

Supply-Based Food Waste in the Food Service Industry: The case of Delish Restaurants

Sylvain Charlebois*

*Contact Author
Professor/Professeur Titulaire
Food Distribution and Policy/
Distribution et Politiques Agroalimentaires

Associate Dean/Vice Doyen

College of Management and Economics/
Collège en Management et Études Économiques

University of Guelph/Université de Guelph

Office of the Dean
MacKinnon Building, Room 900
University of Guelph | Guelph, ON N1G 2W1 | www.cme.uoguelph.ca
sylvain.charlebois@uoguelph.ca | 519-824-4120 Ext. 56808

Abstract

In terms of the challenge of sound resource management, the food service industry is facing increasing global competition, as are other industries. In particular, the issue of food waste has become a focal point in consumers' desire to buy and consume responsibly. The purpose of this study is to identify the key determinants of supply-based food waste in food service outlets. This case study focuses on Delish Restaurants¹, a well-known restaurant chain in Canada, and aims to provide a clear understanding of food service procurement, kitchen practices, cost management, risk mitigation, menu design and technical literacy needs in hospitality. Some recommendations to decrease waste and discussions for future studies are also provided.

¹ Fictional name.

Context

With the remarkable growth of the food service industry (Statistics Canada, 2013), the issue of food waste management has received increased attention, both in practice and in the scientific literature. Data suggests that this growth will continue (Canadian Chain Restaurant Industry Review, 2013), and as with any increase in the business sector, increased waste is inevitable. In the United States, it is estimated that 86 billion pounds of food was lost in 2008 due to waste, of which 19% was generated by the retail and food service industries (Buzby, Hyman, Stewart, Wells, 2011). In Canada, the management of waste alone cost of \$2.2 billion in 2009 (Gooch, Felfel, Marenick, 2010). Food waste arguably causes a significant financial loss for the entire industry; with improved management, this loss can be substantively decreased. Indeed, with operating profit margins falling to 4.2% in 2011 (Statistics Canada, 2011), the financial benefit of reducing food waste is apparent. It is possible and desirable for the food service industry to reduce food waste in order to optimize cost reduction and sustainability.

The issue of food waste has garnered considerable attention in recent years in the industry, as a variety of sources have highlighted the amount of usable food businesses in the industry throw away (Gustavsson, Cederberg, Sonesson, Otterdihk, Maybeck, 2011). Much of the research on food waste in the hospitality sector has been focused on consumer behavior and waste generated by portion sizes and product mixes (Bloom, 2010; Ferreira et al., 2013). To gain a competitive advantage in today's market, many operations in the sector have attempted to offer meals with which patrons can indulge and better appreciate their experience. Coupled with this phenomenon are consumer attitudes and behavioral intentions towards environmentally sustainable practices

in food service facilities which have been explored in the hospitality literature (Schubert et al., 2010).

Recent and significant changes in the global economy has gradually shifted the food industry's attention towards improving cost management practices, resulting in important changes in production. The buying process in the industry has developed models beyond the simple price comparing market operation. In particular, we are seeing a development along the lines of supply chain management, where the hospitality industry works with suppliers to improve quality. With an increased momentum in the industry came a renewed focus on house food waste collection.

Few researchers have taken into account procurement practices, kitchen management and menu design as potential contributing factors to food waste (Sonnino, McWilliams 2011). With the growing interest in research studies on food waste and utilitarian sustainable outcomes in the food service industry in mind, this current study aims to examine the practicality and application of a conceptual model in the casual-eating industry, through an examination of the several determinants outlined in the framework presented in this paper. A particular focus will be taken to the "back of house" production of food, which has largely been left unexplored in the literature. This study is primarily exploratory. Findings of this study can provide invaluable practical insights for food service operators, as well as current and future food and casual-eating restaurant managers and policymakers alike. Some limitations and future research avenues are also presented.

Food procurement practices

The food service industries at all levels require supplies and a variety of inputs to create culinary creations for consumers (Hua, Templeton, 2010). Food procurement practices are the first supply-based determinant in our model (Figure 1). An appropriate, purposeful supplier-focused industry relationship has become increasingly integral to the success of a food service business (Tan, Kannan, Handfield, Ghosh, 1999). In food service, the supplier is typically evaluated by the buyer on specific characteristics that directly apply to their work. These points include: product quality, timely delivery, the ability to support required volume, consistency of the products, and price (Tan, Lyman, Wisner, 2002). Over the years, the food service industry has established specific requirements that their suppliers must abide by, due to the specificity of their needs for delivered goods. Items being shipped must outlast logistical challenges, as well as arriving in good condition to the buyer. The ability of many chain restaurants to purchase in bulk quantities also gives them increased leverage when entering into additional supplier negotiations (Mawson, Fearn, 1997). Reluctance to change suppliers is significant in the sector, as there are always further risks introduced into the business, as a new supplier's reliability cannot be predicted (Sheth, 1973).

Figure 1

Cost management and risk mitigation

Inside food service establishments, strict government regulations define the conditions under which food can be kept. Cost management and risk mitigation within facilities are considered to

be a significant determinant in the proposed model. For food service facilities, regulations are typically monitored by municipalities (Restaurant and Food Service Inspection in Canada, 2014), and restaurants are subject to strict food safety standards and certification compliance policies. Methods undertaken to abide by food safe expectations within a kitchen vary, and are often determined by management. It is their function to establish reasonable control systems, including effective stock control such as proper rotation according to FIFO methods (Merrick, Jones, 1996). Unsound holding conditions for the food, whether prepared or ambient, can lead to premature spoilage. These problems are exacerbated when staff are not trained in on food safe practices (Rodrigues, Salay 2012).

A food service establishment may engage in preventative practices to anticipate costs before they occur. For example, the Cost of Quality (COQ) measures the costs of conforming to standards compared to the costs associated with deviance from those standards (Feigenbaum, 1991). Food service establishments are often accountable to strict standards related to consistency of the product and timeliness of the delivery to the guest (Alonso, O'Neill, Liu, O'Shea, 2013). Within a COQ analysis is the prevention, appraisal and failure (PAF) model, which is in wide use in the industry. Example of preventative costs include: recruiting of quality employees, quality audits, effective training, and equipment maintenance. Under appraisal or detection costs, inspection of products and continuous supplier verification can be included. Failure in any of these variables can be attributed to complaints, product recalls or lost sales originating outside of the organization. Failure may also find its source within the organization in the form of scrap, design changes, and downtime due to defects (Ramdeen, Santos, Chatfield, 2007).

Kitchen Management Practices

A food service establishment is also influenced by the standards set by the management of the organization. Kitchen management practices are another central focus of the model under evaluation in this case study. In a smaller setting, the attitudes of management are weighed more heavily by staff than the requirements mandated by the government and by the public (Wu, 2012). In addition, hygiene training is provided for by the management of an organization who may further dictate when training will occur (Seaman, Eves, 2010). Hygiene training is generally viewed positively by staff; however, once it has been completed there can be a lack of support for enforcement (Howells, Roberts, Shanklin, Pilling, Brannon, Barrett, 2008). Given that it is the staff that carries out the day to day activities, utilizing an appropriate staff selection technique will reduce the likelihood of food contamination (Medeiros, Cavalli, Proenca, 2012). A barrier to the application of hygiene training implementation is that staff may have ingrained negative habits that are not easily changed. Staff may also not view hygiene practices as important, therefore placing greater effort on other tasks at the expense of hygienic practices (McSwane, Robbins, 1994).

Communication between management and staff is also important for conveying the goals of an organization (Quinn, Fearman, Thompson, McGrath, 2003). When cost cutting measures are implemented, it can have deleterious effects on staff such as shortening of hours, resulting in less pay and wavering loyalty. Staff meetings can be used as a forum to communicate to employees the need to implement the cost cutting measure in question (Walker, 1944). Communicating with employees regarding cost cutting efforts can be critical, but how those messages are conveyed

are equally important (Lo, Cheung, Law, 2006). For example, this can come in the form of staff meetings during which the topic is properly addressed.

The relationship of trust between management and the staff is vital for a well-managed kitchen, as staff behavior can have a large effect on wastage (Gill, 2008). Moreover, job satisfaction has been found to lead to good employee performance in a hospitality setting (Brown, Mowen, Donovan, Licata, 2002). A greater satisfaction is also closely associated with organizational commitment; a satisfied employee will be more willing to carry out the goals of the organization in times when the normal flow of business can be compromised by unforeseen factors (Kim, Leong, Lee, 2005). In hospitality, increased staff commitment results in greater attendance, productivity and retention (McNeese-Smith, 1995). Involving staff as active participants in the process will encourage them to take greater ownership of daily activities. Consequently, as staff are the most familiar with the limitations of a facility, they are the most able to minimize waste occurrences (Tompkin, 1994). One method of involving staff in waste reduction practices is to use internal competitive schemes that make waste management a continued part of day to day operations (Gunders, 2012). Evidence suggests that a food service facility can significantly reduce food waste by making employees more accountable by means of reports and friendly competitions.

Inventory and Demand Management

The food service industry is inherently unpredictable insofar as minor factors can appreciably influence the number of incoming customers (Fine, 2009). Thus, inventory and demand management can be a challenge. Weather, local events, chronic disruptions like jobsites and

holidays may unexpectedly impact the demand for food (Gunders, 2012). With unexpected fluctuations in customers, prepared food may spoil before being eaten (Mackenzie, Cheung and Law, 2011) making inventory prediction and control difficult.

Poor selection of food items can lead to waste, as not all parts of the input can be utilized (Hyde, Smith, Smith, Henningsson, 2001). Often a chef will recombine left over materials to form the basis of other dishes, as is the case in specials, stocks and soups. Losses can occur during preparation when items are excessively trimmed (Kling, 1943). Poor holding temperatures, such as overheating of items, may lead to premature spoilage. Shortage of proper labour and equipment may also lead to mistakes, or the need for reworked material, resulting in waste (Youngs, Nobis, Town, 1983). Equipment is a major investment for an organization to make (Rodgers, 2005); unless it is maintained, however, equipment cannot be used appropriately (Shapton and Shapton, 1991).

A driver which sets up a restaurant for food waste is the current demand for large menus, which require increasing expansive inventories that result in unpopular items not being consumed before they spoil (Kantor, Lipton, Manchester, Oliveira, 1997). Outside pressures, such as seasonality, often require a business to change menus, thereby introducing new items into their inventory (Wenzel, 1979). Often seasonal menu items are not coded into computer tracked systems; therefore, they cannot be tracked with the systems (Chan, Au, 1998). What may first appear as food waste may actually be miss-tracking of items within the system. To avoid the problems of untracked items in inventory, establishments may employ activity-based costing methods to track the amount of inputs each dish requires (Vaughn, Raab, Nelson, 2010).

To increase accuracy of inventory management, Reynolds (1999) has proposed that proper rotation of in-house responsibility for conducting the physical inventory among appropriate staff members can make a food service facility more efficient. As such, knowledge and control of inventory would not be as centralized.

The size of portions have been increasing steadily over the past thirty years, meaning that the amount of uneaten food left on a plate has also been increasing (Bloom, 2010). Methods to control the size of portions can be implemented. However, variability across portion sizes can lead directly to food waste that cannot be easily accounted for (Drysdale, Galipeau, 2009).

The method of service to the consumer has a large impact on the magnitude of loss. Poor layout of a facility may hinder communication or transference of the food stuffs (Panisello, Quantick 2001). Proper communication between the consumer of the food and the kitchen will also prevent waste from occurring (Edwards, Edwards, Salmon, 2000)

Methodology

We chose an exploratory case-study design to guide our investigation on restaurants and food waste, based on Yin's (1994) argument that case studies are the preferred strategy when 'how' or 'why' questions are being posed, and when the focus is on a modern occurrence within a real-life context. Such a design is particularly appropriate for understanding the details and complexity of a phenomenon and its design (Stake, 1995). In our study, research data was collected through multiple points. A semi-structured questionnaire was designed and adopted to collect primary

data. The objective of the empirical segment is not to test the applicability of the existing approaches, but rather to study conceptual nuances related to the presented model.

A survey study was focused on formal interviews onsite, in two different food service facilities (Restaurant A and B). Interviews were conducted in February 2014. Comments were recorded comprehensively for supporting analysis. Respondents were interviewed separately, and represented key informants in a variety of functional areas in the kitchen; these individuals possessed sufficient experience and understanding of their operational role, the organization's culture and various strategic intents to enable communication with authorities. The interview questions were largely designed to be open-ended in order to provide flexibility in interview discussions. The interviews provided information on perceptions, application and experience of strategy in food waste management. The collected data was arranged, analyzed and inputted into the subsequent application phase. A draft version of the paper was submitted for review to the organization for internal validity (Yin 1994).

Findings

Our results are presented in Table 1. When considering food procurement, supplier relationships were found to not be significant for food waste prevention. Company wide agreements with specific suppliers prevented individual chefs from creating alterations in their ordering to prevent waste. Order shorting was a somewhat common occurrence.

“Sometimes there's things that are missing”, respondent at Restaurant A

However, shorting was not viewed as a significant contributing factor to food waste. Shorted items could be purchased through other avenues, but this process was more costly. Over and

under ripe produce were the most consistently cited issues with suppliers. Ripeness issues can be partially attributable to seasonality (Wenzel, 1979). Ripeness issues resulted in waste if the produce was too poor to be served, and was not identified by the receivers at the time of delivery. Issues arose during the receipt of supplies when under-trained employees were not able to identify poor produce, requiring Delish restaurants to assume the waste instead of returning produce to the supplier.

Type and extensiveness of training varied across individuals when considering cost management and risk mitigation. Employees who have been with the company for many years had received food safety training by the franchisee, while newer employees were not adequately trained. This may create some inconsistencies when managing food safety risks in the kitchen and in the vicinity. Food safety practices were implemented from reception of supplies, to deliver and to guest through temperature checks and regular line checks. Within the kitchen the first in first out method was used for rotation of produce. It was noted that the FIFO method is not strictly followed.

“Sometime people will grab the newer stuff before the older stuff. Then the older stuff gets thrown out.” respondent at Restaurant B

This behaviour was linked to rushing work during service. Standards for timeliness of delivery are used to ensure that the guest receives their food in a specific time frame. The timings cause some issues when components of a meal require differing amount of time to make. Lack of communication between the different sections that make the components can occasionally cause

waste. Examples cited where a salad is ordered with a steak, and the salad is made too early, resulting in a wilted, spoiled salad.

Table 1

Kitchen management practices were also evaluated. Food safe practices are initially supported by management, but support can taper away as time passes. The primary goals of management are of guest satisfaction, with food safe practices coming secondary. This is evident by the compulsory training of plating skills compared to sporadic food safe training. One employee noted:

“It’s all about making the guest happy.” respondent at Restaurant A

In addition, no daily waste prevention activities are required or supported by management. The relationship between management and employees is one of tension, as the kitchen is ultimately accountable for any issues. Staff will get “a stern talking to” should something go wrong. The relationship between staff members is also enmeshed through food waste through social learning. Employees become disheartened over time if wasteful activities by others are not addressed and punished by superiors. Employees who have been working for a decade or more are described as “not very happy”. One employee speculates:

“I think a lot of it has to do with the fact that that some have been there for 10-12 years, and they just don’t care anymore.” respondent at Restaurant B

This observation may suggest that employee retention may have a positive or negative impact on food waste. The cultural and social environment of each food service establishment appears to vary from one to another. It would also seem that institutional cultures tend to evolve over time. A restaurant which has been open for well over a decade may entrench methods of managing a kitchen and food waste, versus a relatively new restaurant. Restaurant B was open much earlier than Restaurant A.

Factors outside of the control of the restaurant such as weather and local events influences the number of guests at any given time. There is a lack of predictability in the required amount of food that needs to be prepped daily due to guest fluctuations. Waste is compounded when food is over prepped and menu design prevents food recycling into other dishes. Further compounding the menu problems is the popularity inequality between dishes. Unpopular dishes may be over-prepared on a snowy day with no guests, resulting in waste due to a lack of cross-utilization. Delish restaurants have a changing seasonal menu, which has had similar issues with the rest of the menu in terms of unpredictability. In the more recent seasonal menu, for example, the preparatory cook had difficulty in predicting prep levels.

“People didn’t like that [specific dish] at all, so that was hard to keep up with trying to find a happy medium of how much to make”, preparatory cook at Restaurant A

Most employees did not identify portion size as a large driver of waste. This conclusion conflicts somewhat with studies in this area (Kantor, Lipton, Manchester, Oliveira, 1997). If there was waste on a plate it is much more likely to be the starches, which are low cost items as opposed to high cost proteins. However, it was identified that a lack of consistency across portion sizes is a

source of waste. Many components of dishes are portioned to specific weights, such as 8oz for pasta, yet an employee remarked that:

“It depends on the person [who portioned the food]”, whether or not the portion was accurate. And that, “You have to watch some people, they think that they know what 8oz is and they put it in the bag. Compared to other people that actually have the scale there.” respondent in Restaurant A

Guest communication is mediated through the server to the kitchen. Disruption in this communication process causes waste. For example, burgers automatically are topped with mayo; should the server not communicate this to the guest who does not want mayo, the burger will need to be remade. Waste also occurs when staff misread their orders, or when they lack concentration while they are working.

Figure 2

Discussion

Theoretically, and based on the framework in Figure 1, some determinants are worthy of consideration. As suggested by Tan, et al. (1999), relationships with suppliers are important for better inventory practices. In this case, the relationship relies on one or two individuals who are mostly interacting on an informal basis. Tan, Lyman, Wisner (2002) also suggested that seasonality and weather could affect procurement practices; our findings do concur with such an observation.

The pressure of everyday business also seems to take its toll on how risks are properly mitigated within the facility. Internal mandates cost management methods were not overly influential on food waste reduction. This is consistent with some findings found in the literature (Merricks and Jones, 1996; Alonso, O'Neill, Liu and O'Shea, 2013). The data collected seem to suggest that managerial style in the kitchen matter, which is consistent with many passed studies in the field (Wu, 2012; Howells et al., 2008; Medeiros, Cavalli and Proenca, 2012; Quinn, Fearman, Thompson and McGrath, 2003; Lo, Cheung and Law, 2006; Walker, 1944; Gill, 2008). Both restaurants surveyed had differing approaches to food waste, and thus had different results.

Inventory control with menu changes seemed to have been a challenge at both locations. As mentioned by Gunders (2012), stock levels are challenging to manage when demand is unpredictable, particularly for new menu items, and so inventories were constantly in flux (Fine, 2009; Mackenzie, Cheung and Law, 2011; Kling, 1943; Youngs, Nobis and Town, 1983). The conventional approach to stock control in the two facilities was a "bottom up" process where stockholding charges are balanced against clerical purchasing costs for individual items or perhaps groups of items, given that the two restaurants were franchises and part of a purchasing group. Demand management practices can be found in other industries like the airline industry or even on cruise ships. Within the airline industry, for example, revenue management has a well-established track record of increasing profits and has played an fundamental role in strategic and tactical decision-making (Lee et al., 2011). Such a practice was not recognized during this study. This case demonstrated some discrepancies with current literature in the field. For instance, inefficient or misutilized equipment (Rodgers, 2005; Shapton and Shapton 1991) was not

measured as significant determinant of food waste. It was also concluded that kitchen design and layout were not significant contributing factors to food waste (Panisello and Quantick, 2001).

This study also has managerial implications for the hospitality industry. Effects of human resource practices on food waste management practices in back of the house were significantly underestimated at the beginning of this study. Through the interviews it became clear that the emphasis was more on the guest experience rather than preventing food waste. This opinion is projected onto the employees from the top down by corporate governance. The guest accepts the hierarchy of values by a lack of concern in food waste. Concern for the source of their meal superseded food waste. The main areas identified of waste in Delish restaurants could be easily avoided through more careful planning, and potentially saying no to a guest. As the guest does not pressure Delish to reduce their waste, there is no incentive. As a culture, having an enjoyable experience at a restaurant is held as more important than the costs sacrificed for that experience. The amount of food being thrown out is so high that this aspect should not be ignored.

There is a consistent misalignment of goals between the staff and management that appears to compound over time, resulting in more dissatisfied employees. Social learning appears to influence what an employee perceives the consequence of wasteful actions to be. Non-wasteful employees observe a lack of punishment of other employees who are overly wasteful. As a byproduct, non-wasteful employees see no benefit in the activities which prevent waste as it is not recognized or celebrated. As noted by one employee, this effect compounds over time to create a greater distance between management and staff. These findings have not been noted in

current literature and merit further exploration. Greater oversight by managers and accountability on behalf on wasteful employees may slow or stop this process from happening.

Methods of communication utilized by the management team to staff are fragmentary. Individual conversations between staff and management are used for sensitive subjects such as reprimands; however, this method is not always effective. As noted by one participant, multiple individual conversations about waste issues to an employee did not curb their wasteful habits. No other methods of communication were mentioned to be used to more effectively communicate reprimands, such as written documentation of problems or suspension. Further, group communication is rarely used. Sections of the back of house experience collective wasteful practices such as the over cooking of steaks. Due to the nature of shiftwork in kitchens, it is not possible to communicate to all employees of a certain section at one time. To communicate a message to all employees, the message must be repeated over several days when each employee is scheduled to work.

Strategies undertaken by management and chefs are reactive as opposed to proactive strategies. The reactive strategies are only able to identify waste a week after it has occurred through inventory checks. From this point it may be impossible to identify the cause of the waste in order to prevent it from happening in the future. In addition, attribution to the cause may be laid on the incorrect individual, which will further exacerbate the social learning of the staff as a whole. Proactive strategies undertaken before waste occurs are more effective. These strategies groom a team to be more effective, which is the goal of a chef. Proactive strategies can be included through more rigorous line checks, accountability for waste, and constant staff training.

However, these strategies are unlikely to be undertaken in this environment because it requires continual support from management. As the management focus is clearly on the guest, the strategies are unlikely to be maintained.

From a managerial perspective, this study has merit. Arguably, the restaurant industry has a cumulative impact on the environment, economy, and society as a whole. As more consumers in the Western world eat away from home, proper food management practices are desirable. Currently, few governments regulate or mandate measures to monitor restaurants' sustainability claims and waste management. As consumer expectations change, the onus falls on food operations to validate and inform patrons on practices behind the scenes. Culinary kitchens are often not visible or accessible for some customers, or even obscure for others. With increased concerns related to kitchen and procurement practices, restaurants may be compelled in the future to become more transparent about their back of the house operations, which for many have been isolated from dining areas.

Limitations

This research has its limitations, which present opportunities for future research. First, this case study is based on two case studies which have their weaknesses, especially in the reliability of data collection. In future, even though both restaurants had access to an earlier version of this case, a more structured analysis with performance indicators related to food waste would contribute to the internal validity of the study. The external validity of the proposed supply-based determinant framework would benefit from being empirically tested with a larger sample.

To expand on the latter point, there are still differences in how companies and researchers define and manage food waste. While demand-based determinants have been relatively well-explored in food waste research, social elements, especially in food service facilities, include a number of different viewpoints from social justice and working conditions to food safety and the personal and mental wellbeing of operatives. In future, research on multi-factorial factors that increase food waste back of the house could be investigated, and a more in-depth selection considered. Measuring food waste at the retail level, particularly in restaurants, is arguably very challenging. A clear and unambiguous definition of supply-based determinants of food waste in the food service sector may be required both for global companies and local caterers, when food waste is highlighted as a procurement or competitive criterion. Taken as a whole, the findings indicate that considerable empirical study of food waste management practices is still needed in the food service sector.

Finally, another limitation is that all the questions are open-ended, which may have led to difficulty by the respondents in correctly appreciating the problems, as there is no restriction for the respondent to answer the question. But respondents do have some boundaries, such as company margins and time limitation, all of which may have become a restraint to congregate effective information. This was something investigators were unable to fully appreciate.

Conclusion

In general, it must be noted that most of the literature on food waste management in casual-dining restaurants does not cover the key challenges found in the food industry. Most noticeable in the review is that there are very few studies in the literature that include food waste

management practices linked to distribution management. This area of interest within the hospitality industry has not been well developed in recent years and requires more attention. The current study provides evidence that links between determinants in the measured model exist. By examining various links among factors in the framework presented in this paper, future research may also highlight the longitudinal study. As mentioned before, it would be more appropriate to take up a bigger sample size so that practical limits could be avoided when assessing food waste. Further research would focus more on quantitative data, rather than subjective information on back of the house practices.

In conclusion, the implications of the findings of the exploratory study on food waste in two food service establishments vary. In this study, two restaurants are included in the sample on the basis that they are two identical franchises, one opening a few years before the other. Although both restaurants were not compared, our result suggests that food waste practices are influenced by the culture, values and society of national and external environment. If an organization keeps its food management practices in harmony with its organizational culture, the probability of its success should be very high.

Acknowledgements

We are grateful to Delish Restaurants for their contributions to this research project. We also want to thank them for their constructive comments and inputs on an early draft of this article.

References

- Advanced fst* (3rd edition ed.). (2011). Toronto: TrainCan.
- Alonso, A. D., O'Neill, M., Lui, Y., & O'Shea, M. (2013). Factors Driving Consumer Restaurant Choice: An Exploratory Study From the Southeastern United States. *Journal of Hospitality Marketing & Management*, 22(5), 547-567.
- Bloom, J. (2010). *American Wasteland: How America Throws Away Nearly Half of Its Food (and What We Can Do About It)*. Cambridge: Da Capo Press.
- Brown, T. J., Mowen, J. C., Donovan, D. T., & Licata, J. W. (2002). The customer orientation of service workers: personality trait effects on self- and supervisor performance ratings. *Journal of Marketing Research*, 39(1), 110.
- Canadian Food Inspection Agency. (n.d.). *Canadian Food Inspection Agency*. Retrieved October 9, 2013, from <http://www.inspection.gc.ca/eng/1297964599443/1297965645317>
- Canadian Chain Restaurant Industry Review (2013). *GE Capital Franchise Finance*. Viewed online October 2013 at: http://www.gecapital.ca/GECA_Document/2013_canadian_chain_restaurant_industry_review.pdf.
- Canadian Restaurant and Foodservices Association (2013). *Research*. Viewed online October 2013 at: <http://www.crfa.ca/research/>
- Chan, W., & Au, N. (1998). Profit Measurement of menu items: In Hong Kong's chinese restaurants. *Cornell Hotel and Restaurant Administration Quarterly*, 39(2), 70-75.
- Drysdale, J. A., & Galipeau, J. A. (2009). *Profitable menu planning: international edition*. (4th ed.). Upper Saddle River: Pearson.

- Edwards, John S.a., Audrey Edwards, and Julie A. Salmon. "Food service management in hospitals." *International Journal of Contemporary Hospitality Management* 12.4 (2000): 262-266. Print
- Feigenbaum, A. V. (1991). *Total Quality Control* (3rd Edition Review ed.). New York: McGraw-Hill.
- Ferreira, Manuela, Margarida Liz Martins, and Ada Rocha. "Food Waste as an Index of Foodservice Quality." *British Food Journal* 115.11 (2013): 1628-37.
- Fine, G. A. (2009). *Kitchens: the culture of restaurant work*. Berkeley: University of California Press.
- Gill, A. (2008). The role of trust in employee-manager relationship. *International Journal of Contemporary Hospitality Management*, 20(1), 98-103.
- Gunders, D. *Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*. Issue brief no. IP"12-06-B. Natural Resources Defense Council, Aug. 2012. Web. 5 Sept. 2013.
- Gustavsson, J., Cederberg, C., Sonesson, U., Otterdijk, R. v., & Meybeck, A. (2011). Global Losses and Food Waste - Extent, Causes and Prevention. *Food and Agriculture Organization of the United Nations, International Congress*, 1-15.
- Gooch, M., Felfel, A., Marenick, N. (2010). Food Waste in Canada: Opportunities to increase the competitiveness of Canada's agri-food sector, while simultaneously improving the environment. *Value Chain Management Centre; George Morris Centre*. Available online at: <http://vcm-international.com/wp-content/uploads/2013/04/Food-Waste-in-Canada-112410.pdf>

- Hedberg, C., Smith, S., Kirkland, E., Radke, V., Jones, T., & Selman, C. (2006). Systematic environmental evaluations to identify food safety differences between outbreak and nonoutbreak restaurants. *Journal of Food Protection*, 69(11), 2697-2702.
- Howells, A. D., Roberts, K. R., Shanklin, C. W., Pilling, V. K., Brannon, L. A., & Barrett, B. B. (2008). Restaurant employees' perceptions of barriers to three food safety practices. *Journal of the American Dietetic Association*, 108(8), 1345-1349.
- Hua, N., & Templeton, A. (2010). Forces driving the growth of the restaurant industry in the USA. *International Journal of Contemporary Hospitality Management*, 22(1), 56-68.
- Hyde, K., Smith, A., Smith, M., & Henningsson, S. (2001). The challenge of waste minimisation in the food and drink industry: a demonstration project in East Anglia, UK. *Journal of Cleaner Production*, 9(1), 57-64.
- Kantor, L., Lipton, K., Manchester, A., & Oliveira, V. (1997). Estimating and Addressing America's Food Losses. *USDA Food Review*, January-April, 2-12.
- Kim, W. G., Leong, J. K., & Lee, Y. (2005). Effects of service orientation on job satisfaction, organizational commitment, and intention of leaving in a casual dining chain restaurant. *International Journal of Hospitality Management*, 24(2), 171-193.
- Kling, W. (1943). Food Waste in Distribution and Use. *Journal of Farm Economics*, 25(4), 848-859.
- Lee, Seonah, et al. "Do You really Know Who Your Customers are?: A Study of US Retail Hotel Demand." *Journal of Revenue and Pricing Management* 10.1 (2011): 73-86.
- Lo, A., Cheung, C., & Law, R. (2006). The survival of hotels during disaster: A case study of Hong Kong in 2003. *Asia Pacific Journal of Tourism Research*, 11(1), 65-80.

- Mackenzie, M., Cheung, C., & Law, R. (2011). The Response of Hotels to Increasing Food Costs due to Food Shortages. *Asia Pacific Journal of Tourism Research*, 16(4), 395-416.
- Mawson, E., & Fearne, A. (1997). Organizational Buyer Behaviour: A Study of UK Restaurant Chains. *British Food Journal*, 99(7), 239-243.
- McNeese-Smith, D. (1995). Job satisfaction, productivity, and organizational commitment: The result of leadership. *Journal of Nursing Administration*, 25(9), 17-26.
- Medeiros, C., Cavalli, S., & Proenca, R. (2012). Human resources administration processes in commercial restaurant and food safety: The actions of administrators. *International Journal of Hospitality Management*, 31(3), 667-674.
- Merricks, P., & Jones, P. (1994). Designing control systems. *The management of foodservice operations* (pp. 107-126). London: Cassell.
- Panisello, P., & Quantick, P. (2001). Technical barriers to Hazard Analysis Critical Control Point (HACCP). *Food Control*, 12(3), 165-173.
- Ramdeen, C., Santos, J., & Chatfield, H. K. (2007). Measuring the cost of quality in hotel restaurant operations. *International Journal of Contemporary Hospitality Management*, 19(4), 286-295.
- Restaurant and Food Service Inspection in Canada. (2014, February 25). Canadian Food Inspection Agency. Retrieved March 5, 2014, from <http://www.inspection.gc.ca/food/information-for-consumers/report-a-concern/restaurants-and-food-services/eng/1323139279504/1323140830752>
- Reynolds, Dennis. "Inventory-Turnover Analysis: Its Importance for on-Site Food Service." *Cornell Hotel and Restaurant Administration Quarterly* 40.2 (1999): 54-8.

- Robbins, M., & McSwane, D. (1994). Sanitation doesn't cast, it pays: is it true and can we prove it?. *Journal of Environmental Health*, 57(5), 14.
- Rodgers, S. (2005). Applied research and education needs in food service management. *International Journal of Contemporary Hospitality Management*, 17(4), 302-314.
- Rodrigues, K., & Salay, E. (2012). Food safety control practices in in-house and outsourced foodservices and fresh vegetable suppliers. *Food Control*, 25(2), 767-772.
- Schubert, Franziska, et al. "Exploring Consumer Perceptions of Green Restaurants in the US." *Tourism and Hospitality Research* 10.4 (2010): 286-300.
- Seaman, P., & Eves, A. (2010). Perceptions of hygiene training amongst food handlers, managers and training providers - A qualitative study. *Food Control*, 21(7), 1037-1041.
- Shapton, D. A., & Shapton, N. F. (1991). *Principles and practices for the safe processing of food*. Cambridge: Woodhead Publishing Ltd..
- Sheth, J. N. (1973). A Model of Industrial Buyer Behaviour. *The Journal of Marketing*, 37(4), 50-56.
- Sonnino, R., & McWilliams, S. (2011). Food waste, catering practices and public procurement: A case study of hospital food systems in Wales. *Food Policy*, 36(6), 823-829.
- Stake, R. (1995). *The art of case research*. Thousand Oaks, CA: Sage Publications.
- Statistics Canada (2013). Food service and drinking places, December 2013. Viewed online October 2013 at <http://www.statcan.gc.ca/daily-quotidien/140227/dq140227e-eng.htm>.
- Tan, K. C., Kannan, V. R., Handfield, R. B., & Ghosh, S. (1999). Supply chain management: an empirical study of its impact on performance. *Internal Journals of Operations & Production Management*, 19(9-10), 1034.

- Tan, K. C., Lyman, S. B., & Wisner, J. D. (2002). Supply chain management: A strategic perspective. *International Journal of Operation & Production Management*, 22(6), 614-631.
- Tompkin, R. (1994). HACCP in the meat and poultry industry. *Food Control*, 5(3), 153-161.
- Vaughn, P., Raab, C., & Nelson, K. (2010). The application of activity-based costing to a support kitchen in a Las Vegas casino. *International Journal of Contemporary Hospitality Management*, 22(7), 1033-1047.
- Wenzel, G. L. (1979). *Wenzel's Menu Maker* (2nd ed.). Boston: CBI Publishing Company.
- Wu, S. (2012). Factors Influencing the Implementation of Food Safety Control Systems in Taiwanese International Tourist Hotels. *Food Control*, 28(2), 265-272.
- Yin, R. (1994). *Case study research: Design and methods* (2nd ed.). Beverly Hills, CA: Sage Publishing.
- Youngs, A., Nobis, G., & Town, P. (1983). Food waste from hotel and restaurant in the UK. *Waste Management & Research*, 1(4), 295-308.

Figure 1:
Supply-Based Food Waste Determinants in
Food Service Industry

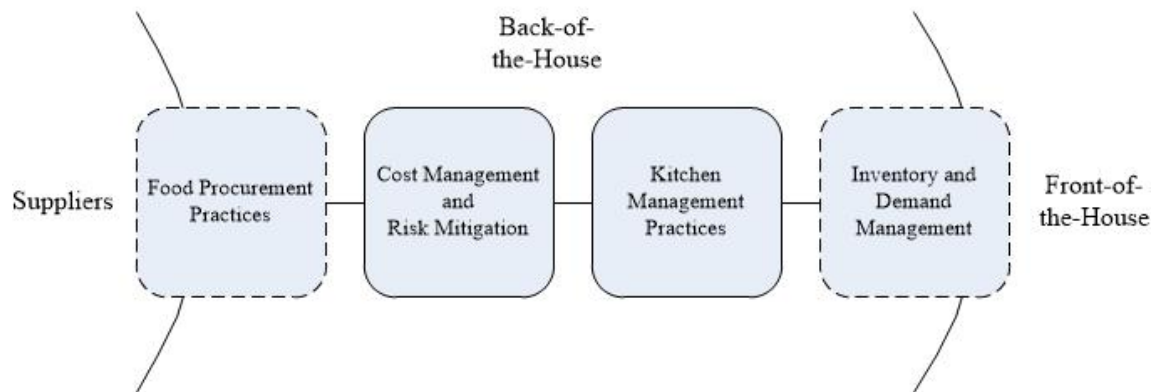


Table 1
Supply-Based Determinants for Food Waste in Restaurants

Antecedents	References	Observations
Food Procurement Practices	Tan, Kannan, Handfield and Ghosh, 1999; Mawson and Fearnle, 1997; Sheth, 1973. (Relationship with suppliers)	Relationship with suppliers is limited to delivery drivers exclusively Negotiation is not possible due to corporate agreements, limitation in substitution Limitation in what chef can achieve with no control over supplies
	Tan, Lyman and Wisner, 2002. (Physical attributes of supplies)	Timeliness of delivery is consistent barrier Weather conditions Shorting of orders common, though financially shorted items are not paid for Supply quality is dependent on seasonality Shorted items are replaced with store bought items to ensure quality for guest
Cost Management and Risk Mitigation	Rodrigues and Salay, 2012; Feigenbaum, 1991; Seaman and Eves, 2010. (Externally mandated cost management methods)	Staff training has inherent focus on plate presentation over food safety as food safe training occurs online No real detection on food safe compliance except when it affects the quality of food Quality audits performed casually, not rigorously Focus on taste and safety
	Merricks and Jones, 1996; Alonso, O'Neill, Liu and O'Shea, 2013. (Internally mandated cost management methods)	Delivery times cause potential waste in miscommunication FIFO method used, but abandoned in times of speed necessity Stock control systems are reactive and not proactive
Kitchen Management Practices	Wu, 2012; Howells et al., 2008; Medeiros, Cavalli and Proenca, 2012; Quinn, Fearman, Thompson and McGrath, 2003; Lo, Cheung and Law, 2006; Walker, 1944; Gill, 2008. (Managerial Relationship)	Food safe practices are initially supported by management and quickly abandoned unintentionally Staff receive message food safety not top priority Food waste not a factor in staff selection Communication through one on one conversations which allows people to miss the message Relationship between management and staff is dictated by personality of chef Relationship between chef and management is one of stress and conflict as chef is always accountable
	McSwane and Robbins, 1994; Brown, Mowen, Donovan and Licata, 2002; Kim, Leong and Lee, 2005; McNeese-Smith, 1995; Tompkin, 1994. (Bottom up relationships)	Mis-alignment between management goals and individual goals contribute Lack of accountability for staff in waste propagate idea that waste doesn't matter Goals of organization become less important the longer staff works there Staff only involved in reactive waste prevention Staff only involved in waste prevention when waste is assumed to be their fault No causative looks into the waste drivers
	Gunders, 2012. (Internal competitions)	No mention of competitions made or alternate ways to encourage employees to waste less
Menu Design and Customer Relationship	Gunders, 2012; Fine, 2009; Mackenzie, Cheung and Law, 2011; Kling, 1943; Youngs, Nobis and Town, 1983. (Stock Levels)	No clear method of predicting the number of guests per day beyond general weather and time of year Inventory levels in constant flux due to unpredictability Lack of recycling of items lead to direct waste, not perceived as significant by staff Poor handling unspoken cause of food waste, blamed on new employees but more likely to be older employees who don't care as much
	Rodgers, 2005; Shapton and Shapton 1991. (Equipment)	Equipment only minorly important to waste Was not a perceived large driver
	Kantor, Lipton, Manchester and Oliveira, 1997; Chan and Au, 1998. (Menu Specific)	Large variety in popularity of items, but all prep considered equally important Par levels may not be accurate due to varying popularity Seasonal menu increases unpredictability Seasonal menu well received by staff as it changes the same old menu
	Vaughn, Raab and Nelson, 2010; Bloom, 2010; Drysdale and Galipeau, 2009. (Portion size)	Portion size perceived to be slightly larger than normal Starches more likely to be uneaten than proteins Understanding that mis-portioning occurs yet is not checked Misportioning due to laziness and acknowledged by management and not reprimanded for
	Panisello and Quantick, 2001. (Kitchen layout)	Only a small influence
	Sonnino and McWilliams, 2011. (Guest communication)	Guest communication is mediated through servers Waste issues caused by server mistakes in their menu knowledge Potential resentment between FOH and BOH

Figure 2:
Sources of Food Waste:
Kitchen Management Practices

Sauté Station	Broil Station	Fry Station	Pantry Station
<ul style="list-style-type: none">• Overportioning when free hand• Extra Chopped items• Spoilage with split sauces• Burnt items• Cross-contamination	<ul style="list-style-type: none">• Overcooked high priced items• Mis-Communication of timings to serve• Improper temperature control	<ul style="list-style-type: none">• Overportioning items• Burnt items• Lack of cross-utilization• Ill-made items (Mistakes in mods)	<ul style="list-style-type: none">• Chopped lettuce• Spoiled items not used• Lack of cross-utilization of items• Frozen items (lettuce)• Items made too early