FOOD WASTE MANAGEMENT: 3R APPROACH IN SELECTED FAMILY–OWNED RESTAURANTS

Mario Immanuel
Crown Plaza Hotel
Alice Springs, Australia
Email: mario.immanuel@hotmail.com

Rafica Hartopo
Banyan Tree Hotels & Resorts
Ungasan, Bali, Indonesia
Email: rafica.hartopo@hotmail.com

Samuel PD Anantadjaya
School of Accounting, Faculty of Business Administration & Humanities,
Swiss German University, BSD City, Serpong, Tangerang, Indonesia
Email: ethan.eryn@gmail.com

Tommy Saroso
Pariwisata Advisory Services
Cilember, Bogor, Indonesia
Email: tommy438@indo.net.id

ABSTRACT

Food waste is an interesting area to evaluate. Studies by the United States Environmental Protection Agency ("USEPA") revealed that 34 million tons of food was wasted in 2010. Food waste has a direct impact to a country's economy, including environmental consequences. Substantial reduction in food waste may hold food price from increasing. For restaurants, savings on excessive food consumption means widening operating margins. At the same time, this reduces food waste. This issue is interesting to note real practices and understanding of food waste management. This study attempts to determine whether there is any correlation in application of food waste management through Reduce, Reuse, Recycle ("3Rs"), in achieving better business performance, helping the environment, and attaining community engagement.

This paper focuses on food waste management by analyzing 3Rs application in selected family restaurants. Thus, the methodologies used were quantitative and qualitative methods. It was found out that the implementation of food waste management through 3Rs method was correlated with benefits. In addition, it was revealed that the awareness level of people who work in food and beverage industry, especially restaurants' operators, tended to be low in facing the food waste management issue. In conclusion, knowledge and education about food waste management method application to maintain environmental cleanliness is valued greatly and essential, starting with a restaurant's owner and all other key personnel. If each individual is about to be given information and educated diligently and consistently practice, it will surely bring good impact both toward business, people, and environment.

Keywords: food waste, reduce, reuse, recycle, and restaurant.

ABSTRACT

Sisa makanan merupakan topik yang menarik untuk dibahas. Penelitian yang dilakukan oleh United States Environmental Protection Agency ("USEPA") mengungkapkan bahwa ada 34 juta ton makanan sisa yang dibuang di tahun 2010. Sisa makanan yang dibuang memberikan pengaruh kepada ekonomi sebuah negara,

termasuk konsekuensi lingkungan. Pengurangan sisa makanan yang dibuang dapat memberikan pengaruh terhadap naiknya harga makanan. Untuk restoran, penghematan yang dapat dilakukan atas konsumsi makanan akan berdampak kepada marjin operasional yang akan membengkak pula. Pada saat yang sama, jika hal ini dilakukan, maka akan dapat mengurangi pembuangan sisa makanan. Topik ini menjadi menarik untuk dibahas karena untuk mengetahui praktik nyata yang terjadi sekaligus mengerti tentang penanganan dari sisa makanan. Penelitian ini berupaya untuk mengetahui apakah ada korelasi yang terjadi antara penanganan sisa makanan melalui Reduce, Reuse, Recycle ("3Rs") dalam upaya untuk mencapai kinerja organisasi yang lebih baik, membantu pelestarian lingkungan, dan melakukan pengabdian masyarakat.

Penelitian ini mengambil fokus dari sudut pandang penanganan sisa makanan, dengan melakukan analisa 3R di beberapa restoran milik keluarga/perorangan. Metode penelitian yang digunakan adalah kuantitatif dan kualitatif. Hasil penelitian menunjukkan bahwa penerapan penanganan sisa makanan via metode 3R memilki korelasi dengan manfaat. Disamping itu, ditemukan juga bahwa tingkat kesadaran para pekerja di bidang industry makanan dan minuman, khususnya restoran, cenderung rendah dalam upaya penanganan isu sisa makanan yang terbuang ini. Kesimpulan yang dapat dicapai adalah bahwa pengetahuan dan pendidikan tentang penanganan sisa makanan untuk menjaga kelestarian lingkungan memang diperlukan, mulai dari pemilik restoran sampai kepada para pekerjanya. Kalau setiap individu sudah mengetahui dan mengerti, serta menjalankannya dengan baik, maka akan memberikan dampak positif terhadap organisasi, masyarakat, dan lingkungan.

Kata Kunci: sisa makanan, reduce, reuse, recycle, dan restoran.

I. INTRODUCTION

Economy contributes to major significant impacts to a country (Arieff, et al, 2010). Economy influences to the number of businesses in countries, the relationship among the related countries, and the most important are the social life improvement, consequently affecting the standard of living in the countries (World Savvy, 2011).

As one of the economic sectors, food service industry is also facing economy issues. The increasing number of restaurants gives more alternative option for customers. According to escalation in freedom of choice, the people lifestyles are changed. People tend to have greater frequency on eating-out behavior (Stewart, 2006). Therefore, these restaurants have to compete with each other in order to impress the customers as the customer become more and more demanding and sophisticated. This is vital issue to attain better revenue.

Despite of the better business development and its contribution to the nation's revenue, there is also a major significant problem that has happened, which is the waste. The waste, including the amount of food waste is staggering in the global scale. Current research by United States Environmental Protection Agency (USEPA) in USA year 2010 concludes that more than 34 million tons of food wastes were generated. Food waste contributes for almost 14 percent of the total municipal solid waste, and less than three percent of which was recovered and recycle in 2010. The food waste nowadays is the single largest component of municipal solid waste ending in landfills and incinerators (USEPA, 2012).

Moreover, the Swedish Institute for Food and Biotechnology (SIK) study on year 2011 estimated that the globally one third of the total food loss and waste are the edible parts of food produced for human consumption (Gustavsson, 2011). These particular foods are considered as the wasted due to the quality standards, which reject food items not perfect in shape or appearance (Gustavsson, 2011).

Likewise, food waste should be handled and organized as soon as possible to prevent a rise in food price. In instance according to the supply and demand theory, if the demand of certain food items is high, it may lead to increase that particular food's price and value (Perner, 2008; Adam, 2010). On the other side, if the food waste level is low, it will definitely affect to the number of raw materials (food) to be purchased by the supplier. Thus, the market price will be decrease (Perner, 2008; Adam, 2010). However, there are not many studies regarding of this issue in Indonesia, famous for unique and enjoyable culinary selections. The lack of knowledge and consideration for managing food waste is not seen as necessary for most restaurants and the customers. However, there are restaurants that have implemented a popular method of food waste management through Reduce, Reuse, and Recycle – The 3Rs, without realizing that these methods are part of the food waste management.

3Rs may be implemented in no time; one might say it is not difficult in its realization as it is user-friendly (LeanPath, 2008). Consequently all level of personnel in food industry could do this method on daily basis. Customer or non-food industry people could also use these methods. Therefore, by raising the awareness among the personnel in charge in the food service establishments and the customers, will lead to a better understanding and self-awareness to minimize and prevent the food waste (Gustavsson, 2011). Moreover, the emergence of Corporate Social Responsibility issue is now perceived as one of the main ethics values in present global business. Therefore, consideration and implementation of 3Rs in the food service industry will lead to the companies' distribution to social responsibility. Thus it has motivated the author to conduct further research about 3R application in restaurant with two purposes, first is to see how far the restaurant concern toward food waste management issue, and obviously to increase 3R application in restaurant. The reason is to give significance contribution for restaurant industry.

The ironic consideration that the amount of food being wasted everyday is enormous while in other parts of the world many still suffer from famine and food shortage. In conclusion, this describes the importance to conduct the research regarding food waste management in order to get better understanding about the well-performed yet responsible business for the environment.

II. LITERATURE STUDY

Food waste issues are important because the growth and development is in constant motion and in linear position with economic growth and increase of population in countries. Ironically the majority of people will choose what they want to eat and discarded food that is unwanted without further consideration. Mean while on the other side of the world, there are still many people who are suffered from the shortage supply of food.

Table 1: Indonesia Waste 2008

Area (island)	Total Waste (1.000 tons)
Sumatera	8.7
Java	21.2
Bali and Nusa Tenggara	1.3
Kalimantan	2.3
Sulawesi, Maluku and Papua	5.0
Total	38.50

Source: Damanhuri, et al, 2010

Table 2: Indonesian's Waste Composition

Waste Classification	Weight (%)	Volume (%)
Pulps and chemicals	32.98	62.61
Woods and timbers	0.38	0.15
Plastic, Leather, and Rubber products	6.84	9.06
Textiles	6.36	5.1
Glasses	16.06	5.31
Metals	10.74	9.12
Stones and Sands	0.26	0.07
Organic Waste	26.38	8.58

Source: Damanhuri and Padmi, 2010

II.1. FOOD WASTE DEFINITION AND SOURCES

A study by the Swedish Institute for Food and Biotechnology (SIK), on behalf of the Food and Agriculture Organization of the United Nations (FAO) defined food waste as food loss occurring during the retail and final consumption stages due to the behavior of retailers and consumers, that is throwing away of food. Food waste is different/distinguished with the food loss, which measures decrease in edible food mass, excluding inedible parts and seed, which are lost at production, postharvest and processing stages (FAOSTAT, 2009). Food waste is defined as any food substance, raw or cooked, which is discarded, or intended, or required to be discard (FAOSTAT, 2009). Food wastes are organic residues generated by handling, storage, sales, preparation (including purchasing/procurement), cooking, and serving of foods.

Food waste is generated from many sources, consisting of: food manufacturing and processing facilities, including farms, supermarkets, institutions, (schools, prisons, hospitals, restaurants, food courts), and households. Restaurants as food service establishments are also responsible for the food waste management. In this era of globalization, restaurants are struggling to cut their costs while competing with each other to attain better revenue. In fact, restaurants can do a lot to minimize the potential cost increases by incorporating simple recycling and waste reduction programs and procedures (Hanning and Rickel, 2009). This will help both to save the business and prolong the life of landfill, valuable energy, and natural resources. Besides, restaurants may help the consumer to be aware of and more willing to embrace solutions to environmental challenges we face today. Therefore, it will construct a better economic and in environmental sense for the restaurants to follows.

Foodservice waste is categorized into 3 main aspects (solid waste types), which consist of:

1. Food waste, consisting of:
   - Pre-consumer waste, defined as food waste discarded by staff within the control of foodservice operator or considered as the food prep waste, including all waste in the back of the house, overproduction, trim waste, expiration, spoilage, overcooked items, contaminated items, and dropped items. In addition, it is also includes waste related to the front of the house that has remained under the control and supervision of the food-service operator, such as salad bars, steam wells, self-serve deli stations, miss-ordered products (i.e. steak, when the waiter/waitress write down the order for a steak to be cooked on medium instead of writing the correct one the waiter/waitress mistakenly note is as well done/medium well), expired grab and go items (take-a-way

service, in example: muffin). Leftover catering items would be categorized as the post-consumer waste if it remained on the catering line and have not been received by an individual customer. If an item has been sold or served to a customer and is then discarded, it is considered as the post-consumer waste. Pre-consumer waste offers opportunities for waste reduction and cost savings (LeanPath, 2008).

- Post-consumer waste, explained as the food waste discarded by customers/guests after the food has been sold or served. This waste is sometimes referred to as plate waste or table scraps and the decision to discard it (or leave the food on the plate) is made by the consumer rather than the foodservice operator. Postconsumer food waste can be reduced through the better portioning standard and awareness program (such as displaying portrait of near to death children in Africa that suffer from famine).

- Packaging waste, consisting of inbound supply chain waste, which refers to palettes, cans, cartons, plastic wrap and other material used to package supplies and food. Other consideration of packaging waste is waste associated with packaging and serving food to the guests. Common wastes items are clamshells, hot and cold cups, and disposable trays.

2. Operating supplies, consisting both the restaurant's:
   - Front of house Departments, which is considered the operating supplies that are used for the server has the high contact with the guests and the operating supplies used by the guests. Consisting of napkins, disposable cutlery, portion-controlled condiments, table linen, chair covered, doilies, paper coaster, and etcetera.

   - Back of the house Departments, which are associated to the operating supplies that used for the ones who work at the culinary side, who mostly have less contact with the guests, consisting of towels and rags, expired seasoning, tissue paper.

II.2. FOOD WASTE MANAGEMENT METHOD THROUGH 3R

Food waste and other organic waste disposed of in landfills generate greenhouse gas emissions that are more hazardous than CO_2. Therefore, it is very important to conduct further and in-depth research about the food waste management regarding to reduce odors and pests, to improve workplace efficiency, and to improve environmental performance.

In terms of waste hierarchy (LeanPath, 2008), 3R is vital to attain the success of food waste management. This is further explanation of the approaches, starting with the most beneficial and moving to the least attractive to foodservice industries.

II.2.1. REDUCING FOOD WASTE

Food reduction is considered as the most powerful and effective dimension that business can do to manage waste. Usually this is the first step in managing food waste. By designing systems and policies to prevent, minimize, or avoid waste in the first place, business have opportunity to save food and labor cost while making the largest positive impact on environment. When business prevents waste, it is not spending money on raw materials that would otherwise go in the garbage. At the same time, business is saving money on labor cost and cost associated with handling or processing these materials.

Reducing food waste and other sources of waste significantly reduces environmental impact and saves more money.

II.2.2. REUSE FOOD WASTE

Reusing the food waste is considered to obtain value from an item that would otherwise be wasted. In foodservice, the most common reuse opportunities involve redeploying overproduced foods and also donate it to a food recovery program and other charity.

II.2.3. RECYCLE FOOD WASTE

Recycling is defined as using the used materials (waste) to process it into new products to prevent waste of potentially useful materials (Kaewkuekool and Laemlaksakul, 2007). Thus, the research found that by recycling or composting the diverted waste from the landfill or elsewhere in the solid waste stream, it will be beneficial to ongoing value when the item is converted into something useful. If the food wastes are no longer edible, the company may sold (or donated) the food waste to the commercial composting company, that will combine these wastes with other organic material to make a soil amendment (Macy, 2008). Furthermore, there are specialized recycling services that are available for materials like grease, cooking oil, and butcher scraps.

II.3. BENEFITS OF FOOD WASTE MANAGEMENT METHOD

II.3.1. IMPROVING BUSINESS PERFORMANCE

Business performance is defined as the degree to which a goal/feat is being or has been accomplished, the return provided by an investment, and satisfying both the owners and customer's obligation (Mifflin, 2010).

- Increase in Sales
  The most basic measurement in calculating the success of restaurants' business performance is the increase in sales (Suttle, 2008). Furthermore, by measuring the sales per head. Sales per head are calculated by dividing the total sales in dollars by the number of customers. Restaurant usually calculates the sales per head at different period during the day (per meal period, and/or per working-shift). Restaurants also track the sales per head each week or month, looking for various positive or negative trends. For example, sales per head trend downward when a restaurant runs discount.

- Increase number of customers
  Number of customers combines the trust of the business' product and services and the relationship created by the business and its previous customers. Customers are willing to purchase on one's product/services based on its previous experiences and the power of advocates, which related to the most promotional tools to the market without spending any cost. By reviewing the number of customers who returns to spend money for the business, it measures the success of the business.

- Increase in customer satisfaction
  Customer satisfaction is another key performance indicator for restaurants (Suttle, 2008). Restaurant companies usually like to measure the key elements of the property, consisting of food quality, hospitality, speed of service, and cleanliness. The usage of mystery guest might evaluate the restaurant based on by measuring the total quality experiences. Restaurant managers may also pass out surveys in the dining area for

customer satisfaction feedback. Decline in customer satisfaction may impact profitability and market share.

- Increase in advertising response rates.
  Most restaurants keep track of advertising expenditures and return on investment. For example, for the promotion and marketing tools, some restaurants use the coupons in magazines that are distributed to residences in the according area. The restaurants will usually keep track of the number of customers who use these coupons. Subsequently, the restaurant owner will determine if the coupon advertisement generate enough sales to justify running additional advertising.

- Increase in employee productivity
  No matter how delicious the food or generous the cocktails, abrasive or flaky servers and bartender can botch the whole dining experience. Treat the good ones well and they might stick around. If the restaurant managers do not take care of their employees, the employees will not take care of the business. It could be observed through the level of employee turnover and their job performance.

II.3.2. HELP THE ENVIRONMENT

Environment includes the elements, factors, and conditions that have some impact on growth and development of certain organism (Haluzan, 2009). Environment includes both biotic and abiotic factors that have influence on the organism. Abiotic factors consisting of light, temperature, water, and gases while biotic factors include all surrounding living species. Therefore, would help to create more sustainable environment for organism to adapt more easily. The indicators of help the environment consisting of:

- People are the most influencing aspect for the environment. People act as guardians and managers of the environment in which they live. On other hand people also could become destroyers of the environment caused by their greed in exploiting the environment in an aggressive way.

- Animals and plants are important and act as agent of balance for the environment itself. For example, plants may help to reduce the chances of flood and animals such as worm may help soil to become fertile. Animal and plant is irreplaceable thus without it environment would be collapsed

- A sustainable environment is an environment in which all of the plants, animals, and other forms of life in the particular environment are able to exist in the ecosystem without any help or disturbance from outside. This can be compared to a self-sufficient community. In this case, nothing is needed that exists outside of the ecosystem, in example; the budding towns in developing countries strive to become self-sufficient. Additionally, adequate quantities of food, water, shelter, and space should exist for at least one population of organism in order to be labeled as sustainable environment. Despite of there are certain types of creatures that may live in extremely hot or cold climates, most of the other creatures will not be survive in that particular extreme climate. Therefore, to sustain, the environment needs to be able to support at least one species.

II.3.3. ATTAIN COMMUNITY ENGAGEMENT

Strong communities are defined as those endowed with social, economic, and

environmental assets and organizational structures that work towards their sustainable use and equitable distribution (Gottlieb, 2005). Community engagement is defined as the process of building relationships with community members who has work and will work together as partner, building the strategy and working together to create the community better place to live (Gottlieb, 2005). Community engagement can be seen to arise from the following aspects:

- Activities and programs regarding to create better living environments,
- Good local services and facilities,
- Pleasant local people (community) and environments,
- Opportunities to participate in environment/social activities.

III. METHODOLOGY

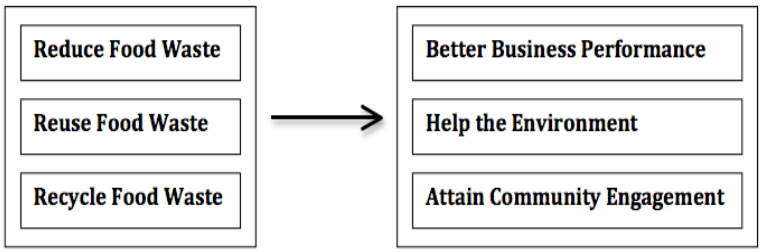
In this research the non-probability, cluster-convenience sampling method is used to evaluate the implementation of food waste management through 3Rs method in family-owned restaurants.

This research conducted by gathering data from primary sources through questionnaires and interviews in family-owned restaurants, while secondary data were taken from the previous related research and supporting literatures. Both quantitative and qualitative analyses being used based on questionnaire. The quantitative approach used to present statistical results pertinent to this study, while the qualitative research used to conclude the deep understanding about the brand loyalty behavior in hotels. Therefore, it is expected that this studies would bring significances both family-owned restaurants and the restaurants industry.

III.1. RESEARCH MODEL

The research model in this study is as illustrated in the following diagram. The diagram illustrates the correlation of food waste management through 3Rs method to possibly attain the benefits stated in the literatures. In addition, it is expected that restaurants' awareness of food waste management are low, since most of the restaurants did not know if they have implemented some of 3Rs approach.

Figure 1: Research Model



III.2. RESEARCH DESIGN AND IMPLEMENTATION

Research was initially conducted by gathering data from primary sources in family-owned restaurants, which located in Tangerang Selatan. The respondents to fulfill this research were 36 respondents, who are currently working in according restaurants in the position as: Restaurant Managers, Supervisors, Team Leaders, Head/Executive Chef, Sous Chef, Chef de Partie, Dishwasher and Logistic, and Storekeeper and Inventory. Respondents were distributed a set of questionnaires consisting of 20-questions regarding to food waste management through 3Rs method and the benefit attained. In consideration, to conduct a

deep study of this research, the 3 respondents, which consist of the restaurant's owners, had been interviewed. The total 8-interview questions are to evaluate the 3Rs methods and restaurants awareness. All respondents are chosen due to previous acquaintances during prior studies. The preliminary statistical analyses were evaluated for 5 respondents through comparison between the filled questionnaires to the normal answers based on the researcher's perceptions and field study to the establishment. The post and data analyses were processed with Pearson Correlation Analysis, by using SPSS.

IV. DATA ANALYSIS

With a total of 36 respondents, all 100% of those respondents are located in Tangerang Selatan and working within these three restaurants during period of April 2012. The respondents' characteristics based on the questionnaires, were as follows;

- From the total of 36 respondents, 31 of them were male and 5 of them were female.
- From the total of 36 respondents, 4 of them were 21 years and below, 25 of them were between 21 and 35 years, 6 of them were between 31 and 40 years, and 1 respondent were 41 years and above.
- From the total of 36 respondents, 8 of were in Junior High School level, 25 of them were in Senior High School level, 3 of them were in D1-D3 level, and no respondents were in D4 and Bachelor (S1) level.
- From the total of 36 respondents, 12 people were working in Front Area, 16 people were working in Kitchen/Culinary Area, 5 people were working in Logistic, focusing on Steward and Dishwasher, and 3 people were working in Store and Inventory Sections.
- From the total of 36 respondents, 12 of them have worked below 1 year, 16 of them have worked between 1 and 2 years, 5 of them have worked between 2 and 3 years, and 3 of them have worked for more than 3 years.

IV.1. DESCRIPTIVE ANALYSIS

Preliminary data collection was gathered from a total of 36 questionnaires. Furthermore, post-testing steps followed preliminary testing. The following table provides the case-processing summary, which indicates that all 36 data is considered valid.

Table 3: Case Processing Summary - Validity Test

		N	%
Cases	Valid	36	100.0
	Excluded[a]	0	.0
	Total	36	100.0

[a] Listwise deletion based on all variables in the procedure.

Source: SPSS

Based on the general results of validity of the 36 data incorporated in this study, an analysis of variance is used to evaluate whether or not two or more independent population have the same averages. The following table shows the results on ANOVA.

Table 4: Analysis of Variance (ANOVA)

				Sum of Squares	df	Mean Square	F	Sig.
Q1	Between Groups	(Combined)		4.582	9	.509	1.244	.312
		Linear Term	Weighted	1.930	1	1.930	4.715	.039

				Sum of Squares	df	Mean Square	F	Sig.
			Deviation	2.652	8	.331	.810	.600
	Within Groups			10.640	26	.409		
	Total			15.222	35			
Q2	Between Groups	(Combined)		3.553	9	.395	1.384	.246
		Linear Term	Weighted	1.009	1	1.009	3.536	.071
			Deviation	2.544	8	.318	1.114	.386
	Within Groups			7.419	26	.285		
	Total			10.972	35			
Q3	Between Groups	(Combined)		5.550	9	.617	1.534	.188
		Linear Term	Weighted	.233	1	.233	.578	.454
			Deviation	5.317	8	.665	1.654	.158
	Within Groups			10.450	26	.402		
	Total			16.000	35			
Q4	Between Groups	(Combined)		6.617	9	.735	1.243	.313
		Linear Term	Weighted	1.371	1	1.371	2.318	.140
			Deviation	5.245	8	.656	1.108	.390
	Within Groups			15.383	26	.592		
	Total			22.000	35			
Q5	Between Groups	(Combined)		4.320	9	.480	1.103	.395
		Linear Term	Weighted	.206	1	.206	.472	.498
			Deviation	4.114	8	.514	1.181	.347
	Within Groups			11.319	26	.435		
	Total			15.639	35			
Q6	Between Groups	(Combined)		7.452	9	.828	.843	.585
		Linear Term	Weighted	1.994	1	1.994	2.029	.166
			Deviation	5.458	8	.682	.694	.693
	Within Groups			25.548	26	.983		
	Total			33.000	35			
Q7	Between Groups	(Combined)		8.496	9	.944	1.411	.234
		Linear Term	Weighted	1.240	1	1.240	1.854	.185
			Deviation	7.256	8	.907	1.356	.261
	Within Groups			17.393	26	.669		
	Total			25.889	35			
Q8	Between Groups	(Combined)		8.629	9	.959	.787	.630
		Linear Term	Weighted	1.914	1	1.914	1.571	.221

				Sum of Squares	df	Mean Square	F	Sig.
			Deviation	6.716	8	.839	.689	.697
	Within Groups			31.676	26	1.218		
	Total			40.306	35			
Q9	Between Groups	(Combined)		2.248	9	.250	.514	.851
		Linear Term	Weighted	.609	1	.609	1.254	.273
			Deviation	1.639	8	.205	.421	.898
	Within Groups			12.640	26	.486		
	Total			14.889	35			
Q10	Between Groups	(Combined)		9.131	9	1.015	2.673	.024
		Linear Term	Weighted	2.193	1	2.193	5.778	.024
			Deviation	6.938	8	.867	2.285	.053
	Within Groups			9.869	26	.380		
	Total			19.000	35			
Q11	Between Groups	(Combined)		7.625	9	.847	1.941	.090
		Linear Term	Weighted	.093	1	.093	.212	.649
			Deviation	7.532	8	.942	2.157	.066
	Within Groups			11.348	26	.436		
	Total			18.972	35			

Source: SPSS

The next step of ANOVA is to analyze the data homogeneity in the attempt to measure variance similarities between at least two distributions. In this study, the homogeneity analysis is verified based on Levene Statistic Test, whereby it is challenging the basic assumption of ANOVA that all formed group should have the same variance. Hence, it is confirmed to have the same variance, homogeneity test is said to be satisfactory fulfilled (Muhidin, 2007: 84). The underlying hypothetical tests concerning data homogeneity are;

H_0 : All populations' variances are expected to be same.

H_1 : All populations' variances are expected to be different.

The parameters should be following commonly accepted guidelines, H_0 should be rejected when the probability (or the significant level) is less than 0.05, and otherwise the hypothesis should not be rejected. Based of decision making are, if probability > 0,05, thus H_0 accepted and if probability < 0,05, Thus H_0 rejected. Referring to the following table, questions 1, 2, 3, 4, 6, 7, 8, and 9 confirm the queries on hypotheses, with the level of significance lower than 0.05. With such lower significance, the null hypotheses are not rejected.

Table 5: Test of Homogenity of Variance 0.05

	Topics of Questions	Levene Statistic	df1	df2	Sig.
Q1	Reducing Food Waste	1.779(a)	6	26	.143

	Topics of Questions	Levene Statistic	df1	df2	Sig.
Q2		1.127(b)	6	26	.374
Q3		2.062(c)	6	26	.093
Q4		1.865(d)	6	26	.125
Q5	Reusing Food Waste	3.435(e)	6	26	.012
Q6		.662(f)	6	26	.681
Q7		2.424(g)	6	26	.054
Q8		2.021(h)	6	26	.099
Q9	Recycling Food Waste	1.155(i)	6	26	.360
Q10		3.049(j)	6	26	.022
Q11		4.565(k)	6	26	.003

Source: SPSS

Though descriptive statistics may not able to address any of the hypothesis tests, however, such statistics may provide an importance glimpse on the general overview of data characteristics such as; minimum, maximum, mean, the standard error, skewness, and kurtosis level on each of the data. From the list of descriptive statistics, as shown in the following table, it is apparent that the data is considered normal since the ratios between skewness and kurtosis do not violate the common guidelines of -2 to +2 (Muhidin, 2007: 84).

Table 6: Descriptive Statistics

	N Stat	Min Stat	Max Stat.	Mean Stat.	Std Dev	Variance	Skewness Stat	Std. Error	Kurtosis Stat	Std. Error
Q1	36	2.00	4.00	3.2778	.65949	.435	-.365	.393	-.661	.768
Q2	36	2.00	4.00	3.4722	.55990	.313	-.402	.393	-.880	.768
Q3	36	2.00	4.00	3.3333	.67612	.457	-.522	.393	-.678	.768
Q4	36	1.00	4.00	3.3333	.79282	.629	-1.052	.393	.674	.768
Q5	36	2.00	4.00	3.1944	.66845	.447	-.242	.393	-.683	.768
Q6	36	1.00	4.00	2.1667	.97101	.943	.441	.393	-.697	.768
Q7	36	1.00	4.00	2.0556	.86005	.740	.175	.393	-1.000	.768
Q8	36	1.00	4.00	2.6389	1.07312	1.152	-.236	.393	-1.154	.768
Q9	36	1.00	3.00	1.5556	.65222	.425	.765	.393	-.386	.768
Q10	36	1.00	3.00	1.8333	.73679	.543	.277	.393	-1.060	.768
Q11	36	2.00	4.00	3.5278	.73625	.542	-1.238	.393	.070	.768
Q12	36	2.00	4.00	3.5556	.60684	.368	-1.036	.393	.154	.768
Q13	36	3.00	4.00	3.7500	.43916	.193	-1.206	.393	-.582	.768
Q14	36	3.00	4.00	3.6944	.46718	.218	-.881	.393	-1.299	.768
Q15	36	2.00	4.00	3.6111	.54917	.302	-1.017	.393	.057	.768
Q16	36	1.00	4.00	3.2778	.84890	.721	-1.176	.393	1.071	.768
Q17	36	1.00	4.00	2.5833	.80623	.650	-.113	.393	-.309	.768
Q18	36	1.00	4.00	2.1111	.85449	.730	.651	.393	.169	.768
Q19	36	1.00	4.00	1.7778	.72155	.521	.849	.393	1.215	.768
Q20	36	1.00	4.00	2.7222	.94449	.892	-.043	.393	-.974	.768

Valid N (listwise) 36

Source: SPSS

IV.2. PEARSON CORRELATION ANALYSIS

Correlation analysis reflects how significant does a variable correlate with another

variable. The result should be between -1 (which denotes an inverse correlation), and +1 (which implies positive correlation). This evaluated whereby one variable increases since another is also increase.

Table 7 (1): Pearson Correlation Analysis

Correlations		Q17	Q20
Q1	Pearson Correlation	0.33	0.36
	Sig. (2-tailed)	0.05	0.03

Source: SPSS, modified

From the above table, it can be learnt that the significant level of both questions are either less than or equal to the preset error tolerance of 5%. It is clear that reducing food waste has a 36% correlation to the improvement on business performance. This implies that when restaurants attempt to reduce food waste, it may eventually bring contributions to business performance. Though it may sound easier said than done, such reductions on food waste may well be applied though precise standards on food preparation (including portioning, FBC-9, ingredient usage). Besides, food waste reduction may be achieved through good inventory management, perhaps by incorporating first-in first-out (FIFO) inventory system, as well as via minimization of mistakes caused by improper handling of inventory. This method has certainly been applied in the family-owned restaurants, which are used as references in this study, to limit unnecessary inventory purchases.

From the above table, it is also clear that food waste reduction has 33% correlation to helping environment by means of maintaining animals and plants. Similar to the above arguments, helping the environment may be done through standards on food preparation (including portioning, FBC-9, ingredient usage). Perhaps, a simple example may be beneficial in this instance. To cook 1 portion Beef Wagyu steak, 250 grams of Tenderloin Wagyu is needed. By carefully considering and measuring the right amount of each of the required ingredients, the numbers of cows to be butchered are controlled. Hence, restaurants indirectly participate in maintaining the overall cow population, including demands for beef.

Table 7 (2): Pearson Correlation Analysis

Correlations		Q14
Q4	Pearson Correlation	0.36
	Sig. (2-tailed)	0.03

Source: SPSS, modified

The above table shows that the significant level of the question is less than the preset error tolerance of 5%. Thus, the correlation between food waste reduction and community engagement is accounted for at 36%. This implies that since the restaurants may have applied the precise standards with regards to food preparation, customers may also be invited to not throwing food waste away. This is mainly due to the fact that the applicable meal portions have been adjusted in accordance with the common standards.

Referring to the following table, at the level of significance of 2%, the correlation of 38% between reusing food waste and better business performance can also be considered. For instance, restaurants can easily reuse edible food based on new recipes. This may be

the very reason why reusing food waste correlates to better business performance.

Table 7 (3): Pearson Correlation Analysis

Correlations		Q14
Q5	Pearson Correlation	0.38
	Sig. (2-tailed)	0.02

Source: SPSS, modified

Table 7 (4): Pearson Correlation Analysis

Correlations		Q16
Q8	Pearson Correlation	0.43
	Sig. (2-tailed)	0.01

Source: SPSS, modified

The above table shows that there is 43% correlation between reusing food waste and helping environment. Though the level of correlation may not be substantially high, however, the level of significant of this correlation is significantly strong, at 1%. As previously mentioned, one of the indicators used toward the approximation of helping the environment is through donation of edible food leftovers to community, donation of leftovers of food production for animal feeds, and/or using non-edible food waste products for canned food packaging, for instance.

Table 7 (5): Pearson Correlation Analysis

Correlations		Q19
Q9	Pearson Correlation	0.33
	Sig. (2-tailed)	0.05

Source: SPSS, modified

From the above table, it is obvious that the level of significance is within the preset error tolerance of 5%. Also, it is evident that there is 33% correlation between Recycling food waste and attaining community engagement. The study in food waste recycling was evaluated by separating food waste materials (classified trash bins), and separating waste recycles processes.

Table 7 (6): Pearson Correlation Analysis

Correlations		Q17
Q10	Pearson Correlation	0.51
	Sig. (2-tailed)	0.00

Source: SPSS, modified

The above table shows that there is a 51% correlation between recycling of food waste and helping the environment. It is important to note that this study also demonstrates the surprisingly strong significance. As stated, this study reveals that food waste separation contributes to the environment. Hence, respondents tend to be in agreement that the correlations between the recycling commitment and the green concepts.

IV.3. INTERVIEW RESULTS AND ANALYSIS

This research also relies on interview sessions with the restaurants' owners. The

interview sessions are summarized as follows:

1. The owners believe that the main cause for environmental damage is coming from various types of wastes. When people are not discarding such wastes in specially designated places/locations, flood may soon follow. In addition to that individual waste from people, industrial wastes as well as deforestation also contribute to the frequent flood and/or environmental damages in existence today.

2. Until now, only limited numbers of individuals/respondents may have shown actions toward actually maintaining the environment. This may include the readiness to extend payment toward regularly scheduled maintenance fee.

3. From total of 3 restaurants' owners as respondents, there is only 1 respondent who have knowledge about such regulations. However, none of the respondents appeared to know exactly the specific contents of such regulations. It may be relatively expected that government may have to actively distribute and/or spread more information in trying to socialize this regulation. By doing so, restaurants' owners may increase their roles in managing food wastes. Of course, in the longer-term, such understanding may contribute to the enhancement in public awareness on consequences concerning food waste.

4. All respondents admitted that they knew about 3Rs. One of the respondents did know that her restaurant has actually implemented 3Rs based on several methods. Two other respondents just realized that their restaurants have also implemented 3Rs in several methods during the interview.

5. All respondents believed that restaurant operational activities should be under their responsibilities, particularly on managing and controlling the restaurant businesses.

6. The total required funds to cover the waste disposal expenses are ranging from Rp. 300.000 to Rp. 800.000 per month, whereby wastes are collected daily, or at the most every 2-day.

7. All respondents are in agreement that the 3R method provides benefits for their restaurants. The respondents believe that by implementing the 3Rs method, their restaurants would be cleaner and may become more attractive. Also, by conducting some kinds of social contributions, the restaurants may indirectly engage in social marketing tactics. Besides the chances on driving-up business performance, such 3R method may also indirectly raise community awareness toward sustainable environment.

V. CONCLUSION AND RECOMMENDATION

V.1. CONCLUSION

Based on the data analysis, it can be concluded that;

1. Food waste management, which is based on the 3Rs method, has a minimum correlation of 36% with any attempts in improving business performance. This could be further explained as follows;
    a. Establishing proper standards in developing FBC-9 or menu recipes (part of reducing food waste) could reduce the amount of food waste. By implementing the proper inventory system for food materials, including food packaging, restaurants

are able to minimize the amount of necessary purchases on food ingredients.

b. Donations in relation to any actual forms on reusing food waste can also be considered as a part of restaurants' promotional activities. This may reduce the cost required on promotional tools. This is expected to increase the number of diners.
c. By managing the cleanliness, which is an integral part of food waste recycling activities, restaurants have participated in helping the government to raise community awareness towards the food waste management. In fact, the 3Rs method may eventually improve employee's productivity since staff members may have become more knowledgeable on proper food waste management.

2. Food waste management, which is based on the 3Rs method, has the minimum correlation of 33% toward helping the environment. This could be further explained as follows;
   a. By establishing and applying proper FBC-9, restaurants may contribute to the overall reduction in demands for animal meat and vegetable required as food ingredients. Also, through the reliance on proper food packaging, restaurants may also contribute to the overall amount of wastes from food packaging.
   b. Through donations of edible food waste, as part of reusing food waste, restaurants may certainly play an important role in assisting and maintaining animal and plants population.
   c. Through segregations of waste, as a part of food waste recycling activity, restaurants may contribute to the environment, particularly on wastes, which are difficult to be degraded, and/or needed time to be decomposed. This may be the way that restaurants contribute to the sustainability of environment.

3. Food waste management based on the 3Rs method has a minimum of 33% correlation with the attainment on community engagement. This could be further explained as follows;
   a. By establishing and applying proper FBC-9, as a part of food waste reduction, restaurants may reduce the number of wastes for disposals by customers. This may raise the awareness of people to be more concerned with the environment by not wasting food. Hence, it may create more pleasant environment.
   b. Donations of edible food waste to the poor may be considered as a vital part in fulfilling social responsibilities. Inviting customers to participate in food donation activities may enhance the living conditions of the community against poverty and/or famine. This may be considered as social contribution.
   c. Putting-up signage, for instance by not littering and/or using eco-friendly products may portray positive contributions toward community engagement.

Evaluating the statistical analysis, interview result, and supporting theories and studies gives strong evidence that 3Rs method applied in food waste management contribute significant influence toward produced benefit. Therefore, it may support the conclusion that 3Rs theory/approach, which explained in chapter 2, contributes well and positive impacts, if it is being implemented properly.

This study suggest that (1) food waste management through 3Rs method gives influence in improving business performance, (2) food waste management through 3Rs method gives influence in helping the environment, and (3) food waste management

through 3Rs method gives influence in attaining community engagement, in the attempt to create both the better strategy to facing high business competition, also to create more sustain and friendly environment for better living.

As mentioned, since influence from food waste management implementation through 3Rs method are based on subjective observation and general statement of the questionnaires, it is considered safe to conclude that food waste management through 3Rs method will generate benefits, both in short and long term orientation, and also in managing sustainable environment. Though this study relies heavily on LeanPath's 3Rs theory and benefits, at least this study answered 3Rs theory implementation to show the benefits stated can be proved. Besides, this research also strives to measure the restaurants' level of awareness in food waste management issues. Unfortunately, this study fails to provide substantial evidence that the personnel (both owners and staff) restaurant will (definitely) implement 3Rs in bigger scale immediately, since the restaurant's awareness in maintaining food waste considerably low.

V.2. RECOMMENDATIONS

Some recommendations could be proposed as follows:

1. One of the easiest ways that any restaurant could do in maintaining environment may start with the food waste reduction. Restaurants may have to create variations in recipes without affecting the selling price. Through the real applications in standardized recipes (FBC-9), including better portioning, food waste may be reduced. This may influence the unnecessary purchases. Also, by evaluating the standardized recipes, restaurants may have to evaluate the quality of dishes. In longer period, it is expected that customers are happier with the food portioning, recipes, variations of dishes, and displays. This may increase business performance.

2. The second easiest issue to deal with may be the proper application on food inventory systems. Certainly First-In, First-Out (FIFO), as a form of the 3Rs method, may assist restaurants' staffs to be more discipline. This may deliver cost efficiency for the restaurants.

3. Another way that restaurants could do is reusing food waste, undoubtedly. This may not only reduce wastes, but also, unconsciously, restaurants will expand the staffs' creativity in developing special recipes, which may eventually become the "chef recommended" menu.

4. Food donation may be put into agenda. Though this may look simple, however, this may serve as a powerful promotional activity for restaurants.

5. Though waste separations may not yet common in Indonesia, nevertheless, restaurants may start to do so, and become the role model and pioneer for other restaurants. Perhaps, by placing garbage bins in a more secluded area, this may prevent garbage odor. Of course, it is expected that customers would be happier with the cleaner surrounding.

6. A simple signage around the restaurants' premises, may promote customers' participation in environmental cleanliness and/or waste management.

7. Above all, knowledge and education on food waste management may have to be shared among restaurants' owners and staff members. If each individual were aware on food waste management, it would surely bring-about positive impact toward the working environment.

There are some limitations of the study. Some of those limitations include the following;

1. To reduce the complexity, this study only concentrates in production (kitchen), inventory, and service. The interaction of other sections in restaurant and/or perhaps hotel needs to be studied, such as sales, marketing and promotion, finance and accounting, especially for in-depth restaurant operational.

2. This study only emphasizes only part or general view of business performance, help the environment, and attain community engagement. Further explanation of detail and in-depth calculation of business performance, help the environment, attain community, and any other benefits have not been covered in this research. Thus, it is suggested that future research may involve more in the analysis dan conducting in-depth study of the details.

3. The subject of this study is family-owned restaurants with medium size family restaurant. It is suggested that future research can expand its participants in the longer research period to other type of restaurant classification, and if possible also reach restaurant customer. Perhaps, further research to improve awareness from the restaurants side and the customers will create more sustain, clean, and well-managed environment.

4. This research expected to become reference and guide tools for further research, which related with waste management, especially to increase restaurant, hotel industry and also environmental community services.

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