world population. The report emphasized that as the demand increases, the costs also increase– whether we eat that food or throw it out. This factor especially highlighted for the low-income families since a large portion of their income goes toward buying food. The United Nations Conference on Trade and Development (2013) has also indicated that the need of the hour is not only increase food production but to reduce food wastage. This can be a more sustainable approach towards problem of food shortage (Food and Agriculture Organization of United Nations, 2014).

3.3.2 Economic Impact of Food Wastage:

Economically avoidable food losses have an instant and undesirable effect on the remuneration of both agriculturists and consumers (Christ & Burritt, 2017) (Garrone, et al., 2014). Keeping in mind the magnitude of food losses, building beneficial interests in decreasing losses could be one method for lessening the expense of food (Food and Agriculture Organization of United Nations, 2014). Food waste is a serious problem in environmental, social & economic terms (Kaipia, et al., 2013) (Gustavsson, et al., 2011). The economic losses have been calculated to cost in to the billions (Food and Agriculture Organization of United Nations, 2015) (Jones, 2004). As per Kumar (2011) the economic impact of food wastage should be calculated as summation of value added throughout the value chain – including agriculture, processing, packaging, distribution and retail. Thus economic loss is enormous. Further, the economic cost should also include the cost structure for municipal solid waste collection and disposal. (Cordell, et al., 2009)The disposal cost is increasing with increasing food wastage.

3.3.3 Environmental Impact of Food Wastage:

The problem of food wastage has serious two types of environmental impact. First, wastage food requires producing more food to compensate that wastage (Feldstein, 2017) (Kumar, 2011) (Raak, et al., 2017). This requires operating machines, exploiting natural resources and harming the environment. Secondly the wastage of food creates environmental pollution by throwing it on road side. This has negative effect on the environment which is very harmful to the global warning. The wastage food causes more CO₂ emissions due to transporting the wasted food to landfill (Khedkar & Singh, 2017) (Henningsson, et al., 2004). Knipe (2005) discusses that the serious environmental impact of wasted food is the creation of the dominant greenhouse gas methane. At the point when biodegradable material, for example, nourishment waste, garden waste and so forth debases without oxygen, as happens in a landfill circumstance, one of the by-items is methane (Iacovidou, et al., 2012).

There are various environmental impacts of food wastage. Some of such results incorporate loss of usable space from expanded landfill use, CO₂ discharges from transporting waste to landfill, leachate at landfill and tangible contamination from landfill, and so forth (WRAP, 2015) (Henningsson, et al., 2004). Trung & Kumar (2004) concentrated their study on environmental impact of food wastage. This problem is a very big problem for today's generation and also leading to various diseases which are very harmful to this world and upcoming generation as well. Goodall (2007) contemplated the other natural expenses emerges from the perplexing and exorbitant procedure of delivering sustenance just for it to wind up as garbage. These include the manufacture, utilize and transport of items, for example, composts, pesticides and herbicides, and different effects, for example, the methane created from creatures and slurry, soil consumption, and the contamination and atmosphere impacts of the transportation of sustenance from producer to market to customer. Stansfield (2008) said that the Natural wrappings as often as possible been replaced with plastics and are the real wellspring of conceivably recyclable residential plastics bound for landfill.

4. Research Methodology

According to Nykiel (2009, p. 19) since the targeted sample of population is representative to the whole population of the study, identifying the sampling for a research is very important. As the study cannot be performed on the entire population, a non- probability convenience sampling will be an ideal sampling to be used as the survey will be conducted at three places. The Sample will be 4 managers from 3 different hotels; The Manager of Food and Beverage Department, the Chef, the Logistics Manager and the Storage Manager. The hotels will be 5 stars hotels (Four seasons Doha Hotel, Sharq Village & Spa hotel, and Grand Sheraton Doha hotel). The total questionnaires will be 12 responders from 3 hotels. The study will use a self-structured questionnaire for collecting primary data from the respondents. The sample of the questionnaire used is provided in annexure 1. The study uses Structural Equation Modelling (SEM) with the path modelling approach assenting factor analysis, and hypothesis testing. Further, the study also uses the inferential statistics to draw the inferences of the study. There are three hypotheses which were tested to draw the results.

- H1o: Logistical issues in hotel have no significant influence on food wastage management
- H1a: Logistical issues in hotel have a significant influence on food wastage management
- H2o: Individual behaviour of customers in hotel have no significant influence on food wastage management
- H2a: Individual behaviour of customer has a significant influence on food wastage management
- H3o: Food portioning in hotel have no significant influence on food wastage management
- H3a: Food portioning in hotel has a significant influence on food wastage management

5. Analysis and Results

5.1 Structural Equation Modelling

Measurement Model: Table 1 shows the Cronbach’s alpha coefficient and the composite reliability result for the model after confirmatory factor analysis. Alpha coefficients range from 0.8 to 0.9 indicating a moderate to high level of internal consistency. The composite reliability vales also range from 0.8 to 0.9 indicating high reliability values. The results of the convergent validity assessed based on factor loading (> 0.6) indicate a strong effect of the factor on the variable of study (Table 2). To test for discriminant validity, the square root of average variance extracted (AVE) for each construct was compared with the correlation between the construct and the other constructs. Table 3 shows acceptable discriminant validity between each pair of construct, with all AVE square roots greater than the correlation between the constructs.

TABLE I: Reliability and validity measures

	AVE	Composite Reliability	R Square	Cronbach’s Alpha	Communality	Redundancy
FDP	0.9216	0.8601	0	0.7761	0.6133	0
FW	0.9216	0.8968	0.9583	0.86	0.5945	0.3309
IBR	0.8281	0.8384	0	0.8073	0.3691	0
LGS	0.9216	0.8467	0	0.7801	0.5374	0

Legend: FDP=Food portioning; FWM=Food wastage management; IBR=Individual behaviour; LGS=Logistical issues

TABLE II: Factor Loadings after Confirmatory Factor Analysis

	FDP	FWM	IBR	LGS
FDP2	0.8653	0	0	0
FDP3	0.5389	0	0	0
FDP4	0.8008	0	0	0
FPR1	0.879	0	0	0
FWM1	0	0.7219	0	0
FWM2	0	0.8891	0	0
FWM3	0	0.8314	0	0
FWM4	0	0.6201	0	0
FWM5	0	0.7437	0	0
FWM6	0	0.7914	0	0
IBR1	0	0	0.5196	0
IBR2	0	0	0.5501	0
IBR3	0	0	0.6162	0
IBR4	0	0	0.7639	0
IBR5	0	0	0.8015	0
LGS1	0	0	0	0.8781
LGS2	0	0	0	0.8476
LGS3	0	0	0	0.7527
LGS4	0	0	0	0.6717
LGS5	0	0	0	0.624

TABLE III: Inter-item Correlations

	FDP	FWM	IBR	LGS
FDP	0.96	0	0	0
FWM	0.9286	0.95	0	0
IBR	0.8186	0.9273	0.91	0
LGS	0.8789	0.9311	0.8603	0.96

TABLE IV: t- values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics ((O/STERR))	Hypothesis
FDP -> FWM	0.3761	0.376	0.0372	0.0372	10.1143	Supported
IBR -> FWM	0.3956	0.3857	0.0672	0.0672	5.8854	Supported
LGS -> FWM	0.2602	0.2699	0.0599	0.0599	4.3476	Supported

Structural Model: The R2 value is 0.96 which indicates that 96% of dependence of the dependent variable on independent variables is explained by the model, which is quite adequate (cut off 0.1) in Table 4.

All the three hypotheses are supported and hence:

H1a: Logistical issues in hotel have a significant influence on food wastage management

H2a: Individual behaviour of customer has a significant influence on food wastage management

H3a: Food portioning in hotel has a significant influence on food wastage management.

6. Discussions and Implications to the Managers

The results have indicated that logistical issues in the hotel industry play a very important role in the food wastage management. This finding is in alignment with the research finding by (Farshid, et al., 2006) (Aung & Chang, 2014) (Jedermann, et al., 2014). Research has indicated that the use of the right logistics helps in improving the quality and service of the hotel company and also cuts cost as resources utilization is optimized (Dani, 2015). The ultimate purpose of logistics management in hotel industry, which is an important component of supply chain management, is to reduce the food inventory and it can adopt principles such as Just-in-Time so that adequate quantity of items are supplied in right quantity at the right time so that waste minimization is ensured (Rushton, et al., 2014). Another direct benefit of an efficient logistics support system in hotel industry is that it will maintain a forward as well as reverse flow of information between the suppliers and customers, both internal and external suppliers (Odoom, 2012). Internal suppliers in hotel are various sections in the hotel such as storage department and kitchen. The maintaining of a proper record on the items received and items dispatched will enable the employees to keep stock of the inventory and the past records will be very useful in making forecasts. This information will ensure that the right amount of consumables will be ordered and wastage will be minimum (Leslie, 1987).

Studies have shown that managers in hotel do not follow the logistics in supply chain because of its complex nature (Zondag, et al., 2017) (Cetindamar, et al., 2016). The logistics involves huge number of processes which are interdependent and monitoring and controlling them is not easy. The way in which the orders are placed with the vendors in the hotel industry is not systematized to the extent of manufacturing industries. Thus keeping track and monitoring of the food inventories is not easy (Vivianne, et al., 2016). Another reason why logistics and supply chain management has not been seriously considered in the hotels is that the managers are not trained appropriately in logistics and supply chain management (Oelze, et al., 2014) (Alizadeh & Handfield, 2017). This has resulted in managers in hotels focusing only on functional skills as informally stated by managers during the hotel visits. In today's dynamic business environment in hotel industry, many of the manufacturing concepts have been successfully emulated in the hotel industries and logistics and supply chain management need to be practiced to greater extent as it has bearing on food wastage management (Odoom, 2012).

It is also indicated in the hypothesis testing that individual behaviour of customer has an influence on food wastage management. Actually speaking, hotel has very little control over the individual behaviour of the customer in connection to the food order and usage aspects. Research has indicated that usually guests order more than they actually need (Ali & Abdullah, 2012). Russell, et al., (2017) have associated food wastage to rationality principles. Singleton (2012) associates it to the individual mentality, so there are different perspectives to the individual behaviour in terms of food wastage. The point to be noted is that in this research it is indicated that the individual behaviour has significant influence on food wastage management and it is the responsibility of the hotel management to create awareness among the customers about the food wastage issues and how it would hinder mainly economic sustainability on the long run (Ali & Abdullah, 2012) (Graham-Rowe, 2015). Many hotels have pictorially created awareness through colourful means by displaying the do's and don'ts in terms of the food utilization. This kind of awareness creation can control the individual behaviour of the guests to some extent.

Food portioning has an impact on food wastage management (Williams & Walton, 2011) (Pirani & Arafat, 2016). Thus, serving food in small customized size can add to the food wastage management. Hotels need to work out strategies on deciding on the right portion for the different age groups. Children menus can be separate. Each of the food items may have a pre-fixed portioning based on experience. Refill option may be kept open, if necessary, but the portioning must be most appropriate. Some measures taken for porting of food by hotels include: standardizing the spoon size, maintaining different portion sizes for different age groups, offering average quantity of food and providing top up options, helping the customers in ordering the right portion, and offering doggy bags. The hotels may consider using the checklist for: maintaining consistent portion size, offering same item in different portions, offer average item quantity with top up option, present food creatively by cutting on quantity, offer to leave any ingredient such as salad, onions etc.

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