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Food waste in Hong Kong –

a study on source reduction

by

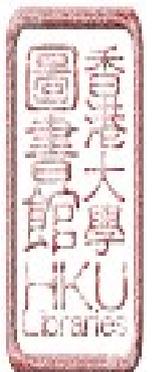
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(2012921426)

A dissertation submitted in partial fulfillment of the requirements for the
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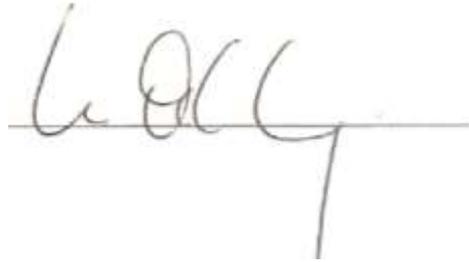
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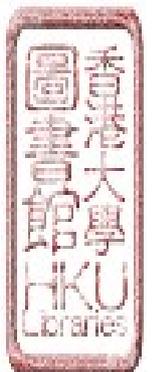
Disclosure statement

This dissertation represents the author's own work conducted for the purposes of this MSc in Environmental Management programme. All significant data or analysis used in this dissertation from other sources – including work the author may have carried out for purposes other than for this programme – has clearly been identified as such.

Signed:

A handwritten signature in black ink, appearing to read 'WOO Pak Keung', written over a horizontal line.

Printed name (Date): WOO Pak Keung (20 May 2014)



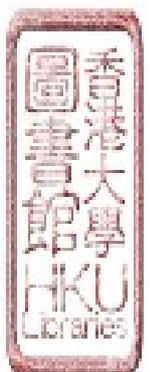
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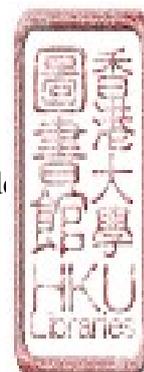


Abstract

Hong Kong is a densely populated area located in the south-eastern coast of China. The volume of food waste generated surges with the substantial economic and population growth. In Hong Kong, there are currently 3,584 tonnes of food waste produced daily which are mainly disposed at landfills. The existing landfills, however, are expected to be full in the coming 5 years. The food waste problem is therefore urgent and significant. As a response, the Policy Address 2014 puts forward a package of waste management measures and calls for the implementation of “reduction first” approach. This study reviews the past efforts of food waste management and looks specifically at source reduction.

Consumerism promotes the progressive purchasing of food products without the consideration of the adverse environmental impacts. The consumer behaviors driven by consumerist lifestyles boosted the food waste quantity. The meanings and relationships of food waste, source reduction, sustainable waste management, consumerism and consumer behaviors are therefore analyzed to illustrate the sustainable food waste management. The principles affecting consumer behavior, household behavior and C&I sector behavior on both supply and demand sides are especially studied to understand the situation.

Making reference to overseas experience and a best practice framework, this research study focuses on the attitudes, difficulties and decision making of the Hong Kong residents, foodservice suppliers, the Government and NGOs on food waste issues. Literature review, questionnaire survey, in-depth interviews and site visits were conducted to understand consumer behavior. A collection of government policies and other stakeholders’ initiatives was reviewed and analyzed. These include A food waste & yard waste plan for Hong Kong, Food Wise Hong Kong Campaign, volume-based waste charging scheme, voluntary garbage sorting, OWTF



infrastructure, Green lunch charter and Community Green Stations. The green groups have organized food waste reduction programs, food donation activities and light banquet campaigns to promote right-size food purchase and sustainable lifestyles in Hong Kong. Food waste-to-energy approach is more preferred than composting and animal feed production in Hong Kong. Other relevant measures learned from Taiwan can be the environmental awards, food waste recycling industry, financial funding and university researches.

The study found that there are insufficient environmental policies and laws, inadequate financial incentives and low level of environmental CSR to promote food waste reduction. Limited collaboration among stakeholders, weak environmental education in the formal curriculum and consumerist lifestyles are also the reasons of the food waste problem.

The study concludes that the food waste source reduction is achievable. The Government should improve the existing environmental policies and laws to promote sustainable lifestyles. A combination of measures should be implemented. Waste charging, Food Wise Hong Kong Campaign, food donation, social mobilization, OWTF infrastructure, environmental education and publicity, community green stations and right-size food purchase should work together to solve the problem.

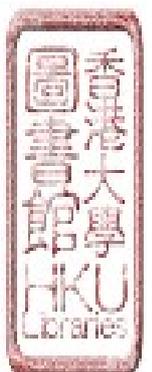
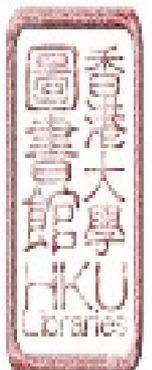
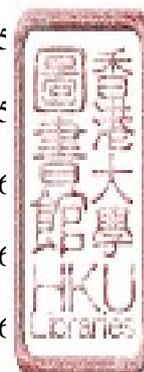


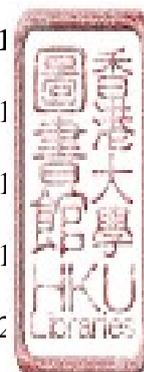
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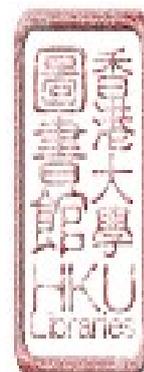
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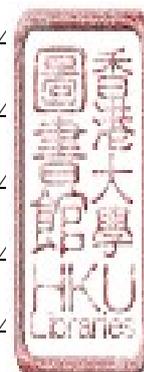


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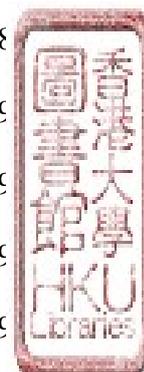


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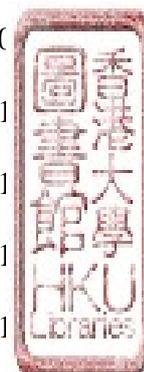
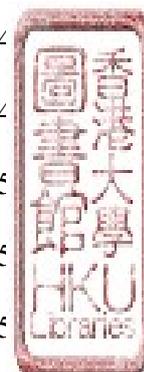
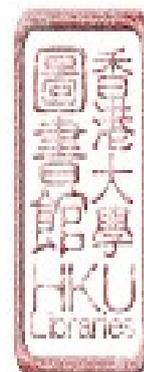


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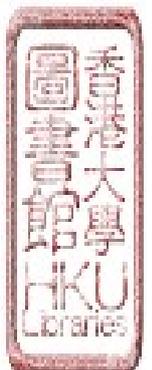


List of abbreviations

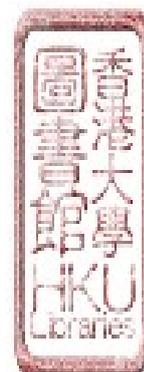
ACE	Advisory Council on the Environment
AFCD	Agriculture, Fisheries and Conservation Department
APCO	Air Pollution Control Ordinance
BEC	Business Environment Council
BOGO	Buy One Get One free
BSAP	The Biodiversity Strategy and Action Plan
BYOC	Bring Your Own Container
C&I	Commercial and Industrial
CBD	The Convention on Biological Diversity
CGS	Community Green Stations
CNSR	Consumer Social Responsibility
CPI	Consumer Price Index
CRN	Community Recycling Network
CSR	Corporate Social Responsibility
CSSA	Comprehensive Social Security Assistance
CUHK	The Chinese University of Hong Kong
ECC	Environmental Campaign Committee
ECF	Environmental Conservation Fund
EIA	Environmental Impact Assessment
ENB	Environment Bureau
EPD	Environmental Protection Department
EPI	Environmental Performance Index
EPR	Extended Producer Responsibility
F&B	Food and beverage



FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GHGs	Greenhouse gases
HKAEE	Hong Kong Awards for Environmental Excellence
HKCTU	The Hong Kong Confederation of Trade Unions
HKDSE	The Hong Kong Diploma of Secondary Education
HKFORT	Hong Kong Federation of Restaurants and Related Trades
HKGD	Hong Kong Green Day
HKIA	Hong Kong International Airport
HKOWRC	The Hong Kong Organic Waste Recycling Centre
HKPC	Hong Kong Productivity Council
HKSAR	Hong Kong Special Administrative Region
HKU	The University of Hong Kong
HKUST	The Hong Kong University of Science and Technology
ISO	International Organization for Standardization
IWMF	Integrated Waste Management Facilities
KBWRC	The Kowloon Bay Waste Recycling Centre
L&T	Learning and teaching
MGS	Mandatory Garbage Sorting
MSW	Municipal Solid Waste
NCO	Noise Control Ordinance
NENT	North-East New Territories landfill
NGOs	Non-governmental Organizations
OECD	The Organization for Economic Co-operation and Development
OLE	Other Learning Experience



OWTF	Organic Waste Treatment Facilities
PAYT	Pay as you throw
PBL	Problem-based learning
PRS	Producer Responsibility Scheme
RFMB	Recycling Fund Management Board
RTS	Refuse Transfer Stations
SCMP	South China Morning Post
SD	Sustainable Development
SDC	The Council for Sustainable Development
SENT	South-East New Territories landfill
SMW	Statutory Minimum Wage
TEPA	Taiwan Environmental Protection Administration
TSWCDN	Tin Shui Wai Community Development Network
UN	United Nations
UNEP	United Nations Environment Programme
WED	World Environment Day
WENT	West New Territories landfill
WPCO	Water Pollution Control Ordinance



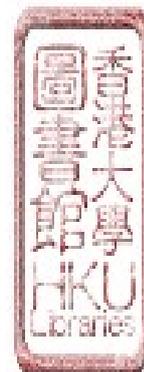
Chapter 1 Introduction

1.1 Significance of the Study

When Hong Kong economy continues to improve and prosper, the total amount of municipal solid wastes (MSW) produced rises accordingly. Together with the increasing population and consumption pattern of Hong Kong citizens, the MSW management has become a serious and urgent issue for the past two decades.

The Policy Address 2014 stated that environmental protection is one of the priorities of the current-term government. The Government will ensure that waste treatment facilities meet high environmental and operational standards (HKSARG, 2014b). The 2014-15 Budget also provides an estimated Government expenditure of 13,042 million on Environment and Food, which contributes to 4.2% of total government spending in nominal terms. The public spending and percentage on Health are 52,373 million and 17.0% respectively for comparison. (HKSARG, 2014a). The annual expenses for the treatment and disposal of municipal and chemical wastes amounted to 1.03 billion (EPD, 2012).

The total daily amount of Hong Kong MSW in 2012 is 9,278 tonnes (ENB, 2014). The Environmental Protection Department (EPD) of Hong Kong Special Administrative Region (HKSAR) Government states that the existing landfills will be completely full in about 5 years. Although a 10-year policy framework was put in place in 2005, not until in recent years that the Government has acted seriously about the waste problem. The Government plans to build new landfill sites, integrated waste management facilities (including an incinerator) and organic waste treatment facilities to overcome the problem. The local residents refuse to have the landfills built in their living district, however. Besides, the cost of building a landfill and its operation are high. Each landfill costs about \$2 billion while the annual operating



cost is about \$140 million for each landfill (EPD, 2013c).

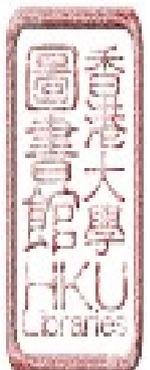
In Hong Kong, there are 3,584 tonnes of food waste disposed every day, which is 38.8% of the total MSW (ENB, 2014). In Singapore, 1,926 tonnes of food waste are generated every day in 2012. It contributes to only 9.7% of the 19,916 tonnes total MSW. The food waste proportion in total MSW in Hong Kong is four times higher than that in Singapore (NEA, 2014).

Source reduction is the priority strategy in waste management; it is however difficult mainly due to the consumerist lifestyle of Hong Kong citizens.

Consumerism is economically manifested in the purchasing of new goods and services regardless of the environmental impacts. Consumerism is driven by materialism under the profit maximization goals in the companies. Citizens are encouraged to purchase excessive food which will be finally disposed. It created significant environmental problems to Hong Kong (HKIED & CSD, 2011).

The research was thus designed to investigate the consumer behavior in food waste for source reduction. The attitudes, difficulties and decision making on food waste reduction at source of Hong Kong residents, foodservice suppliers, HKSAR Government and NGOs will be examined. The source reduction should be highly promoted in Hong Kong to solve the local environmental problems.

The academic and application values of this dissertation are high because there has been little research study conducted to illustrate the food waste source reduction issues, especially in the Asian city context. The importance of source reduction has received much attention especially the end-of-pipe treatments are unwelcomed by the local community. The Government, general public, academic professors, mass media business corporations and other stakeholders recognize source reduction as the most effective solutions to the solid waste crisis. If the research can clearly identify the true reasons for the unreasonably excessive amount of food waste and provide



corresponding recommendations on the issue, it would greatly help Hong Kong overcome the food waste problems.

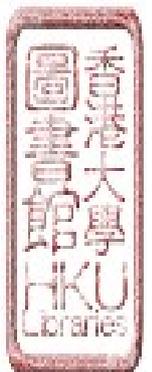
1.2 Study Objectives

The main purpose of the dissertation is to provide a comprehensive research on the food waste source reduction. The food waste management in Hong Kong will be analyzed for improving the local environmental conditions and alleviating the landfill pressure.

The following objectives are recommended to satisfy the main purpose of the dissertation stated above:

- ✓ To understand the theoretical relationship between food waste, source reduction, consumerism, consumer behavior and sustainable solid waste management;
- ✓ To develop a best practice framework for food waste reduction at source;
- ✓ To analyze the current situation of the food waste generation and source reduction activities in Hong Kong;
- ✓ To compare the differences between government policies, resident practices and environmental cultures in Taiwan with Hong Kong on food waste source reduction;
- ✓ To identify gaps between the best practice framework and the situation of Hong Kong through questionnaire surveys, personal interviews and site visits;
- ✓ To provide feasible and effective recommendation for food waste source reduction in Hong Kong.

1.3 Research Scope



Emphasis will be put on source reduction on food waste. Food waste is selected in the research because it is a significant portion of the Hong Kong MSW. Food waste is the food loss in the retail and consumption stages. The investigation will include household, commercial and industrial (C&I) sector, workplace, community and schools. Source reduction consists of prevention and minimization, which is the best option in the waste hierarchy (Price & Joseph, 2000).

1.4 Methodology

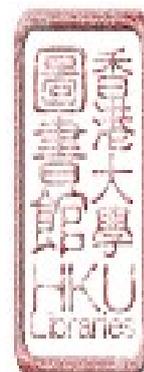
Literature review would be carried out to provide precise explanation on the definitions and their relationships on food waste, source reduction, consumerism, consumer behavior and sustainable waste management. It forms the theoretical and analytical framework on the food waste source reduction. Food waste source reduction information in Hong Kong and Taiwan would be gathered by studying journal articles, books, news, reports and other sources.

Sophisticated research methods will be conducted to collect first-hand information. Questionnaire surveys on Hong Kong residents will be conducted. Personal interviews and site visits with the foodservice suppliers, the Government and NGOs will be arranged.

The overall situation of the source reduction will be assessed by considering all the relevant theories and information obtained. Recommendation and conclusion will finally be provided.

1.5 Limitation

The survey respondents and interviewees are environmentally friendly. The environmentally unfriendly consumers, companies and NGOs rejected the research requests. The environmentally unfriendly situation cannot be completely



investigated.

The survey respondents are sensitive to personal information. The relationship between the research questions and respondent's profile is difficult to obtain.

The confidential information policies make the interviewees not to disclose part of the company operation in the research. The whole picture might not be reflected.

Successful overseas experience should not be limited to Taiwan situation only. Other countries like Switzerland, Australia and Singapore can also be extensively studied.

1.6 Structure of the Study

The study consists of six chapters.

Chapter 1 is the introduction, which briefly mentions the significance, objective, scope, methodology and structure.

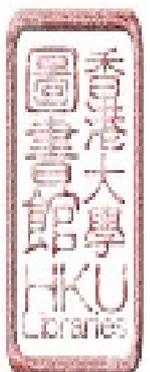
Theoretical and analytical framework of the study will be illustrated in Chapter 2. Food waste, source reduction and sustainable waste management will be discussed. The influence of consumerism and consumer behavior on food waste will be described. The household and C&I sector behaviors on both supply and demand sides will be investigated.

Chapter 3 is the investigation of current situation of Hong Kong food waste management. The seriousness, government plans and policies will be studied.

Taiwan case study will be assessed in Chapter 4. Analytical and critical investigations will be provided with comparison with the local situations.

Chapter 5 provides the comprehensive research on the current situation of food waste source reduction activities through questionnaire survey, interviews and site visits.

Finally, recommendation and conclusions will be provided in Chapter 6.



Chapter 2 Theoretical and analytical framework

Food waste and source reduction in sustainable waste management are described in this chapter. The relationship between consumerism and consumer behavior is studied as the theoretical and analytical framework for the research study. The framework hopes to give insights on understanding the causes of food waste generation internationally.

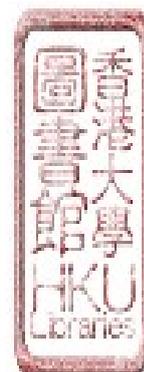
2.1 Food waste

The definition, classification and sources of food wastes are described.

2.1.1 Definition

The Agenda 21 defines food waste as a kind of municipal waste. The international definition of solid waste include municipal waste, industrial waste, mining and quarrying wastes, agricultural wastes and energy generation wastes (Beck & Parke, 2012).

According to the definitions of the Food and Agriculture Organization (FAO) of the United Nations, food loss and food waste are different. There are five system boundaries in the food supply chains, including agricultural production, postharvest handling and storage, processing, distribution and consumption (Figure 1). (FAO & SIK, 2011).



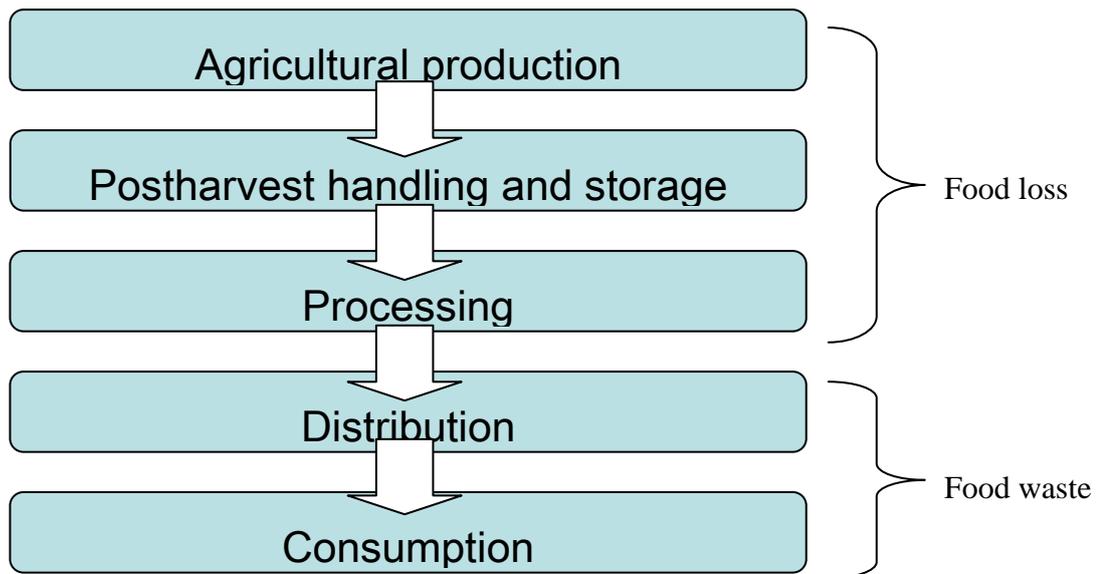
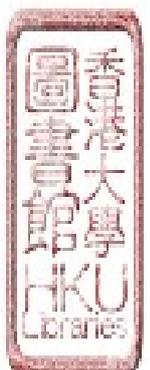


Figure 1: Flowchart showing the FAO five system boundaries
Source: FAO & SIK (2011)

Food loss refers to the decrease in edible food mass throughout the parts of the supply chain that specifically leads to edible food for human consumption. Food losses take place at production, postharvest and processing, and processing stages in the food supply chain (Buzby, Hyman, Stewart, & Wells, 2011).

Food waste is the amount of food losses occurring at the retail and consumption stages of the food supply chain. It is affected by the retailer and consumer behaviors. The food which was planned for human consumption but consequently gets out of the food chain for non-food uses is also considered as food waste (FAO & SIK, 2011).

The research study of food waste, therefore, focuses only on the distribution and consumption stages. Distribution stage refers to the food waste in the market system including retailers and supermarkets. Consumption stage refers to the food waste at the household level including the customers and restaurants (Ahmed, 1979). The FAO finds that roughly 1.3 billion tons of global food produced annually become food loss and food waste. The food waste problem is more severe in developed countries. The per capita food waste in Europe and North America is 95-115 kg/ year



while the ones in Sub-Saharan Africa and South & Southeast Asia are only around 6-11 kg/year (Figure 2). The food waste issues in developed countries mainly relate to consumer behavior and weak coordination in the supply chain. The food waste source reduction can be facilitated by raising environmental awareness among

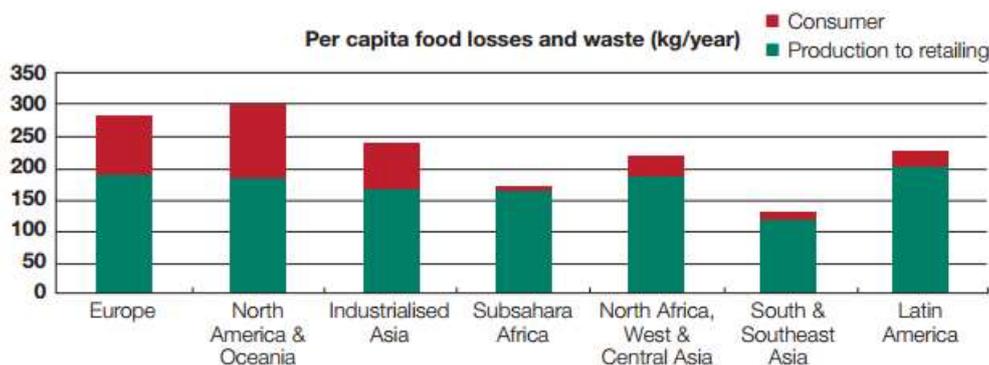


Figure 2: Global per capita food losses and waste

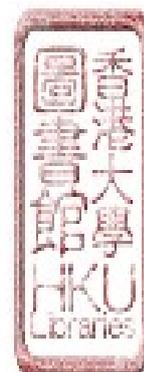
Source: FAO (2011)

retailers and consumers (FAO & SIK, 2011).

2.1.2 Classification

Food wastes can be classified by whether they are avoidable. They include “avoidable”, “possibly avoidable” and “unavoidable”. The avoidable food waste is further divided into three groups according to the reasons for disposal. They comprise “cooked, prepared or served too much”, “not used in time” and “others” (Figure 3). The major food groups include fresh vegetables & salads, fresh fruit, bakery, home-made & pre-prepared meals, meat & fish and dairy & eggs (WRAP, 2009).

Avoidable means the food was disposed simply because it is no longer wanted. The food is still considered edible by the majority, however. The edible food before best use date disposed by supermarkets is an example. The cooked, prepared or served too much refers to excessive amount of food prepared and consequently



disposed. The remaining rice in dishes belongs to this group. Not used in time refers to the food passed the use-by dates and deteriorated in quality like moldy bread. Others mean the food is thrown away for other and unknown reasons. The people may throw away the food because of wrong purchasing decisions. The food is eventually lost when they take them home. One example is that the food is used in games and finally wasted. (Quested, Parry, Easteal, & Swannell, 2011).

Possibly avoidable refers to the food in which some people eat but other does not and can be eaten after appropriate processing. The bread crusts and potato skins are examples. Unavoidable means the food is not edible under normal situations. For instance, bones and apple cores are not edible (Parfitt, Barthel, & Macnaughton, 2010).

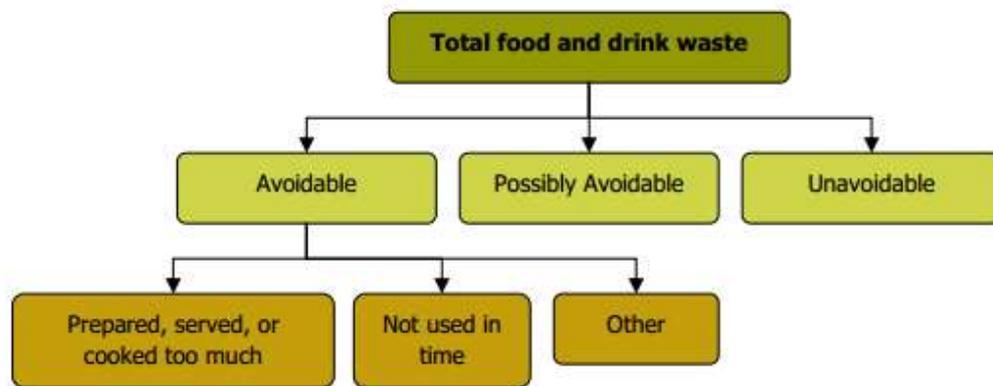
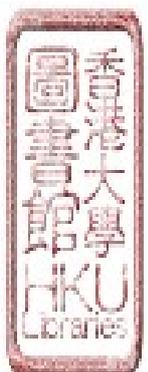


Figure 3: Classification of food waste

Source: WRAP (2009)

Pre-consumer and post-consumer food waste can also be classified for source separation purposes. Pre-consumer food waste is the leftover generated in the food production and distribution before they are being sold in foodservice suppliers. It may result from overproduction, spoilage and food preparation. Post-consumer food waste is the leftover discarded after the customer consumption. It includes the plate scraping and uneaten purchased food (Nahman & Lange, 2013).



2.1.3 Sources of food waste

The sources of food waste mainly originate from household, foodservice suppliers and food processing factories. The foodservice suppliers include supermarkets, wet markets, tuck shops, hotels, restaurants, meal box services and other catering outlets. Food processing factories consist of all the food manufacturers. Food distribution wastes food in improper food handling, packaging and transportation. Overstocking and inadequate stock rotation also generate food wastes. Consumer food wastes are resulted from improper storage, wasteful food preparation processes, over-purchase behaviors and plate scraps (Griffin, Sobal, & Lyson, 2009).

In the distribution stage, the wholesale and retail activities from food stores and supermarkets produce food wastes. The catering and beverages business like restaurants, pubs and hotels create kitchen wastes. The hotel buffets produce leftovers by throwing away edible food for hygiene reasons. In the consumption stages, the Chinese banquets and lunchbox services serve too much for the guest and generate leftovers (FoE, 2013a). The improper household, foodservice supplier and customer behaviors are therefore the main causes of food waste in both distribution and consumption stages.

2.2 Source reduction in sustainable waste management

Sustainable waste management, the role of source reduction and the relationship between food waste and source reduction will be illustrated.

2.2.1 Sustainable waste management

Sustainable development, waste hierarchy, zero waste, polluter pays principle and extended producer responsibility are described as the theoretical framework.



Sustainable development

Sustainable Development (SD) is defined as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It consists of three major areas, namely environment, economic and social sustainability (Figure 4). There are two key concepts called 'needs' and 'limitations'. 'Needs' means that the overriding priority should be given to the essential needs of the world's poor. 'Limitations' refers to the inability imposed by the state of technology and social organization on the environment's ability to meet present and future needs (WCED, 1987).

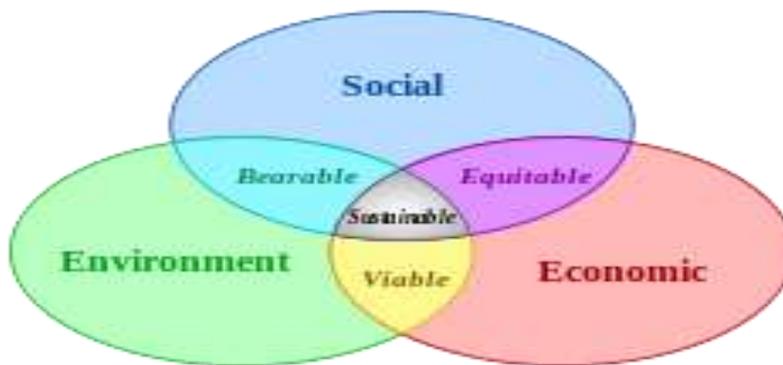
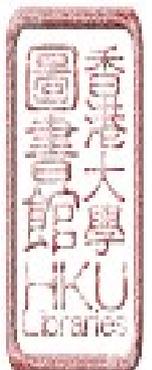


Figure 4. Sustainable Development
Source: WCED (1987)

This concept was proposed in the Brundtland Report. Agenda 21 and Rio Declaration states that proper solid waste management is one of the successful indicators of sustainable development (WB, 1997). Economic sustainability refers to the encouragement on the effective use of resources for economic prosperity without adverse impact on the environment and ecology. Social sustainability means that the next generations should have the same rights of access on the social resource including human rights and freedom, equity, diversity, social cohesions, quality of life, democracy, governance and maturity. Environmental sustainability means the



waste generation rate should be smaller than the environmental capacity. The regeneration rate of renewable resources should be greater than the rate of depletion (Quaddus & Siddique, 2013).

Waste hierarchy

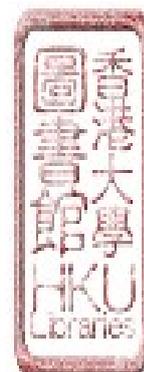
The waste hierarchy (Figure 5) (SLWP, 2013) demonstrates the priority of preferred environmental options. The most preferred one is reduce, followed by reuse, recycle and energy recovery. The least preferred environmental option is disposal. Reduce means waste prevention and minimization. They target at minimizing the use of materials and energy by the producers and consumers. Taking away the remaining food after having dinner in restaurants is a good example of waste reduction. We can have the take-away food as lunch tomorrow so that the amount of solid waste disposed in landfills can be reduced (Al. Ansari, 2012).

Reuse refers to using the item again after it has been used. We can use reusable utensils instead of disposable forks and spoons to reduce the amount of waste disposed to landfills and combustors (Medley, Zhou, & Condon, 2006).

Recycle means collecting the used waste materials to convert to new products to minimize the waste disposal volume. The local citizens can collect the kitchen waste for composting to produce organic fertilizers for sale and agricultural use (Ghiban, Negoita, & Negoita, 2012).

Energy recovery is the way of minimizing the energy input by the exchange of energy from another sub-system. The food waste can be converted into biogas in anaerobic digesters for electricity generation (Schneider & Bogdan, 2011).

Disposal is the process of throwing away the wastes in a suitable way and location after appropriate treatment. Putting the food waste into the landfills is a common way of waste disposal (Powell, Turnera, & Bateman, 2001).



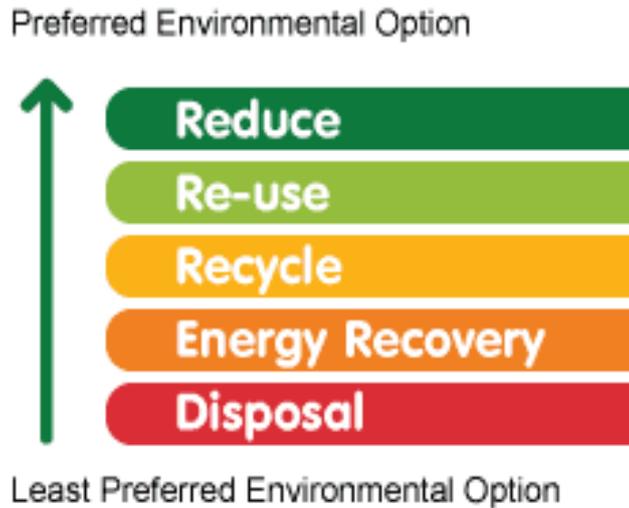


Figure 5: Waste hierarchy

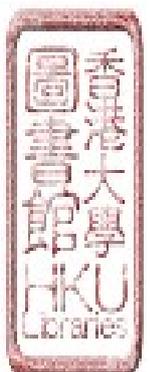
Source: South London waste partnership (2013)

Zero waste

Zero waste is the objective which encourages people to adopt sustainable lifestyles. The products and production processes are designed and managed to reduce the volume and toxicity of waste in order to preserve the natural resources. It is mainly performed in the market development, customer services, researches, education and promotion. The amount of waste disposed to landfills and combustors are thus minimized (Lehmann & Crocker, 2012).

The objectives of zero waste focus on five areas, including resources, production activities, product life, emissions and use of toxics. Resources like energy, natural resources and human efforts are minimized in production. Production activities like recycling and sourcing are at their optimum efficiency. Product life like entering market, use and end of life are well managed. Emissions like air, soil and water are reduced. Use of toxics in the processes and products are avoided (ZWA, 2013).

Polluter pays principle



Polluter pays principle states that the party responsible for the pollution is liable to pay for the environmental costs. This concept consists of pay as you throw (PAYT) and extended producer responsibility (EPR) (OECD, 1975).

Pay as you throw (PAYT) is the usage-pricing model for disposal of solid wastes. The citizens are charged based on the amount of solid waste produced. The payments should cover the handling cost of the solid waste of the local government. Usually the amount is determined by weight and volume. PAYT provides sufficient financial incentives for the local residents to practice waste reduction, reuse and recycling. “Per-Bag Fee collection policy” was implemented in Taiwan by providing blue bin bags for household and companies. The waste volume significantly reduced while the reuse and recycling rate improved drastically after successful implementation (Barrett, 1997).

Extended producer responsibility

Extended producer responsibility (EPR) is the environmental strategy by using financial incentives to encourage producers to provide environmentally friendly products by making them responsible for the costs of whole life-cycle of their products. Under this concept, the supermarkets would be responsible to pay for the unsold food disposed. It influences their company policies and practices in handling the food disposal to minimize the amount of solid waste (OECD, 2004).

OECD framework for effective and efficient environmental policies

Effective and efficient environmental policies can be classified into eight categories under the OECD framework.

Setting environmental objectives means the planning and monetary assessment on the benefits and costs of the environmental improvements. Achieving these



objectives can alter the decisions to internalize externalities (Edvardsson, 2004). Links to economic policies refer to the policy design and implementation which reflects the environmental goals in the governmental organizations. The international trade agreements should have considered the environmental impacts (Dietz & van der Straaten, 1992).

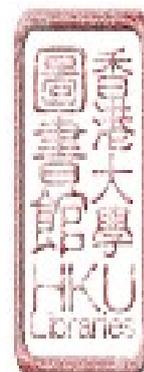
Direct environmental regulation refers to the environmental laws and regulations to control the pollution sources. The undue inflexibility should be avoided which might limit its effectiveness and efficiency (Meijer & De Jong, 2009).

Environmental related taxes are the market-based instruments to provide financial incentives to change the consumer behavior. It is cost-effective to change the polluter and resource user behavior with long-term incentives (OECD, 2001). Tradable permits systems establish emission caps and promote investments for environmentally favorable outcomes. Cap-and-trade system and “baseline-and-credit” system are commonly used for global emission trading (OECD, 2002).

Public financial support for environmental goods and services is used to support environmental promotion and education activities and to finance the environmental infrastructure development (OECD, 2003).

Promoting technological development means the development of environmentally friendly innovations to improve the environmental performance. Safeguards should be developed to promote competition of technology development (Marinova, Annandale, & Phillimore, 2006).

Other instruments include the environmental information system and the voluntary approaches. Environmental information includes information about environmental decisions, policies and activities (Rautenstrauch & Patig, 2000). Environmental voluntary approaches consists of environmental performance



agreements and public volunteer programs (Mol, Lauber, & Liefferink, 2000).

Several environmental policies are often applied as a mixed instrument to tackle the same environmental problem (OECD, 2008).

2.2.2 The role of source reduction in sustainable waste management

Food waste source reduction can effectively minimize the negative environmental consequences, reduce the burden of waste treatment facilities and provide financial benefits to the society. The source reduction definition and practical solutions are introduced.

Definition

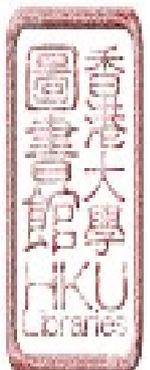
Source reduction includes the activities to reduce the volume and toxicity of waste generated by citizens and corporations. It can be achieved by improving production processes, encouraging the use of non-toxic substances, implementing conservation techniques and re-using materials (Hurst & Reils, 1988).

Source reduction also means pollution prevention. It refers to the practices to reduce the amount of any hazardous pollutants entering the waste stream and the negative impacts on public health and the environment. It also emphasizes the protection of natural resources by conservation (USEPA, 2013).

Various ways to reduce at source

Practical ways for food waste source reduction can be done in proper procurement, storage, menu, customer orders and staff training.

Sustainable food procurement should be adopted to reduce the food waste generation in the catering food supply chain. The amount of food purchase should be controlled in an appropriate level to reduce food wastage (Rimmington, Smith, &



Hawkins, 2006).

Proper food storage can also minimize food waste. The “First In, First Out (FIFO)” rule of rotation should be implemented in the storage system. Bulk purchases should be avoided to prevent wastage from food spoilage. Effective storage strategies should be provided to cater for the specific storage needs of various food commodities (RB, 1992).

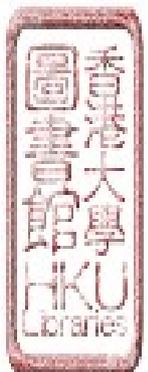
The suitable menu design can encourage the right-size food purchase of the customers. Menu review can also help understand the favorite cuisines from the customers. All parts of food materials can thus be better utilized. Good menus can therefore effectively promote food waste reduction at source (Hackes, Shanklin, Kim, & Su, 1997).

Consumer social responsibility (CNSR) can help reduce food waste. The customers should act ethically to avoid excessive food purchase. This can be strengthened in citizenship education through the media. Education in formal curriculum can also improve the environmental knowledge of the customers (Manning, 2013).

Corporate social responsibility (CSR) can protect the environment through effective kitchen waste management and environmental staff training to improve the environmental knowledge and awareness on food waste issues (Maloni & Brown, 2006).

2.2.3 Food waste and source reduction

Source reduction is internationally and academically recognized as the most effective way to solve the food waste problem in the waste hierarchy. The global food waste generation rate is increasing. Effective food waste source reduction program can drastically reduce the amount of food waste produced per capita per day



with significant environmental, economic and social benefits in sustainable development (Purcell, 1993).

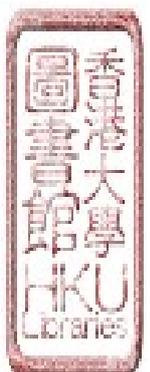
Food waste source reduction program can save landfill spaces and reduce the future landfill demand. The methane gas production in landfills can be minimized. Methane can lead to explosion when ignited by sparks, which poses a safety hazard in the disposal facilities. Source reduction emphasizes the changes of individual habits to reduce food waste generation. The burden on the Organic Waste Treatment Facilities (OWTF) can thus be drastically alleviated (Ueta & Koizumi, 2001).

Poor food waste management can create public health problems. Inappropriately stored food waste can attract mice and insects. The bad odors and bacterial growth impair the hygiene conditions and the quality of life of local residents. Source reduction can thus improve sanitation and public safety of the community. The food waste recycling amount can also be minimized (Lin, Huang, & Wahlqvist, 2009).

Source reduction contributes to greenhouse gases (GHGs) emission benefits. The GHGs emitted in the process of raw material preparation, product production and the transport of the reduced wastes can be minimized. The amount of carbon remaining in the ecosystem like the forests can be improved by saving wood and papers. The GHGs generated during the waste treatment process can also be substantially reduced (Ryu, 2010).

Saving food can minimize the raw materials use and resources wastage in the food manufacture. Energy, water, fertilizer and pesticide consumption can be significantly reduced. Global valuable natural resources can be preserved. Food waste minimization can thus reduce the local pollution and the global adverse environmental impacts (Shanklin & Hoover, 1997).

Food waste source reduction can lower the disposal costs in waste charging schemes in most of the developed countries. Tax benefits can be obtained by



donation to food banks in some countries. The household residents and business corporations are motivated by sufficient financial incentives to achieve environmental goals in food waste minimization. The government environmental expenditure would decrease if the MSW volume drops (Bates & Phillips, 1998).

The labor costs and over-purchasing expenses can be saved. The food waste handling costs from storage and transportation can be eliminated. The avoidable food waste disposal costs from excessive buying would decline. The productivity of staff can be improved by environmentally friendly operation design. Work efficiency is improved by minimizing workloads and mistakes (Wie, Shanklin, & Lee, 2003).

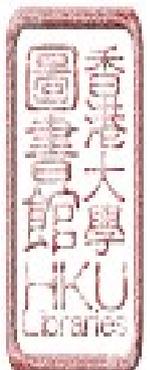
The poor households and elderly may not have sufficient food. Excessive food can be donated to the food banks for poverty alleviation. The basic needs of the poor can thus be satisfied. Sound food waste source reduction can minimize the social nuisance on the community. The environmental friendly culture can improve the corporate image and customer satisfaction. Source reduction can also improve the workplace safety (Leroux, 1999).

2.3 Consumerism and consumer behavior leading to food waste

The main causes on food waste are consumerism and consumer behaviors. Ethical consumerism and the principles affecting consumer behavior will be discussed to provide solutions to the problem. The household behavior and C&I sector behavior will be described. The supply and demand side behavior of the C&I sector will be further elaborated.

2.3.1 Consumerism

Consumerism is the belief which promotes the progressive purchasing of new goods and services without consideration of the negative environmental



consequences. It highly promotes the consumption to enhance the economy. Massive advertising and promotional activities are launched to create great desires for potential consumers. Materialism is the philosophy directing the consumer behaviors (Sterns, 2006).

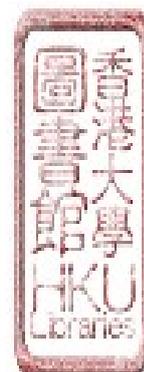
Consumerism has negative impacts on sustainable development. The customers are educated to follow the market trends rather than develop a healthy balanced society. Since consumerism encourages frequent buying activities of the citizen, catering industry have low incentives to provide food and beverage in suitable amount. They tend to provide excessive food to customers in order to maximize the profit. Without appropriate waste charging scheme, the environmental costs are externalized to the government waste disposal system (Lenzen & Cummins, 2011).

Local residents tend to causally dispose their food instead of careful source reduction. It can be reflected in the ordering style in traditional Chinese banquets. Consumerism and materialism provide the belief that we should provide excessive catering and beverages to the guests so that they have faces. The guests are not encouraged to take away the remaining food in order to have faces. The restaurants can maximize their profit when the amount of food ordered is maximized. This leads to unnecessary pressure on landfills and the adverse impacts on the municipal solid waste management system (Boden, 2003).

2.3.2 Ethical consumerism

Ethical consumerism is buying things ethically without negative impacts on humans, animals and nature. It consists of positive buying, moral boycott and conscious consuming.

Positive buying means that customers favor ethical products and companies. The businesses should promote fair trade, cruelty free operations and environmental



conservation. Some labels like 'Fairtrade' and 'Organic Trade Association' are used to show that the corporations practice ethical trading. If the restaurants highly promote food waste source reduction, the customers should support these ethical restaurants (Linton, 2012).

Moral boycott is the practice of negative purchasing in which the customers avoid buying products from companies with unethical behavior. The boycotts can be initiated by environmental damage of the companies, which results in significant damage of the corporate reputation. If the canteens do not promote source reduction, boycotts may happen to these restaurants (Harrison, Newholm, & Shaw, 2005).

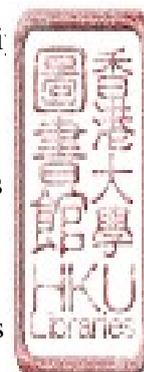
Ethical consumerism works with conscious consuming. Conscious consuming is a social movement that reflects the impact of consumer purchasing decision on the negative consequences on the environment by the influence of media and advertisements (Carrier & Luetchford, 2012).

2.3.3 The principles affecting consumer behavior

The main principles affecting consumer behaviors include legislation, financial incentives, moral motives, simple user-friendly system, social environmental belief and specific educational information.

Legislation is the mandatory measure imposed on all the local residents to change their behavior. Mandatory garbage sorting, for example, is implemented in Taiwan to legally require all the citizens to separate the rubbish into kitchen waste, resources and garbage before disposal to the solid waste collection system (McGarti, 2004).

Financial incentives can effectively promote food waste source reduction. Bijas vegetarian restaurant located in HKU is a case in point. It has implemented the Weigh What You Eat vegetarian buffet for customers. The amount of food ordered is



directly proportional to the price, which provides sufficient financial incentives to save food. The food waste volume is thus drastically reduced in this operation mode (Bates & Phillips, 1999).

Moral motives are also important to reduce leftovers. Christians and traditional Chinese, for instance, have a moral belief to treasure food. These morally responsible people tend to have food waste reduction habits in their daily life. Source reduction promotion on these people would have rewarding effects (Seel & Tian, 2003).

Simple user-friendly system can facilitate kitchen waste reduction, too. To quote an example, the green hotels have user-friendly system and encouraging atmosphere to allow the customers to take-away excessive food in banquets and dining. The volume of food waste generated can thus be reduced (Frenkel, Cummings, Scannell, Tang, & Maillacheruvu, 2008).

Social environmental belief can enhance the waste reduction. For instance, the Australian residents believe that waste reduction should be much better than landfill disposal. They have the correct environmental consensus, which highly facilitates food waste source reduction (Salleh, Ali, Harun, Jalil, & Shaharudin, 2010).

Specific educational information can help reduce food waste. For example, a simple guide on food cooking and storage can remind the residents to use every part of the food and provide proper storage to prevent spoilage (Plueddemann, 1994).

2.3.4 Household behavior

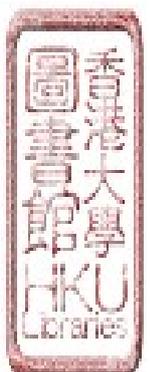
Household contributes to around 70% of the total food wastes internationally. The residents simply buy the food but did not consume. They often throw away avoidable good condition food to trash. Surprisingly, some research and surveys showed that the citizens claim they do not waste food at the same time. Besides, the food waste volume rises with the disposable income (Lazaros & Shackelford, 2008).



The customer food purchase judgments often go wrong. There is a great difference between the perception and actual food amount they need. They believe in healthy lifestyles so that lots of nutritious food is bought. They planned to consume them all originally. The citizens, however, are exhausted in weekday work. The actual food consumption is much lower than their purchase volume. Excessive purchase leads to increase in food waste volume. The citizens have lost touch with food. The wrong perception that food is cheap and plentiful leads to food wastes and obesity. The survival strategy on food and food production knowledge has been lost. The motivation on saving food has thus dropped to a low level. Such incorrect buying behavior leads to the disposal of large amount of edible food before expiry date. In addition, supermarkets encourage the household residents to have large quantity purchase to save money. Furthermore, volume-based waste charging system may not be implemented in the country. The disposal costs are thus externalized to the public, which make the food waste problems even worse (Drichoutis, Lazaridis, & Nayga, 2007).

Unsuccessful food waste source reduction is resulted from pessimistic household attitudes on environmental issues. Citizens simply buy excessive food without appropriately planned shopping list. They take unnecessary bulk purchase discounts which is much higher than the actual consumption amount. The fridge may not function properly to keep the temperature sufficiently low for storage. They may not have appropriate attitude to treasure food especially the edible ones. The leftovers are not reused while the cuisine serving amount is often more than necessary (Macy, 2002).

The recycling failure often discourages the household food waste reduction. The low accessibility and opportunities to recycling facilities promotes food waste generation. Household garbage sorting system may not be properly developed and



socially recognized. Selfish behavior without social responsibility makes food waste source reduction challenging (Yang, Li, & Fu, 2011).

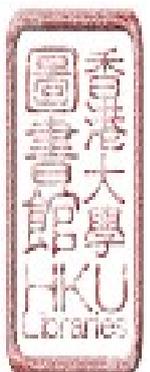
Food waste reduction centers may not be established to provide environmental education to the household. There are insufficient environmental education programs to equip their environmental knowledge and awareness to reduce unnecessary household food expenditure and develop healthy eating habits. Early childhood food waste reduction education may be inadequate to provide lifetime effects through simple environmental messages. The formal curriculum lacks useful knowledge about practical food waste reduction measures. Altruistic attitudes for the society are replaced by incorrect narcissistic minds. Adults may not be reminded through the media to save food. The community do not fully understand the adverse environmental consequences for ineffective food waste management (O'Connell, 2011).

2.3.5 Commercial and industrial sector behavior

The supply side of the commercial and industrial (C&I) sector mainly include foodservice companies, catering industry and food processing factories. The demand side is the customers. The supermarkets and restaurants create desires to shape the customer's needs. On the other hand, the supply side also responds to the wants from the demand side. It forms a circle with interdependent relationship. Food waste source reduction should therefore change the wasteful behaviors of both supply and demand side (Morganosky & Cude, 2002).

Supply side behavior

Supermarkets often throw away lots of food wastes daily. The disposed edible foods are deliberately destroyed to avoid scavengers from taking them. The

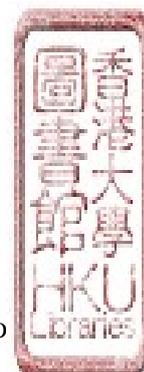


unscrupulous wasteful behavior has increased the burden on the MSW management system. Buy One Get One free (BOGO) often tempt consumers to buy unnecessary items (Jones, 2005).

The low ethical standard makes the management of supermarkets overrule the Code of practice and guidelines. Supermarkets and foodservice companies just simply throw away edible food instead of food donation. They externalize the food waste disposal cost to the government without appropriate recycling. The government officials may not cooperate well with the supermarket management board due to public distrust. The government and public concern on the food waste disposal practices are not fully reflected in the commercial sector. “Buy Now, Free Next Time” offers are often not used to sacrifice the environment for profit (USFNS, 2008a).

Little food waste source reduction knowledge sharing is conducted in the catering industry. Some hotels and restaurants do not perform food waste source reduction measures would suffer from lower customer loyalty and brand equity. Environmental awards and eco-labels may not provide sufficient incentives for the restaurants. The canteens are not operating at the optimum point to reduce food waste. The hotels may simply dispose the excessive buffet serving instead of food donation and staff benefits under cost accounting calculations. No financial rewards like free drink redeemable vouchers are provided to customers who can finish their dishes. Convenient doggy bags for leftover takeaway may not be provided in small restaurants. The serving amount is often inordinate to the actual consumption for profit maximization. Consumerist catering is therefore adopted by the industry. Schools and universities usually do not have trayless dining to reduce food waste in all-you-can-eat fare (Mensah, 2007).

Food processing companies may not provide split packs and resealable packs to



help consumer keep their food to extend the shelf life. Proper guidance on storage and usage are not provided to avoid food spoilage. Unclear packaging label leads to accidental food wastage (Dudlicek, 2010).

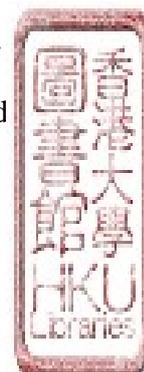
Demand side behavior

The customers may not have sufficient environmental knowledge and awareness to make food purchase decisions. They tend to make sustainable choices only when there are sufficient financial incentives.

Consumer responsibilities on food waste are significant factors to source reduction. Customers generally prefer perfect-looking food. Those nutritious foods without good-looking appearance are not their choices. Together with the fear of customer litigations on food poisoning, the foodservice companies generally do not put them on their shelf for sale. They simply discard lots of edible food without good appearance (Banwell et al., 2013).

Consumers expect that all types of food worldwide should be available to them all year round. The long traveling time increases the risk of food spoilage from global sources. If we allow a flexible and seasonal approach to our purchase, the flexibility would reduce the pressure of food producers to produce a surplus (Hume, 2007).

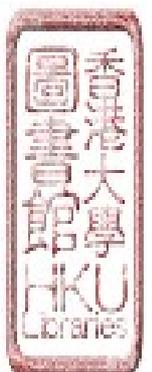
Customers often order excessive food in restaurants because there is no cost saving for smaller portion. The disposal cost of the remaining food is not borne by the consumers. They should practice food saving habits for right-size food purchase. The catering arrangements should be made convenient for customer to save food and money (USFNS, 2008b). Customers can have bring-your-own-container (BYOC) policy to buy exactly how much food they need in schools and universities rather than the excessive amount provided by the caterers (Concilio, 2006).



Restaurants may offer leftover takeaway services for customers. However, it does not mean that the customers will eat the takeaways. Since they do not know when the leftover are no longer safe to eat and how to reheat them, they just simply throw away the takeaways at home. They may be embarrassed to ask for a doggy bag for takeaways. Lack of moral responsibilities and environmental knowledge are the major causes for food wastes (Nassaurer, 2012).

2.4 Final words

The definitions and relationships on food waste, source reduction, sustainable waste management, consumerism and consumer behaviors are illustrated as the theoretical and analytical framework. The framework will be used as the criteria in the research study of food waste reduction at source in Hong Kong.



Chapter 3 Food waste management in Hong Kong

Hong Kong is a densely populated city. The prosperous economic and population growth leads to the boom in the amount of food waste generated. Limited organic waste collection and treatment system make food waste recycling difficult. The consumerist lifestyles and wasteful consumer behaviors of Hong Kong residents have contributed to the 3,584 tonnes of food waste generated daily. The food waste management should be substantially improved to meet the rising needs and public expectation (HKSARG, 2013c).

3.1 Hong Kong food waste problem

The daily domestic waste generation per capita in Hong Kong is 1.36kg (Figure 6), which is the greatest among Asian cities (Figure 7). The landfill rate is 52% in Hong Kong (Figure 8), which is also the highest among Taiwan, Singapore, Japan and South Korea. Hong Kong currently has no incineration facilities. The least preferred environmental option disposal is highly used instead of the most preferred waste reduction in the waste hierarchy (EPD, 2013e).

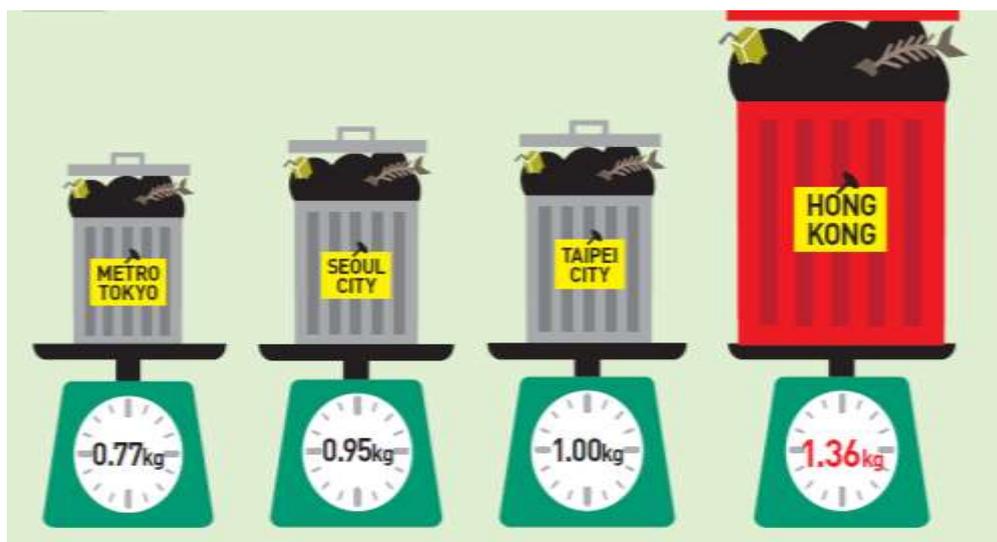
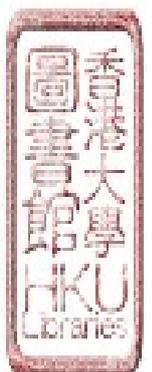


Figure 6: Hong Kong daily domestic waste generation rates per capita
Source: Environment Bureau (2013)



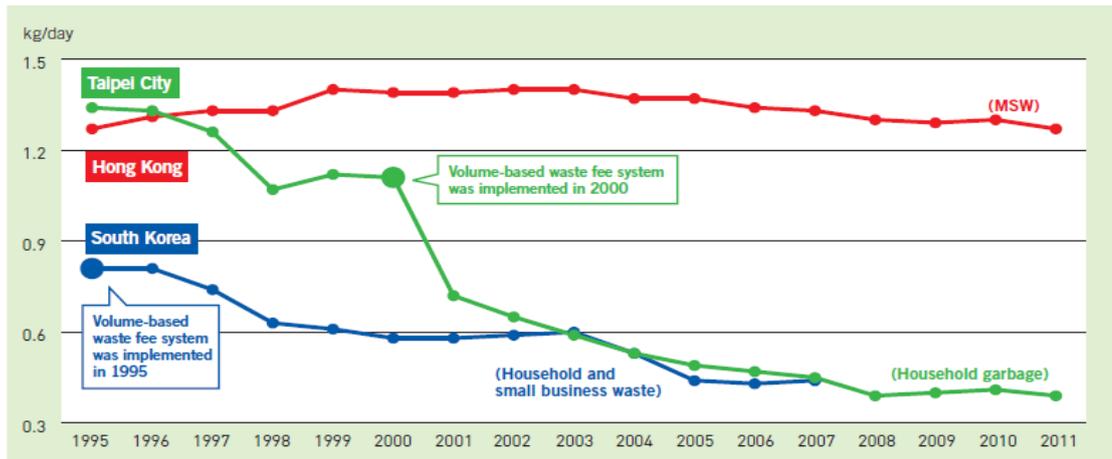


Figure 7: Waste disposal rates in Hong Kong, Taipei and South Korea
Source: Environment Bureau (2013)

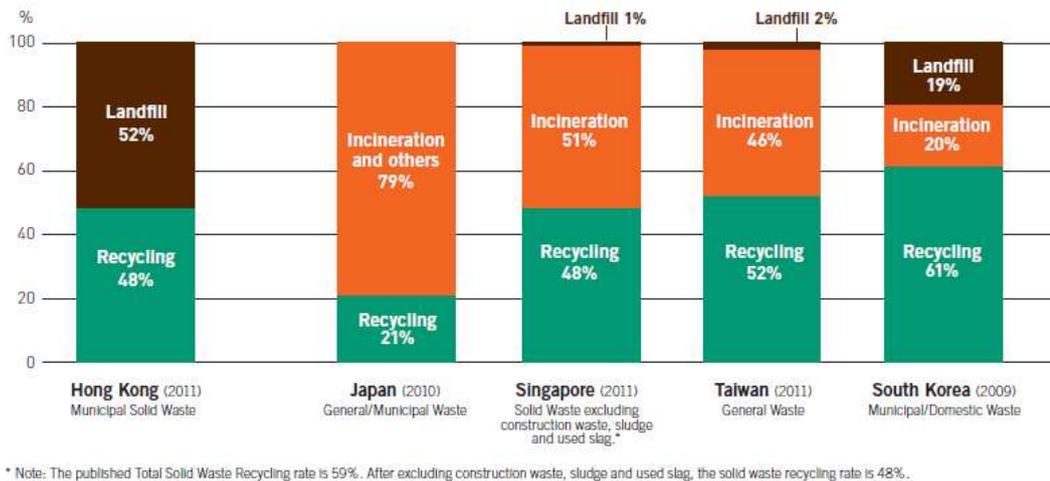


Figure 8: Comparison of waste management structure with other Asia areas
Source: Environment Bureau (2013)

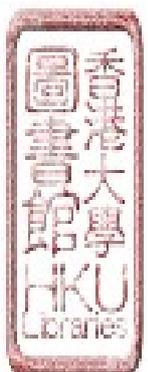
In addition to the various recycling initiatives, Hong Kong’s municipal solid waste (MSW) management system consists of three strategic landfills (Figure 9), a network of refuse transfer stations (RTSs) and collection services by government and companies. The strategic landfills are the West New Territories (WENT) landfill at Nim Wan, the South-East New Territories (SENT) landfill in Tseung Kwan O and the North-East New Territories (NENT) landfill at Ta Kwu Ling (Yu, 2006).





Figure 9: Hong Kong strategic landfill sites
Source: Environment Bureau (2013)

The landfills continue to take up 9,278 tonnes of MSW (Figure 10) daily, in which 38.6% is food waste (Figure 11). The construction costs of three landfills amounted to \$5.9 billion while the annual operating costs are \$485 million. The annual operating costs of the RTSs amounted to \$342 million. The Government expects that the landfills will be full by 2019. Consequently, new landfills of about 400 hectares should be developed for the expected usage until 2030. Domestic food waste contributes to 71.8% of the total volume produced every day, which is 2,868 tonnes in 2011. The C&I sector contribute to 28.2% of the total food waste. The unfinished student lunchboxes with plenty of rice is the major source of food waste from schools (FoE, 2013a).



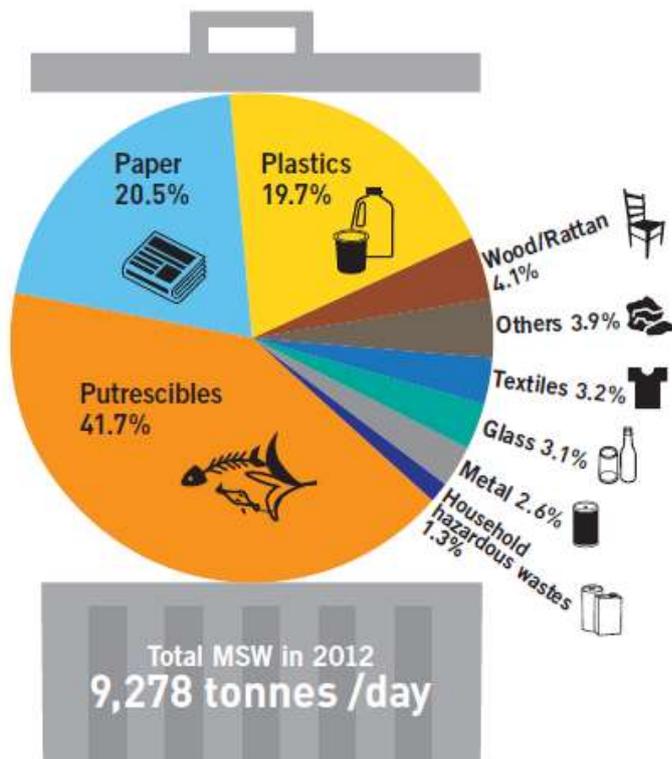


Figure 10: MSW composition 2012
Source: Environment Bureau (2014)

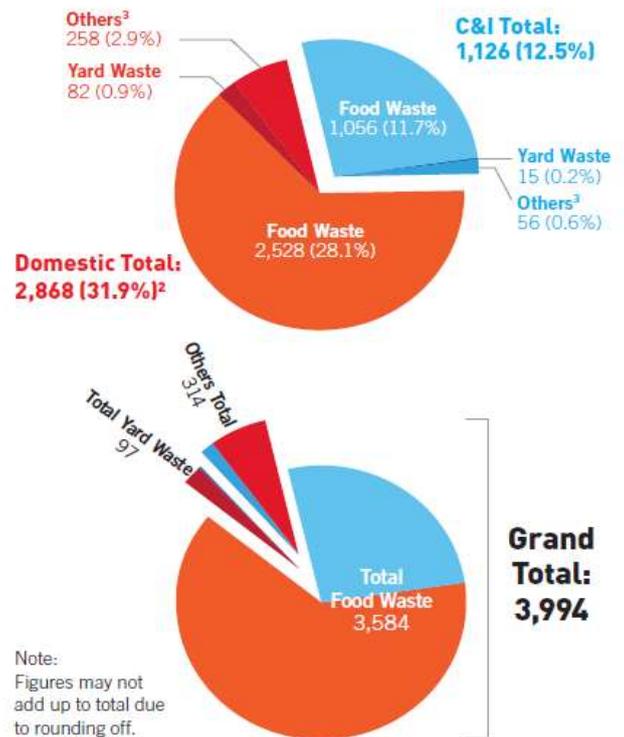
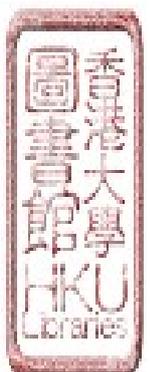


Figure 11: Putrescibles breakdown 2011
Source: Environment Bureau (2014)

The domestic food waste per capita of Hong Kong and Taipei are 0.13 and 0.07 tonnes respectively (Figure 12). It reflects that the environmental performance in Hong Kong is much lower than the one in Taipei. The current food waste collection system is not properly established in the community. The Hong Kong citizens doubt whether their participation would improve the food waste recovery. Public distrust is thus resulted on food waste reduction at source (ENB, 2013).



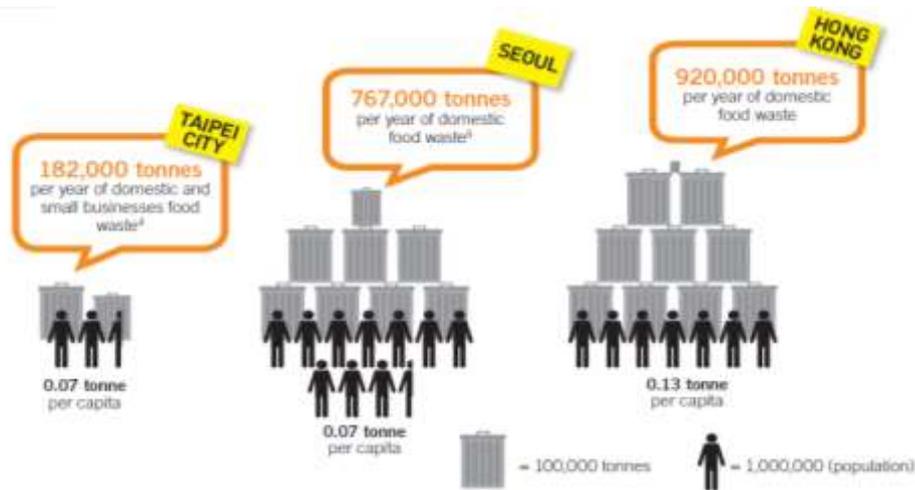


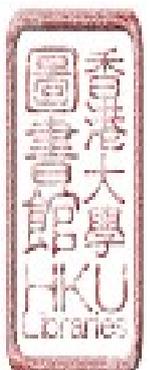
Figure 12: Food waste of Hong Kong and other cities from domestic sources
 Source: Environment Bureau (2014)

3.2 Policy efforts by the Government

3.2.1 A food waste & yard waste plan for Hong Kong (2014-2022)

A food waste & yard waste plan for Hong Kong (2014-2022) (the Plan) is the companion document to the Hong Kong blueprint for sustainable use of resources (2013-2022) (the Blueprint). The vision is “Use Less, Waste Less” on food waste. The food waste reduction target is set at 40% by 2022. The strategy for food waste has four main components. They include: mobilize the community, promote food waste separation, recycle separated food waste and treat non-separated food waste and final disposal.

The Plan (Figure 13) addresses the food waste avoidance, separation & collection, treatment & recycling and disposal strategies. The food waste management hierarchy (Figure 14) shows that the top priority is “food waste reduction at source” Food donation, food waste recycling and food waste-to-energy in anaerobic digesters are encouraged. Landfill disposal of food waste is minimized. The projected reduction in food waste volume will be around 2,100 tonnes by 2022



(Figure 15). Waste charging, Food Wise Hong Kong Campaign, Organic Waste Treatment Facilities (OWTF) and private facilities are expected to have significant waste reduction effects. There will be a considerable amount of food waste mixed with other MSW. The rest will be sent to landfill after the food waste reduction and recycling efforts. The community support and government commitment are critical to the success (ENB, 2014).

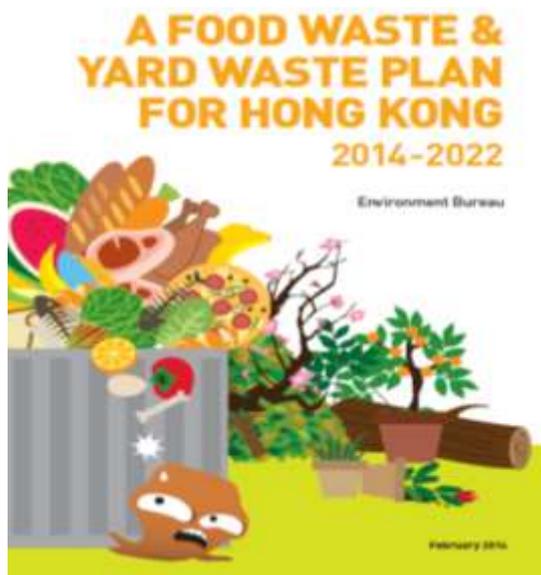


Figure 13: A food waste & yard waste plan for Hong Kong 2014-2022
Source: Environment Bureau (2014)

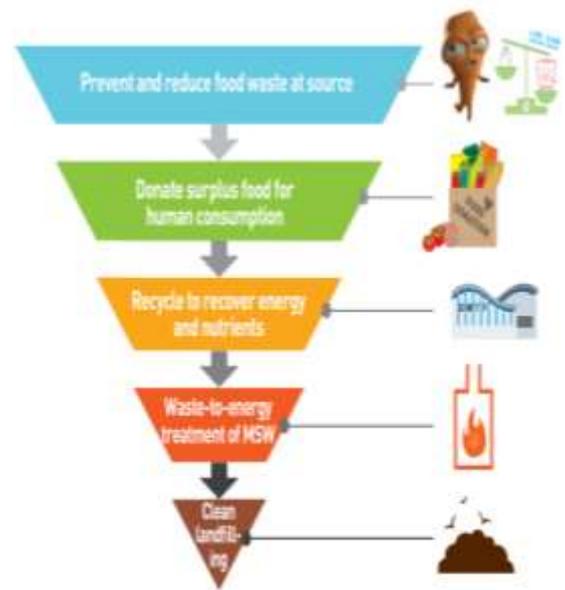


Figure 14: Food waste management hierarchy
Source: Environment Bureau (2014)

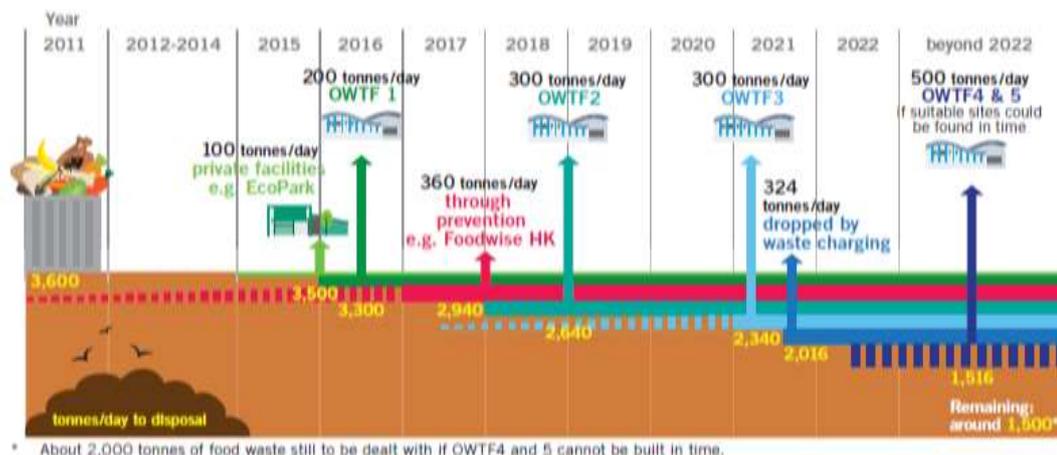
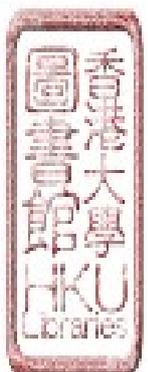


Figure 15: Projected reduction in food waste volume
Source: Environment Bureau (2014)



The food waste plan reflects the determination of the Government to solve the problem. The reduction target 40% is really aggressive. We may not fully achieve 40% waste reduction, it is better to use a higher target, though. If we set the target at 40%, we may achieve around 30% actual waste reduction. If we set a lower target at 25%, the actual waste reduction may be only around 15%.

The food waste source reduction incentives of the individuals and companies mainly rely on policy and legal requirements, financial incentives and moral motives. The food waste plan has well addressed these areas and matches the public expectation. Besides, the OWTF development makes the food waste management system much more user-friendly. It should be a positive shift of the environmental policy and the focus on food waste management is well-justified.

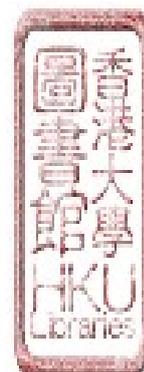
3.2.2 A policy framework for the management of municipal solid waste (2005-2014)

A policy framework for the management of municipal solid waste (2005-2014) (the Policy Framework) described the MSW management strategies in Hong Kong. It aims at source reduction, polluter pays principle and advanced waste treatment technologies. The citizens and companies should bear their own eco-responsibility with appropriate economic incentives to adopt sustainable lifestyle (FT, 2007).

The targets of the Policy Framework are described below:

- ✓ The amount of MSW produced in Hong Kong should be reduced by 1% annually until 2014 based on the 2003 situation.
- ✓ The recovery rate of MSW should be increased to 50% by 2014.
- ✓ Total MSW disposed to landfills should be reduced to less than 25% by 2014 (EPD, 2005).

Three policy tools are proposed:



- ✓ Waste charging alters the casual purchasing and disposal decisions of local residents and companies. The polluter pays principle would make them responsible for the environmental costs and adopt sustainable lifestyles (ENB, 2012).
- ✓ Producer Responsibility Scheme (PRS) ensures the “end-of-life” products are properly treated. The community should be responsible for recycling and treatment of “end-of-life” product to promote sustainable development. (ENB, 2010).
- ✓ Landfill disposal bans helps preserve the landfills. Specific materials are banned to be disposed at landfills to ensure its useful life (Wolf, 2009).

Two support measures are introduced:

- ✓ State-of-the-art technologies are used for waste treatment. Unavoidable wastes are treated in a cost-effective and sustainable way (Cowan, 2010).
- ✓ Legislation and education should be used to complement the policy tools. Mandatory measure should be implemented through legislation to ensure its compliance (Sive, 1977). Education is performed through the Environmental Campaign Committee (ECC) to promote the public awareness of environmental conservation (Stevenson & Dillon, 2010).

The policy framework is only useful to some extent. Construction waste charging and landfill disposal bans have been effective. The environmental outcomes are not sufficient to meet the high public expectation.

3.2.3 Hong Kong blueprint for sustainable use of resources (2013-2022)

The Policy Address 2014 emphasizes the food waste source reduction and supports the kitchen waste recycling industry for sustainable development (HKSAR 2014b).



The 10 year waste reduction target is 40% (Figure 16). The HKSAR Government expects to decrease the landfill rate from 52% to 22% by 2022. It will also provide energy recovery facilities and improve leftover recycling in the coming 10 years (Figure 17) (ENB, 2013).



Figure 16: Hong Kong food waste disposal rate reduction targets
Source: Environment Bureau (2013)



Figure 17: Hong Kong food waste management structure targets
Source: Environment Bureau (2013)

“Use less, waste less” shared value is promoted in the Hong Kong community. It is the social contract between the Government and the Hong Kong residents. Every food product consumed comes from natural resources. Excessive food consumption should be avoided to reduce kitchen waste volume, conserve materials and minimize



greenhouse gas emissions. Sustainable food waste management should therefore be adopted by every Hong Kong citizens based on ethical consumerism (Raven, Berg, & Hassenzahl, 2012). The Joined-up Action Agenda (Figure 18) on food waste management are based on social mobilization, policy development & legislation and infrastructure investments (ENB, 2013).

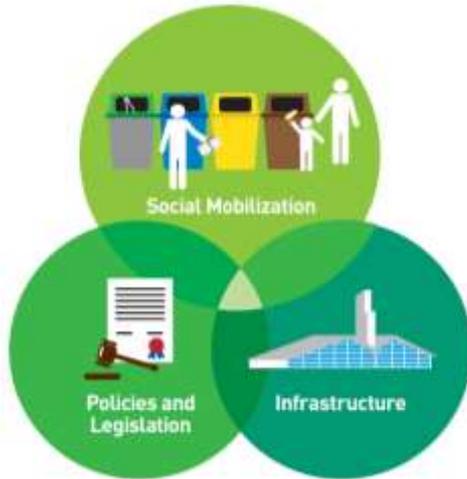
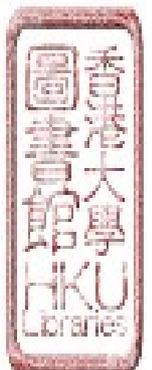


Figure 18: Joined-up Action Agenda
Source: Environment Bureau (2013)

Social mobilization on food waste source reduction is mainly through the Food Wise Hong Kong Campaign. The Government would also provide funding for small-scale food waste treatment facilities through Environmental Conservation Fund (ECF). The cooperation among the Government, food waste recycling companies and District Councils are strengthened to reduce food waste (Steinberg & VanDeveer, 2012).

Policy development & legislation focuses on the MSW charging and Producer Responsibility Scheme (PRS). PRS allocates the leftover disposal costs to the foodservices companies instead of the Government (ENB, 2010). Green procurement is encouraged in the Government (Roberts, 2011).

The OWTF network, incineration plant and landfill extensions will be established for the food waste disposal. Community Green Stations (CGS) are



operated by environmental groups to promote green living habits. EcoPark is established to provide affordable long-term land for the food waste recycling companies. The existing waste separation and collection system will be modified to promote food waste recycling (Kagioglou & Tzortzopoulos, 2010).

The Blueprint shows the determination of the Government to tackle the environmental problems. The policy directions should be supported by future actions to build the public confidence. The source reduction incentives are low because the disposal costs are externalized. Ethical consumerism and environmental education are insufficient to meet the growing need on food waste reduction (EPD, 2005).

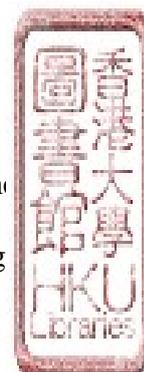
3.3 Source reduction related programs

In Hong Kong, the Government, green groups, food banks and food waste recycling companies are the active members in food waste management. A green group is a non-governmental organization (NGO) which aims at minimizing the deterioration of the ecological environment. They comments on food waste issues with significant influences on the government and companies. They help improve the environment by reducing pollution, resources depletion and climate change. Greeners Action and Friends of the Earth are the examples of green groups which promote food waste reduction in Hong Kong (Lowe & Goyder, 1983).

3.3.1 Consumer behavior related programs by the Government

Food Wise Hong Kong Campaign

The Food Wise Hong Kong campaign (Figure 19) was officially launched by the HKSAR Government for food waste source reduction in 2013. The Food Wise Hong Kong Steering Committee, which is chaired by the Secretary for the Environment,



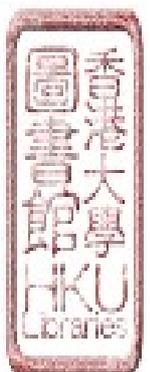
focuses on the consumer behavior changes for food waste source reduction. It coordinates the efforts of the customers, foodservice suppliers, the Government and green groups for synergy (FoodWise, 2013c).



Figure 19: Food Wise poster
Source: Food Wise Hong Kong (2013)

The Subcommittee on Food Waste Reduction Good Practices in Institutions and Commercial and Industrial Establishments provide the best practice guides to food & beverage companies, hotels, residential areas and shopping malls for green habits. Subcommittee on General Publicity and Education promotes the changes the environmental belief of the Hong Kong citizens to waste reduction instead of disposal and encourage food donations to charities. Both subcommittees periodically reports to the Steering Committee on the progress for evaluation (FoodWise, 2013a).

The Food Wise Charter is prepared for corporate public participation. The Statement of Commitment shows that the participants understand that food waste is a serious problem in Hong Kong. They are committed to reduce food waste for sustainable development. The companies set targets and implement reduction plans by changing the business settings. They conduct waste audits for analysis of food



waste situations and provide environmentally friendly recipes. They support Food Wise Hong Kong Campaign to drive the cultural changes to waste reduction. The successful activities and waste reduction efforts will be recognized by the Steering Committee. Food Wise Ambassadors are currently recruited with appropriate trainings to minimize food waste. They spread the news of Food Wise Hong Kong Campaign in the community to promote the environmental awareness and knowledge (FoodWise, 2013b).

Food Wise Hong Kong Campaign mainly relies on the moral motives of Hong Kong residents. There should be some environmental benefits. Hong Kong people are highly motivated by money. Comparatively, waste charging can have more conspicuous effects because it provides suitable financial incentives.

Food Waste Reduction Program

The EPD has initiated the Food Waste Reduction Program (Figure 20) as publicity activities with the District Council and Greeners Action in shopping malls to promote food waste source reduction. No leftover program has been launched to improve the public awareness in cherishing food. Greeners Action inspectors will look for the no leftover customers in participating restaurants, who will have a chance to win a prize. Shopping mall exhibitions and composting plant visits are arranged to equip the food waste reduction knowledge for Hong Kong residents. Seminars on Good Food Waste Reduction Management are provided to the catering industries (GA, 2013).

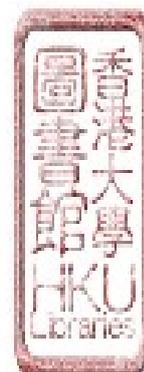




Figure 20: Food Waste Reduction Program

Source: Greeners Action (2013)

Food waste reduction program also depends on moral motives. The promotion of the program is not extensively performed. The effects are diminished because the dominant Food Wise Hong Kong Campaign has already covered its function.

Green lunch charter and On-site meal portioning in schools

The Environment Bureau and Education Bureau jointly launched the Green Lunch Charter in 2010 to promote food waste reduction at source (Figure 21). On-site meal portioning projects in schools is launched to avoid serving excessive food to students. Additional serving is only given on request. Different sizes of lunch boxes are provided to minimize food wastage. Central portioning option and reusable lunch boxes are more preferred than disposable lunch boxes. Sufficient facilities and space should be provided for central portioning. The students are encouraged to avoid food wastage. Environmental policy on meal arrangement should be discussed with parents and students (EPD, 2014).

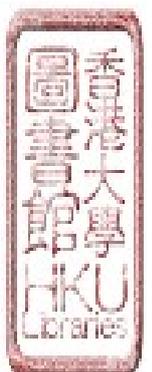




Figure 21: Green lunch charter

Source: Lam Tai Fai College (2014)

Quantity-based waste charging system

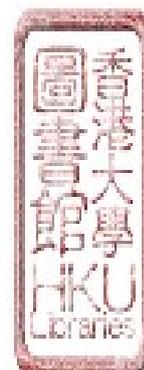
Quantity-based waste charging provides adequate financial incentives for people and companies under the “pay-as-you-throw” principle (Figure 22). The Council for Sustainable Development (SDC) is conducting public consultation to collect the opinion from the community. It will significantly change the consumer behavior and decision-making of the polluters (ENB, 2014).



Figure 22: Quantity-based waste charging system

Source: Environment Bureau (2014)

The food safety guidelines for food recovery



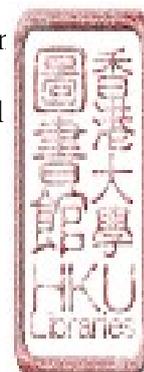
The “food safety guidelines for food recovery” emphasizes the food safety principles on the type of donated food and the processing steps involved. Food donations should be obtained from reliable sources. The food recovery program operators should understand the operations of the food donors. The food should be packed in clean containers with pack-date and expiry date marked. Proper storage and thorough heating can safeguard the food safety. Food hygiene training should be provided to food handlers to keep good personal hygiene. When the food safety is in doubt, simply throw the food away (CFS, 2013).

Food waste source separation, collection and delivery

Voluntary food waste source separation, collection and delivery are currently adopted in Hong Kong, which is only in the pilot stage. The waste generators should be responsible for the separation. Food waste vehicles are needed to collect and deliver food waste without leakage and odour. The current status is merely gaining experience in the housing estates and C&I sector. The Environment Bureau is planning to broaden the implementation of food waste separation, collection and delivery in Hong Kong (ENB, 2014).

Community Green Station

The Government plans to develop one community green station in each of the 18 districts in Hong Kong community. The stations will be run by NGOs with sufficient funding of \$400 million. It will be responsible for environmental education and recyclables collection in the local community. The environmental education will involve food waste reduction messages. The green stations will collaborate with Hong Kong residents, companies, government, green groups, schools and relevant stakeholders on environmental education. It will also support the Community



Recycling Network (CRN) and promote the separation of waste at source (HKSARG, 2014b).

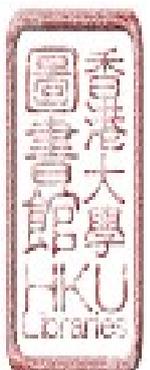
Environmental awards and eco-labels

Hong Kong Awards for Environmental Excellence (HKAEE) is led by the Environmental Campaign Committee (ECC) to encourage corporate green management and innovations. The Advisory Council on the Environment (ACE) and the Business Environment Council (BEC) has provided significant support to the HKAEE. The Wastewi\$e Label is the recognition scheme of Environmental Labels for waste reduction. The Hong Kong International Airport (HKIA) has been awarded the Class of Excellence of the Wastewi\$e Label because of its enthusiastic waste reduction efforts. HKIA has started collecting food waste from airport caterers, hotels and cargo terminals to provide proper waste source separation. The food waste is converted into composts for airport use and fish meal in the off-site plant (HKAEE, 2010).

Wastewi\$e Label (Figure 23) is the information-based instrument to provide incentives to improve corporate image and reputation. The “Food Wastewi\$e Label” can be especially designed to promote kitchen waste reduction.



Figure 23: Wastewi\$e Label
Source: ECC (2014)



Environment and Conservation Fund

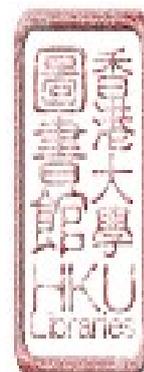
The Environment and Conservation Fund (ECF) was established in 1994 under the Environment and Conservation Fund Ordinance (Cap. 450). The Secretary for the Environment is legally appointed as the trustee of the ECF. It provides financial support for environmental and conservation projects in Hong Kong. The public expects the recipient organizations should be of high standard of integrity. The relevant vetting subcommittees will consider the applications based on the sustainability and education value in a fair manner. The NGOs can apply for the ECF with non-profit making environmental projects. The operation of funded projects should comply with the funding conditions and requirements. The Stage Report and Final Report to the Secretariat should be submitted during and after the completion. An audit report is required for a grant of more than HK\$150,000 conducted by a professional accountant (ECF, 2013).

3.3.2 Consumer behavior related programs by the NGOs

Waste No Food campaign

Friends of the Earth has launched the Waste No Food campaign (Figure 24) to promote “Cherish food, waste no food” belief to the Hong Kong residents. Environmental education is provided to the students on food waste issues. Teaching materials, video and audio clips, posters and action tips on food waste source reduction are prepared for teachers in deepening the Waste No Food belief in the primary and secondary school students (FoE, 2013a).

Waste No Food campaign is very similar to Food Wise Hong Kong Campaign and Food waste reduction program. The environmental outcomes are favorable only when the Waste No Food belief works with related food waste programs like light



banquet campaign.



Figure 24: Waste No Food campaign
Source: Friends of the Earth (2013)

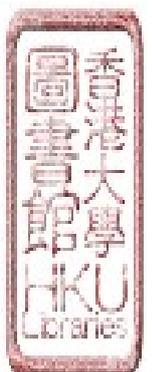


Figure 25: Light banquet campaign
Source: Friends of the Earth (2013)

Light banquet campaign

Light banquet campaigns (Figure 25) are conducted because lots of food waste comes from Chinese banquet tables. “Order Less Waste Less, More Blessings” is the philosophy in the light banquet campaigns. Green menu is provided to reduce the number of courses by two. It has gained support from the Sustainable Development Fund and the catering industry. The consumers are encouraged to cut at least 2 courses and order the suitable amount of food. Zero waste in banquets is promoted by motivating the guests to bring their own containers to take away excessive food (FoE, 2013b).

Light banquet campaign has changed the consumer behavior of traditional Chinese banquets to source reduction. The zero waste concept becomes dominant idea instead of excessive food serving for saving face. It also provides adequate financial incentives to reduce the courses by two. It should be widely promoted in Hong Kong for food waste source reduction.



Food for Good

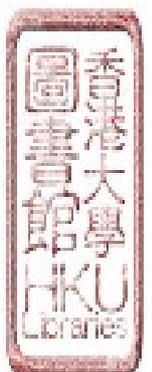
Food for Good is the green group which promotes food waste reduction and recycling in Hong Kong. Sustainable lifestyles and surplus edible food redistribution are encouraged in the program. The founder and patron is the Chief Executive's wife Mrs. Regina Leung. Foods for Good press conference, seminars, community kitchen, community garden and food donation activities are organized. They have invited a local cartoonist to using a famous cartoon character, McDull (Figure 26), to promote the food waste reduction messages (FG, 2014).



Figure 26: McDull supports food waste reduction at source
Source: Food for Good (2014)

Hong Kong Green Day

Hong Kong Green Day (HKGD) (Figure 27) was held on 5th June 2013 by Green Council to celebrate the World Environment Day (WED) of the United Nations Environment Programme (UNEP). The theme for WED 2013 is



Think.Eat.Save. The Love Food, Waste Not campaign aims at improving the public awareness on the adverse environmental impacts on food choices and consumerist lifestyles (UNEP, 2013). The Environmental Campaign Committee (ECC) has launched various publicity programs to improve the Hong Kong consumer behaviors to source reduction. The community collective decisions on food waste reduction can save money and minimize the negative environmental impacts (GC, 2013).



Figure 27: Think.Eat.Save
Source: Green Council (2013)

Hong Kong Green Day has limited effect on leftover reduction. However, it is good to improve the environmental awareness through a series of activities in HKGD.

Food donation

A food bank is a non-profit charity which distributes food to the poor. The local food banks usually adopt the front line model. The examples are Food Grace, Foodlink Foundation and Food Angel Food Recovery Program (Figure 28). The donated food is mainly the excess unsold food near the expiry dated from the catering companies and food wholesalers (Raizman & Ritvo, 2005).

The food banks are usually supported by individual donors, foodservice suppliers and volunteers. The donated food is then cooked with high food safety and delivered to serve the needy (ATV, 2005).

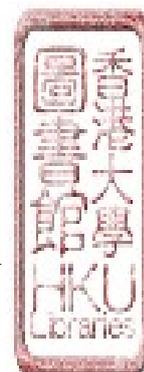




Figure 28: Jacky Cheung supports Food Angel and food donation.
Source: Food Angel (2014)



Figure 29: Food recovery program
Source: Food Grace (2013)

Food Recycling Scheme launched by Food Grace (Figure 29) of the Hong Kong Confederation of Trade Unions (HKCTU) facilitates the food waste source reduction in Hong Kong. It aims at tackling the food waste problem and helping the grassroots. It successfully saves 30,000 kgs of food annually (HKCTU, 2013).

Food banks serve an important function in food waste reduction and poverty alleviation. The operations are currently maintained by the green groups. The Government can provide more financial support to the food banks.

3.3.3 Effective recycling for source reduction

Food Waste Recycling Partnership Scheme

The EPD introduced the Food Waste Recycling Partnership Scheme (Figure 30) in 2009. This program aims at developing food waste source separation and recycling practices in the C&I sector. The working groups members include the government officials and catering managers (EPD, 2013d).

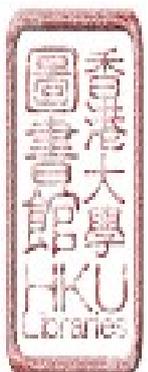




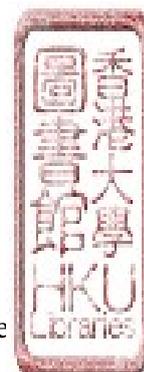
Figure 30: Food Waste Recycling Partnership Scheme
Source: Greeners Action (2013)

The scheme lasts for 3 years and the participants conduct food waste source separation. The sorted food wastes are transferred to designated collection bins provided by EPD, which will be delivered to pilot composting plant. Practical guidelines are provided to foodservice suppliers for food waste reduction and source separation (GA, 2011). Competition of Good Food Waste Reduction Eatery and leftover decomposer visits are also organized to improve the environmental awareness. Housing Department shared their experience in using food waste recycling machines in the sharing session (HKSA, 2013).

Food Waste Recycling Partnership Scheme is a good start to gain practical food waste recycling experience. The whole community should proactively participate in the social mobilization.

Food Waste Recycling Projects in Housing Estates

The Budget 2013-14 provides \$5 billion in the Environmental and Conservation Fund (ECF) for green projects initiated by the community (HKSARG, 2013a). The ECF then provides \$50 million to establish the Food Waste Recycling Projects in Housing Estates (Figure 31) to promote household food waste source reduction, garbage sorting and recycling. Housing estates will be subsidized to install on-site food waste composting machines (ECF, 2010). The EPD and Hong Kong Productivity Council (HKPC) have launched the help-desk services to coordinate the



food waste projects. Educational and promotional activities on kitchen waste source reduction, collection and recovery will be financed (EPD & HKPC, 2013).

These projects have changed the household behavior to prepare food waste for recycling purposes. The professional advices on suitable site for waste treatment facilities installation, food waste planning and performance evaluation make the projects user-friendly.

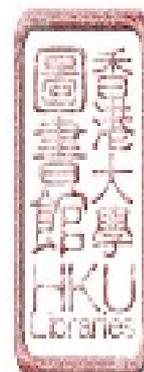


Figure 31: Food Waste Recycling Projects in Housing Estates

Source: Environment Bureau (2014)

The Islands Food Waste Recycling Scheme

The EPD has launched the Islands Food Waste Recycling Scheme on Cheung Chau and at Yung Shue Wan on Lamma Island in 2012. It helps social mobilization of food waste reduction and recycling on local residents and foodservice suppliers. Free collection bins for food waste are provided around catering restaurants and hostels. The food waste will be transferred to the local refuse transfer stations every day by the waste collection team. The food waste processor with a total daily capacity of 300kg will change the leftovers into organic fertilizers, which will be donated to local residents and community organizations for greening. Practical guidelines on food waste management and recycling are provided to them. Besides, environmental awards are given to the participants to appreciate their food waste reduction and recycling efforts (HKSARG, 2014c).



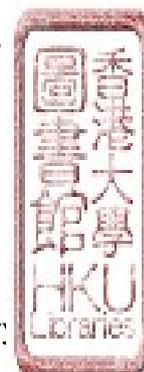
Steering Committee to Promote the Sustainable Development of the Recycling Industry and the Recycling Fund

The Steering Committee to Promote the Sustainable Development of the Recycling Industry has been established in August 2013 to promote the development of all recycling industry. The Chairman of the Steering Committee is the Chief Secretary for Administration. Food waste recycling may be involved in the future. At this stage, the Committee will focus on the low-value recyclables and recycling companies facing lots of difficulties (HKSARG, 2013d). The Policy Address 2014 allocated \$1 billion to the Recycling Fund for machinery purchase to support the recycling activities. The mode of operation and details will be developed in the future (HKSARG, 2014b).

Food waste recycling industry

The local food waste recycling companies are responsible for the routine food waste collection services and renewable material supply. Daily food waste recycling services requires special treatment due to its high water content, which may leads to odor and hygiene problems. One-stop recycling services are therefore provided on 24 hour, year round and onsite basis. Proper sorting and carbon footprint audit on food waste are also performed. Student lunch boxes are also collected to reduce food wastes (ATV, 2012).

The local food waste recycling industry is not lucrative. It makes the source reduction difficult because of unsuccessful recycling activities. The main difficulties include lack of government support, insufficient land, inadequate funding, lack of financial incentive for catering business, high operation cost and small food waste product markets (SCMP, 2013a). The government can provide subsidies to these recycling companies to maintain breakeven and liquidity. Once the recycling industry



prosper, the subsidy can be removed.

Hong Kong Organic Waste Recycling Centre

The Hong Kong Organic Waste Recycling Centre provides environmental education and waste management consultancy services to the community. Food waste reduction systems and processors are available for rental and sales to the companies and housing estates. Advanced biotechnology and after-sales services are launched to support the food waste management. High quality fertilizers and animal feed are made for market sale (HKOWRC, 2013).

EcoPark

EcoPark (Figure 32) is the recycling-business park of the EPD located in Tuen Mun. It provides affordable long-term land and environmental infrastructures for the recycling industry to facilitate capital investments, cash flows and advanced technologies. Synergy, vertical integration and prestige are the major advantages of the EcoPark. The management company of the EcoPark would also provide security, cleansing, marketing and operation-related services to the environmental companies. South China Reborn Resource (Zhongshan) Company Limited is the food waste recycling company located in the EcoPark. It recycles food waste to produce high protein content feed for poultry and aquaculture (EcoPark, 2013).

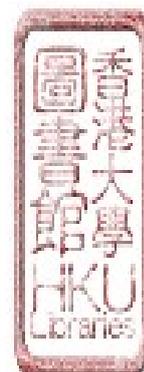




Figure 32: EcoPark

Source: EcoPark (2013)

EcoPark provides economies of scale and effective coordination in recycling industries. It can be further expanded to provide support to the local recycling industry.

3.4 Other food waste management programs

Organic Waste Treatment Facilities network

The organic waste treatment facilities (OWTF) process well-separated food waste to useful products by biological technologies. Aerobic composting change the food wastes to organic fertilizers. Anaerobic digestion turns the organic waste into biogas for energy supply (EPD, 2010).

The OWTF consists of six phases. The processing capacity of food waste is about 470 tonnes for phase 1 & 2, which is only 12.2% of the total daily production. The proposed locations for the OWTF are Siu Ho Wan, Shaling and Shek Kong (Figure 33). The Environmental Impact Assessment (EIA) report was approved by the Director of EPD. Phase 1 is now in progress on preparation work while phase 2 is conducting the feasibility study (EPD, 2013b).

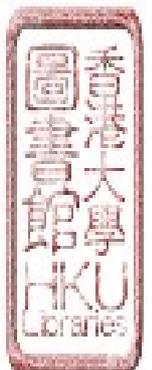




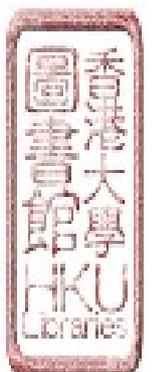
Figure 33: Network of Organic Waste Treatment Facilities (OWTF)
Source: Environment Bureau (2014)

The EPD developed the pilot composting plant at the Kowloon Bay Waste Recycling Centre (KBWRC) in 2008. The purpose is to gather experience on treatment of food waste and application of biological technology. In-vessel composting technology is used in the composting plant. The treatment capacity is 500 tonnes of food waste, in which 100 tonnes of compost are produced (EPD, 2013a).

It is expected to spend 10 years to build sufficient OWTF for the Hong Kong community. The success depends on the community support of the OWTF establishment.

Food waste-to-energy and anaerobic digestion

The Environment Bureau plans to recycle food waste mainly into renewable energy in the anaerobic digesters. Hong Kong has a great need for energy. On the contrary, Hong Kong has limited agriculture and poultry development. On-site composting in Hong Kong is not suitable because of the dense urban environment



and operational challenges. Besides, the trading market of compost and animal feed products has not been developed. So, the preferred option is anaerobic digestion for energy instead of composting and animal feed production (EMSD, 2014).

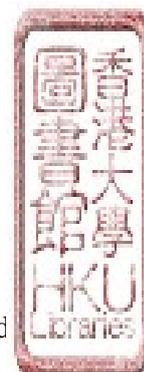
Food waste technology research and development

The university researchers are exploring new food waste treatment technologies in Hong Kong, which is supported by the ECF funding. The newly developed biological treatment technology will be applied into the future food waste development projects. The Green Technology Consortium also promotes the food waste recycling in Hong Kong. The Environmental Microbiology and Biotechnology Laboratory of the City University of Hong Kong is conducting research on biotransformation of food waste to bioenergy (CityU, 2014a). Starbucks Hong Kong has invested in the biorefinery technology to change kitchen waste into succinic acid for plastic production (FF, 2014). The Assistant Professor Dr. Carol Lin at the City University of Hong Kong is conducting research on the valorization of food waste through conversion into commercially valuable products like bio-degradable polymer (CityU, 2014b).

3.5 The need for food waste source reduction in Hong Kong

The continued expansion on food waste volume leads to heavy workload on food waste treatment, rising food waste disposal cost, lack of respect for nature and insufficient justice to the community.

The treatment of food waste is difficult. Most of the food wastes are currently disposed at landfills. High water-content food wastes are difficult to be burnt in the incinerators. Lack of OWTF infrastructure makes the recycling inconvenient. The food waste product markets and local consumption are too small for the compost and



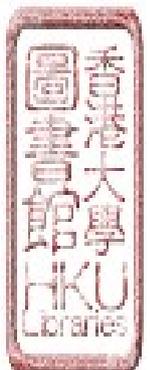
animal feed produced (Hu, Zhang, Yu, & Zhang, 2012).

The food prices keep rising in the coming years. So, the pricelists in the menu would continue to increase. If the amount of food waste is reduced, the menu prices and leftover disposal costs can be reduced. The inflation rate in Hong Kong was 3.7% in December 2012 (TE, 2013). The Consumer Price Index (CPI) on food increased by 7.0% in 2011. The prices of beef, pork, poultry, fresh fruit and salt-water fish has risen by 11.4%, 18.5%, 8.7%, 10.9% and 20.5% respectively. There is a general rising trend on food prices in recent years (CSD, 2011).

Starvation is still a common problem around the world. FAO estimates that there are 868 million people are in hunger globally in 2010-2012 (FAO, 2012). In Hong Kong, there are around 1.3 million of citizens live below the Hong Kong Official Poverty Line. We should respect the nature which nurtures food. If the edible food are appropriately distributed to the poor instead of treating them as food waste, social justice will be strengthened in the Hong Kong community (FoE, 2013a).

3.6 Final words

The food waste problem is serious and urgent in Hong Kong. The food waste management policies and infrastructure are only in the preliminary stage with limited prior experience. A significant proportion of food waste is simply disposed to the landfills. Sustainable waste management and principles affecting consumer behavior should be included in the food waste policies. The Taiwan kitchen waste policies can be adopted in Hong Kong. The consumer behavior changes on food waste reduction are expected to be similar in both Hong Kong and Taiwan. The consumers, foodservice suppliers, the Government and NGOs should cooperate to promote food waste reduction at source.



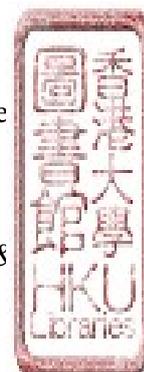
Chapter 4 Taiwan case study

Both Taiwan and Hong Kong are located in the East Asia. Taipei is the political, economic and cultural center of Taiwan. They share highly similar food consumption patterns in the Chinese-dominated societies, high-income economies and nearby geographic locations. The Chinese diet mainly consists of cereals, meats, fruits, vegetables and aquatic products (Wu, 2004). In 2011, the putrescibles in Taiwan and Hong Kong are 40.6% (TEPA, 2012) and 44.0% (ENB, 2013) respectively. They need similar OWTF to solve the solid waste problems. The comparability on the study is thus high based on the food consumption patterns and MSW composition.

4.1 The purpose and context of the Taiwan case study

The purpose of the Taiwan case study is to provide a comprehensive comparison between Hong Kong and Taiwan on food waste source reduction. The theoretical relationship between food waste, source reduction, consumer behavior, consumerism and sustainable waste management can be reflected in Taiwan practices. We can learn from the Taiwan food waste source reduction practices, environmental cultures and zero waste policies for insights. The overseas case study can then provide appropriate suggestions on Hong Kong food waste source reduction. Since successful food waste recycling can promote the positive consumer behavior on waste reduction, the Taiwan kitchen waste recycling activities will also be investigated.

Taiwan is internationally appreciated on the food waste management. The Environmental Performance Index (EPI) 2014 of Taiwan is 62.18 with the ranking 46th among 178 countries (Yale & Columbia, 2014). The top four Asian countries are Singapore (4th, 81.78), Japan (26th, 72.35), South Korea (43rd, 63.79) and Taiwan (46th, 62.18). It has strong environmental performance on the health impacts, water & sanitation, forests, fisheries and climate & energy (Yale, 2014).



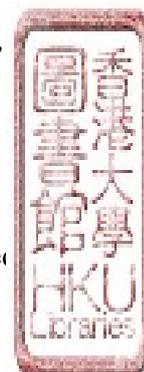
The Taiwan food waste recycling and reuse program officially becomes the significant component of the Green Industry of the “Six-Year National Development Plan” and “General Waste Resource Recycling Promotion Program” in Taiwan Environmental Protection Administration (TEPA). The kitchen waste recycling and reuse program in Taiwan has been awarded the National Sustainable Development Award by the Executive Yuan, which gained worldwide recognition (TEPA, 2013a).

The Taiwan MSW and food waste management achievements, zero waste policies, kitchen waste recycling and reuse program, waste charging scheme, garbage sorting system, food waste EPR program, financial funding, household food waste source reduction practices, kitchen waste collection system and leftover recycling methods will be reviewed under the theoretical and analytical framework. The reasons of success of the Taiwan food waste measures will be described. Furthermore, the suitability of such measure in Hong Kong will also be commented.

4.2 Current status of food waste management in Taiwan

The Taiwan MSW management has been successful for the past decade. The landfill rate has declined from 80% in 1996 to 15% in 2006. The proper treatment rate has grown to 99.8% in 2006. On the other hand, the incineration rate has surged from 15% in 1996 to 85% in 2006 (Figure 34). There are currently 24 MSW incinerators in operation for energy recovery with a daily capacity of 24,650 tonnes. There are 67 landfills under operation. The garbage volume collected per capita per day came down drastically from 1.14 kg in 1997 to 0.61 kg in 2006 (Figure 35) (Ho, Lee, & Lai, 2007).

Most of the food waste in Taiwan is treated by landfill disposal before 2001. Approximately 30% of the Taiwan domestic waste is food waste. The TEPA launched the kitchen waste recycling and reuse program to alleviate the pressure on landfills



and incinerators. The hygienic conditions, public nuisance from waste treatment facilities, farmland productivity and sustainable lifestyles have been substantially improved. The successful kitchen waste recycling program leads to a rising trend in annual kitchen waste collection in Taiwan (Figure 36). The annual kitchen waste collection soared from 167,304 tonnes in 2003 to 721,472 tonnes in 2009 (TEPA, 2013a). The food waste collected soared from 216 tonnes in 2001 to 811,199 tonnes in 2011. The recycling rate of food waste surged from 0.003% in 2001 to 10.74% in 2011 (TEPA, 2013e).

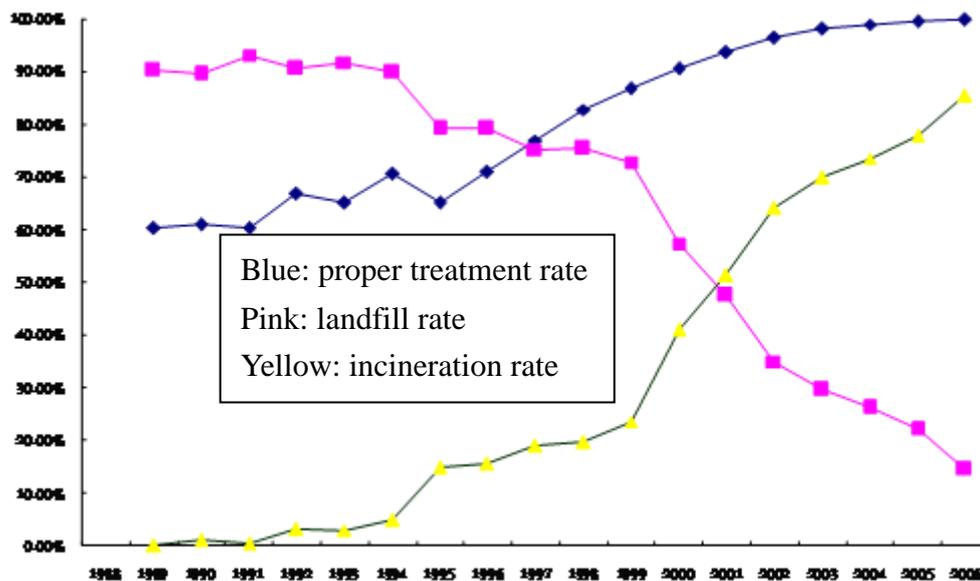


Figure 34 Taiwan landfill, incineration and proper treatment rate (1998-2006)

Source: TEPA (2013)

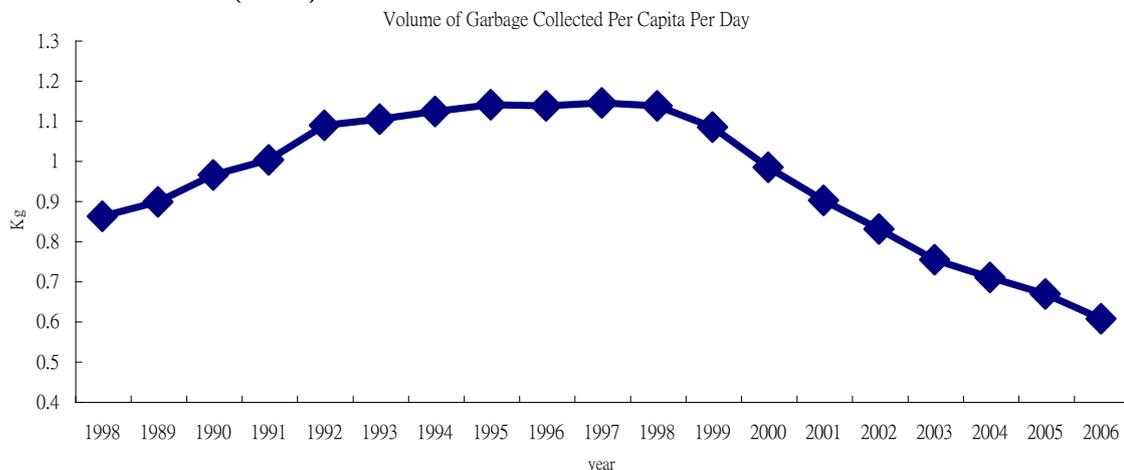
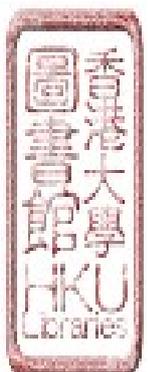


Figure 35: Taiwan volume of garbage collected per capita per day (1998-2006)

Source: TEPA (2013)



Fiscal Year	No. of governments implementing Kitchen waste recycling	Daily kitchen waste collection (tone/day)	Annual kitchen waste collection (tone/year)
2003	172 townships/towns/cities in 25 counties/cities	458	167,304
2004	267 townships/towns/cities in 25 counties/cities	818	299,264
2005	292 townships/towns/cities in 25 counties/cities	1,270	463,401
2006	319 townships/towns/cities in 25 counties/cities	1,561	569,862
2007	319 townships/towns/cities in 25 counties/cities	1,816	662,849
2008	319 townships/towns/cities in 25 counties/cities	1,889	691,271
2009	319 townships/towns/cities in 25 counties/cities	1,977	721,472

Figure 36. The daily and annual kitchen waste collection (2003-2009)

Source: TEPA (2013)

4.3 Zero waste policy in Taiwan

Taiwan has adopted a holistic approach in MSW management. Food waste is part of the overall solid waste management strategy in the environmental policies.

The TEPA has launched the zero waste policy for MSW in 2003 to promote sustainable development. The policy emphasizes source reduction and green consumption instead of landfill disposal and incineration. The comprehensive environmental policies implemented (Figure 37) makes the food waste source reduction successful in Taipei. The volume reduction target is set for 75% by the end of 2020 based on the MSW volume in 2001 (Liang, 2008).

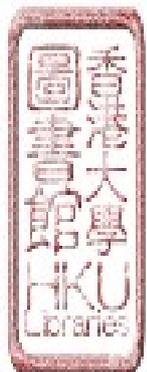




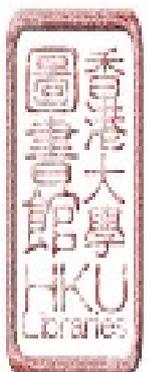
Figure 37: Schedule of waste policies and measures imposed in Taipei
 Source: Environment Bureau (2013)

4.3.1 Source reduction related policies

Per-bag trash collection fee system, mandatory garbage sorting and extended producer responsibilities are the source reduction related policies in Taiwan, which mainly relies on legislation and financial incentives to promote source reduction.

Per-bag trash collection fee system

The per-bag trash collection fee system (Figure 38) has started since 2000 under the polluter pays principle. It is the environmental related tax which provides the financial incentive for source reduction. The collection fee is set at NT\$0.45/L in Taipei under the pay as you throw (PAYT) concept. The recyclables are collected for free. The consumer behavior has significantly changed to waste reduction and recycling instead of consumerist lifestyle because most of the Taiwan residents prefer saving money. The lower the volume of food waste generated, the less the residents have to pay. The household residents carry their trash bags with properly sorted kitchen wastes, garbage and recyclables to wait for the garbage vehicles for recycling and disposal. (TEPA, 2008). General waste clearance and disposal fee is also



imposed under the Waste Disposal Act. The fee covers the public cleaning costs, waste transportation costs and operation costs of incinerators and landfills (TG, 2002).



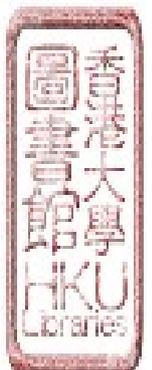
Figure 38: Per-bag trash collection fee system
Source: TEPA (2013)

The waste charging scheme is successful because it provides sufficient financial incentives to Taiwan residents on food waste source reduction. The consumer behaviors are thus positively changed to sustainable lifestyle in daily household and consumption habits. They are motivated to reuse the remaining food and recycle kitchen wastes (TCGDEP, 2013c).

Hong Kong should also adopt similar waste charging scheme to provide adequate financial incentives. The Food Wise Hong Kong Campaign mainly relies on the moral motives for source reduction. It is feasible in Hong Kong because Taipei and Hong Kong are very similar in nature. We can do the same thing as Taipei and the total amount of food waste generated will drop dramatically.

Mandatory garbage sorting

Mandatory garbage sorting (MGS) (Figure 39) has started in Taiwan since 2004

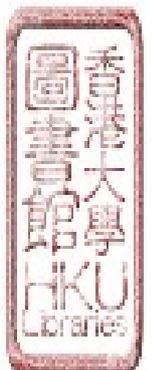


It is the direct environmental regulation applied to all local residents through legislation to change their behavior. MGS classifies the trash into three main groups, namely kitchen wastes, resources and garbage. All Taiwan citizens are legally required to provide proper food waste sorting under the Waste Disposal Act. There are user-friendly and plentiful food waste recycling bins located near supermarkets, convenience stores and schools. The municipal trash collection teams would collect the food waste for recycling (Chen, Chang, & Chang, 2007).

The mandatory garbage sorting is well implemented in Taiwan because sufficient environmental education on food waste is also provided to strengthen the environmental knowledge and awareness on source reduction for high community commitment. The Taiwan residents understand that food waste water content should be minimized to reduce the waste volume, promote hygienic conditions and facilitate composting. The kitchen wastes should not be put in plastic bags but directly disposed in kitchen waste buckets. The chopstick, toothpicks and packaging materials should be removed from the leftovers (TEIC, 2013).



Figure 39: Mandatory Garbage Sorting
Source: TEPA (2013)



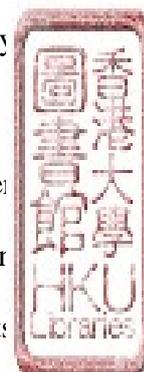
Hong Kong can also adopt MGS in the future. However, the waste charging, food waste recovery system, recycling industry development, municipal solid waste collection system and environmental education should be well developed first. Otherwise, even though the Hong Kong citizens properly separate the waste, they will be sent to landfills. Unsuccessful experience in the environmental activities will drastically impair the motivation for source reduction. Furthermore, the EPD can also publish garbage sorting guidelines to educate the Hong Kong citizens.

Extended producer responsibility

Taiwan has started extended producer responsibility (EPR) programs since 1989, which is reflected in the food waste treatment processes. It is the links to economic policies to provide financial incentives for source reduction. The catering industry is responsible for the disposal costs of excessive food waste produced. The EPR has positively changed the C&I sector supply side behaviors in storage habits, menu design and procurement decisions to minimize food waste generated. The business decisions would include the food product life cycle towards sustainable development. Green consumption from the demand side matches the EPR from the supply side, which results in favorable environmental benefits (So, 2013).

EPR is prosperous in Taiwan because the financial incentives are suitable to the food industry. The operation design and management are therefore shaped to minimize food waste generated. The food industry environmental knowledge, awareness and experience are internationally advanced to support the policy implementation.

The HKSAR Government currently implements the EPR in the Producer Responsibility Scheme (PRS) to some extent. It is comparatively easy to adopt in Hong Kong to provide financial incentives to the catering industry. The restaurants



and hotels would therefore like to save food and minimize expenses when they are fully responsible for all cost in the product life cycle.

4.3.2 Effective coordination for source reduction

Resource recycling Four-in-One program and the Recycling Fund Management Board focus on coordinating the source reduction efforts of the stakeholders to provide synergy to maximize the net environmental benefits.

Resource Recycling Four-in-One Program

The TEPA initiated the “Resource Recycling Four-in-One Program” in 1997, which is fully implemented nationwide in 2006 (Figure 40). It is the links to economic policies to properly coordinate the communities, recycling enterprise, recycling fund and municipal trash collection systems to reflect the environmental goals. It facilitates the positive consumer behavior indirectly with better coordination of the environmental activities to make the environmental facilities user-friendly. Leftover is a kind of waste in the program. The communities facilitate household food waste separation and development of environmental groups. Recycling enterprise promotes the prosperity of the food waste recycling industry. Municipal garbage collection teams manage the kitchen waste transportation and provide financial assistance to environmental organizations and staff. Recycling fund is responsible for the kitchen waste recycling fees involved and the fund management (TEPA, 2007).

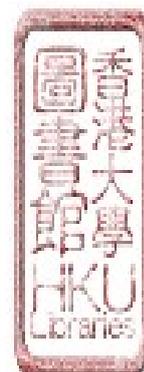




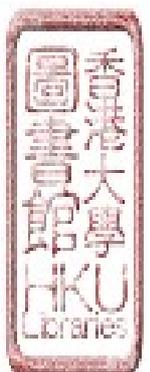
Figure 40. Resource Recycling
Four-in-One Program
Source: TEPA (2013)

The program is successful because the environmental activities are supported by sufficient financial and moral incentives. Subsidies are also provided for environmental education and buying food waste equipments. The TEPA continues to improve the existing food waste policies and practices by implementing extended producer responsibilities and eco-design principles to ensure its effectiveness and efficiency.

Hong Kong can adopt similar environmental coordination programs. Social mobilization should be enforced by excellent cooperation of stakeholders in the Hong Kong society. The environmental efforts from the government, commercial corporations, community and environmental organizations can be better coordinated to promote food waste source reduction.

Recycling Fund Management Board

The TEPA has established the Recycling Fund Management Board (RFMB) in 1998 for handling the recycling related fees. RFMB is also responsible for food waste education and promotion, subsidies provision, policy development, fund administration, statistical analysis and management on audit and certification schemes



It is the other instruments with information-based and voluntary approaches. RFMB does not directly change the consumer behavior but it highly supports and coordinates the environmental programs with reliable information (Shen, 2008).

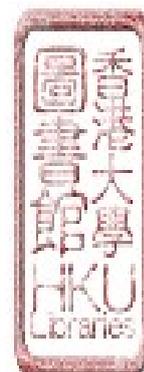
RFMB is fruitful in Taiwan because it targets at a complete closed-loop recycling society in Taiwan by providing enhancement plans for the kitchen waste recycling industry. It has also launched the “Garbage reduction and resource recycling program” to facilitates food waste source reduction. RFMB has gained international appreciation on the successful kitchen waste fund management support. The Environmental Conservation Fund (ECF) in Hong Kong is supported by the Financial Secretary in the Budget (HKSARG, 2014a). The ECF should extend its functions for information-based environmental support. It is relatively simple to cover most of the environmental support programs in Hong Kong to facilitate food waste source reduction.

4.4 Source reduction related programs

The kitchen waste recycling and reuse program consists of education and promotion, collection and transportation system, modes of kitchen waste reuse and market development of the recycled food waste products.

Taiwan food waste source reduction and recycling activities have effectively extended the useful life of landfills and combustors. The public food waste disposal expenditure is reduced with the declining food waste volume. The Taiwan hygienic condition is improved by minimizing food decay and pest growth from untreated kitchen waste. The agriculture and poultry industry benefits from the high quality compost and animal feeds at lower costs. Sustainable lifestyles are promoted in the territory to promote environmental benefits (TEPA, 2013d).

The Hong Kong food waste recycling partnership scheme is much smaller than



the Taiwan kitchen waste recycling and reuse program. It mainly relies on the active participation of the catering industry and green groups in Hong Kong. We can learn from Taiwan experience to further strengthen the food waste source reduction in every part of the society.

4.4.1 Consumer behavior related programs

The consumer behavior source reduction habits are reflected in household practices, green consumption and environmental education.

Household food waste source reduction practices

The Taiwan residents generally adopt household food waste management practices with Green Eating Habits. It is the other instruments of voluntary approach to promote the social mobilization on food waste reduction. The strong environmental awareness in Taiwan has changed their daily habits to save food in the preparation processes in restaurants and household kitchens. The consumers target at 70% full, which is the appropriate amount for food preparation and ordering. They have habits in completely finishing their dishes and taking away excessive food if necessary. They avoid mixing the used dietary oil, tissues and disposal utensils with the recyclable kitchen waste. Green Eating Habits promote healthy and environmentally friendly daily diets (TEPA, 2013b).

Taiwan residents would also prepare their own compost for their gardens as organic fertilizers (Figure 41). The low water content food wastes with composting bacteria are put in the compost bucket. They repeat the steps for several days until it is 80% full. The mature organic compost will turn dark brown after five months. The water content in the composting bucket is extracted to become composting fluid (Figure 42). The liquid can be used as fertilizer after dilution. It can also be used as a



cleansing agent for toilets (TCEPB, 2012).



Figure 41: Household composting bucket
Source: TEPA (2013)

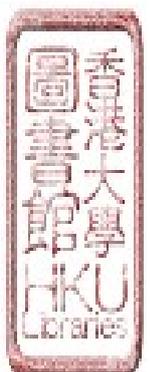


Figure 42: Household composting fluid
Source: TEPA (2013)

The success of these voluntary approaches mainly depends on the moral motives, strong environmental awareness and adequate food waste knowledge of the Taiwan residents. The household food waste management practices serves as environmental education activities in Taiwan families, which cultivates excellent environment protection atmosphere for the Taiwan community. The successful environmental measures can thus be passed to next generations in Taiwan.

Hong Kong can only partly adopt similar household food waste reduction measures. We should adopt Green Eating Habits to reduce the amount of food waste generated. The food waste infrastructure is not well established in Hong Kong. Even though we properly prepare the food waste without tissues and toothpicks, they will be delivered to the landfills. Frustration will be resulted which hampers the social mobilization. Besides, Hong Kong citizens generally do not have gardens for compost consumption. Household composting activities will not be popular in Hong Kong.

Green consumption



Green consumption is facilitated by the “Government Green Procurement” program since 2002. It is also the other instruments of voluntary approaches. The environmental measure is based on ethical consumerism and source reduction concepts. The demand side consumer behaviors shifted to the certified eco-products with eco-designs in the Taiwan Government, business corporations and community as the source reduction measures (TEPA, 2013c).

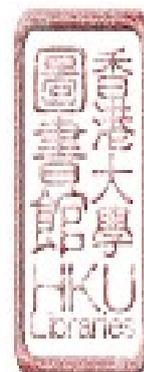
This is successful in Taiwan mainly because of the enthusiasm of local residents. They love Taiwan and prefer environmental friendly consumption behavior to protect their nation.

HKSAR Government can formulate green consumption environmental policies to provide effective food waste guidelines to government departments, NGOs and business corporations to change the demand side consumer behavior to sustainable ones. The public generally supports simple user-friendly approaches for environmental purposes.

Environmental education

The kitchen waste reduction campaign promotes the Green Eating Habits. It is the other instruments with information-based approach. Education activities focus on the catering industry and schools. The catering staff and managers are provided with on-the-job training on food waste issues. Promotion activities are extensively conducted in the media and internet. The citizens are thus equipped with proper environmental knowledge. The local residents understand the correct consumer behavior to promote sustainable food waste management (Yueh & Barker, 2011).

The success depends on the high environmental awareness driven by the moral motive. The primary and secondary school students are equipped with food waste knowledge and awareness. The residents share their experience to deal with various



kinds of kitchen waste issue to make Taiwan a better place.

Hong Kong should strengthen the environmental education in the primary and secondary formal curriculum. Environmental awareness and knowledge on food waste can also be widely promoted in the media. Television drama, internet messages, environmental activities should be launched in the community.

4.4.2 Effective recycling for source reduction

The household and community food waste collection system are user-friendly. The government food waste policies and programs are continuously assessed to meet the collection targets with sufficient research and development projects.

Household food waste collection

Taiwan residents usually have family food waste bucket (Figure 43) for collecting household food wastes. It is the other instruments with voluntary approaches. The capacity is six liters for two days food waste amount. The bucket should have a tight cover for sanitary purposes. The Taiwanese have developed household habits in preparing food waste for recycling. The contents are transferred to the community food waste buckets located in the leftover area. The community food waste buckets are then collected by food waste recycling trucks at collection points to organic waste treatment facilities (TCGDEP, 2013b).

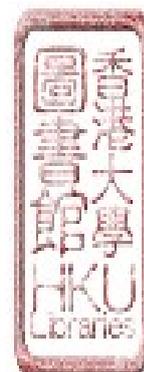




Figure 43: Family food waste bucket
Source: TEPA (2013)



Figure 44: Community food waste bucket and leftover area
Source: TEPA (2013)

Community food waste collection

The community food waste collection system (Figure 44) is the public financial support for environmental goods and services. The smooth operation of this food waste infrastructure has strengthened the confidence on source reduction of the Taiwan citizens. The residents changed their behavior to ensure the normal functioning of the food waste collection system. The hygienic conditions of the food waste buckets should be ensured by regular cleaning and sanitation treatments. The bad decaying smell should be prevented by providing tight covers to the buckets. It also avoids cultivating mosquitoes and pests. Dogs and cats should be prevented from feeding on the food wastes. Sufficient buckets and collection time are provided to residents to ensure proper functioning of the collection system. Regular checking on food waste in buckets is needed to remove plastic bags and other impurities. Collection points are located in shadow areas with proper ventilation to prevent food waste fermentation under high temperature in direct sunlight. Buckets should be placed in convenient and clean areas. The kitchen wastes should be collected daily to



ensure the hygienic conditions (TCGDEP, 2013a).

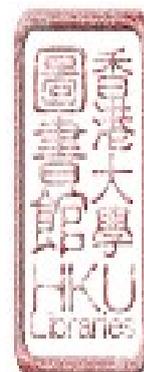
Excellent urban planning, environmental infrastructure management and transportation system leads to the high performance of the food waste collection system. The transfer stations are located in convenient locations to suit the food wastes recycling transportation routes. The treatment capacities are increased in public holidays and festivals. The kitchen wastes are weighted for statistical purposes. Centralized cleaning of community food waste buckets are performed in the transfer stations. The resulting sewage is properly treated before discharge. Advanced equipments and facilities should be installed in the centralized transfer station for cost reduction.

Hong Kong cannot develop sophisticated food waste collection system at this moment. The food waste recycling infrastructure including the composting plants and anaerobic digesters should be built first. Pilot schemes on food waste collection can be launched to gather experience for future development.

Research and development on food waste recycling

Regular inspection on recycled product safety and statistical analysis are performed to provide the qualitative and quantitative information on the food waste products. Research and development projects are the environmental policies on promoting technological development. It is financed by the Taiwan government to explore advanced technologies and other food waste reuse options. With the continuously improving technology, the consumer behaviors are shifted to environmental friendly options with reduced costs (TEPA, 2013a).

The food waste technological development prospers in Taiwan. The TEPA provides proper incentives and subsidies to business corporations to facilitate the continuous development of the food waste recycling and reuse industry. The local



agricultural government departments and organizations ensure the proper functioning of the food waste reuse system. These measures highly promote the prosperity of the food waste recycled products markets.

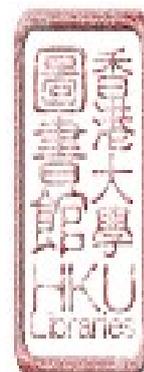
Hong Kong should also spend money on food waste research development. It is especially useful in the local universities. The University of Hong Kong (HKU), the Chinese University of Hong Kong (CUHK) and the Hong Kong University of Science and Technology (HKUST) can cooperate to develop new food waste treatment methods which are suitable to Hong Kong needs and situation.

4.5 Other food waste management programs

Kitchen wastes are mainly reused as organic fertilizers, pig feed and energy recovery. The leftovers are changed to organic fertilizers by advanced biochemical composting technologies. They can be processed under high temperature for sterilization to produce pig feed. They may also be used to produce biogas in anaerobic digesters for electricity generation. These measures are the public financial support for environmental goods and services on environmental infrastructures.

4.5.1 Composting

The purpose of composting is to decompose the kitchen waste organic materials by microorganisms into nutrients for plants. Sufficient oxygen, optimum pH and temperature, humidity and composting space should be provided in composting plant (Figure 45). The well-established composting plant has changed the consumer behavior to promote recycling for the prosperity of local agriculture. The organic wastes are detoxified and stabilized above 60°C to kill the pathogens and parasites, which will return to 30°C when the fermentation completes. The unpleasant odor is removed when appropriate ventilation is arranged to provide plentiful oxygen



(Jackson & Campbell, 2001).



Figure 45: Composting plant

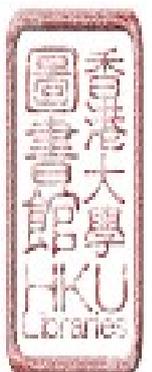
Source: TEPA (2013)

The success of the composting relies on the quality control of the compost. The organic fertilizers with suitable C:N ratio are produced to improve the soil quality. Physical checking, gaseous and odorous experiments are carried out to ensure the hygienic conditions of the city.

Composting is not the best option in Hong Kong. We can consume limited amount of composts in tree management, schools and organic farms.

4.5.2 Animal feed production

There is a long history of feeding pigs by food wastes in the Chinese community (Figure 46). The pigs have similar dietary habits with humans, which digest the leftovers to produce pig meat as a human food source. The Taiwan poultry industry provides a feasible way to consume the food waste. The Taiwanese has changed their consumer behavior to enthusiastically preparing quality food wastes for the pigs because they expect to consume the pigs in the future. Each pig consumes about 10 kg food wastes per day while each pig farm with 3,000 pigs can greatly consume 30 tonnes kitchen wastes daily. Pig feed is prepared by food waste



heating center at 90°C for 1 hour with constant stirring and water dilution (Wenk, Fernández, & Dupuis, 2000).



Figure 46: Pig feed preparation

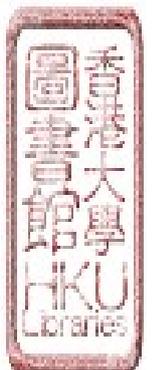
Source: TEPA (2013)

This arrangement is successful because the operating costs of the pig farm can be drastically saved by 50% by using pig feeds. Besides, the burden on waste treatment facilities can be relieved because food waste has high fat and dietary fiber contents. Chicken and fish feed can also be prepared by similar biochemical processes.

HKSAR Government does not encourage poultry business in Hong Kong for hygiene reason. Pig feed is comparatively difficult to transport for export purposes.

4.5.3 Anaerobic digestion for energy recovery

Anaerobic digestion of food waste is a renewable energy source which can replace the non-renewable fossil fuel consumption. In Taiwan, it promotes the food waste recycling to some extent only because composting and pig feed production are better choices of food waste treatment. The consumer behavior has changed to prepare appropriately sorted food waste because they want to prevent the anaerobic digesters from damage. Developed countries including the United States, Japan and South Korea have their own anaerobic digester for electricity generation. The



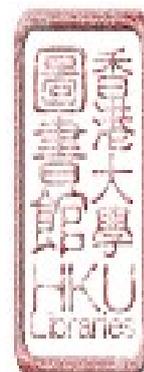
methane produced can be collected as fuel. The organic residues and sewage generated can be used as fertilizer. The odor is well controlled in enclosed area. The food waste volume is reduced and stabilized (Caruana & Olsen, 2012).

Taiwan does not rely on anaerobic digesters for electricity generation. The initial investment and maintenance costs on the anaerobic digesters are high. The processing volume is high enough for cost-benefit purposes.

Hong Kong can build several anaerobic digesters as food waste recycling infrastructure. It is a better choice than composting and pig feed production. All districts should equally share the Integrated Waste Management Facilities (IWMF).

4.6 Final words

The Taiwan food waste source reduction and recycling practices are mature and implemented nationwide. On the other hand, Hong Kong is only at the preliminary stages. Hong Kong government should learn from Taiwan experience and adopt similar policies to promote food waste source reduction.



Chapter 5 Developing the best practice framework for food waste source reduction in Hong Kong

Best practices and policies on food waste source reduction can be identified from the previous literature review. The set of best practices and policies will serve as an analytical framework to critic the current food waste situation in Hong Kong as well as to point to specific areas for future improvement.

5.1 Best practices and policies

Strategy of best practices in food waste source reduction can broadly be classified by roles: consumers, foodservice suppliers and the Government & NGOs (Non-governmental organizations). The below describes the roles that different sectors can contribute in food waste reduction at source in the context of Hong Kong.

5.1.1 Consumer behavior

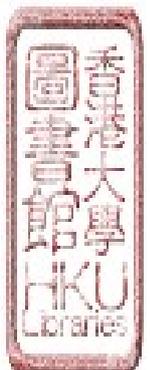
With the adequate consumer's behavior, Hong Kong residents could provide the demand side pressure to support the Government to implement relevant policies and incentives/disincentives to solve the food waste problem. The over-riding public interest and consensus provide the justification for the Government to introduce the environmental laws and regulations needed in facilitating the behavior change in the community as well as the provision of service on the supplier side.

Ethical consumerism, social mobilization and sufficient environmental knowledge & awareness should be emphasized to promote sustainable lifestyles. Drawing from literature and case studies, the below are considered the most important best practice for consumers from the demand-side and it is necessary to find ways to encourage the consumer's commitment on them:



- ✓ Right-size food purchase decisions should be made with smart judgment.
The perception, consumption and purchase amount should be approximately equal.
- ✓ Planned shopping list can be used to avoid taking bulk purchase discounts.
- ✓ Bring-your-own-container (BYOC) can be used to promote suitable food purchase volume and leftover takeaway.
- ✓ Never throw away edible good condition food to trash.
- ✓ Customers can provide seasonal flexibility to food producer to reduce the pressure to produce a surplus. The shopping list, for example, should not include great amount of tomatoes in winter and spring because the harvest time of tomatoes is in summer and autumn.
- ✓ Consumers may guarantee no food poisoning litigations on donated food.
- ✓ Nutritious food without excessive packaging can be sustainable choices.
- ✓ The refrigerator should function properly to keep the food fresh.
- ✓ Consumers should feel confident to ask for a doggy bag for takeaway and really eat the takeaway at home.
- ✓ Healthy eating habits, high motivation on saving food and altruistic behaviors should be cultivated.
- ✓ The public should support the establishment of the food waste collection and treatment facilities even though they are near to their home.
- ✓ Environmental education can be provided by parents through simple environmental messages and food waste source reduction practices.
- ✓ Environmental friendly products are preferred in green consumerism.

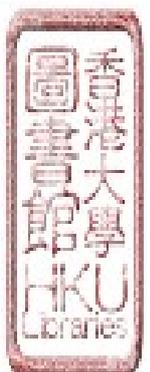
5.1.2 Foodservice supplier behavior



With sufficient public preference, the Hong Kong C&I sector would also join hand and press and facilitate the Government to do the right thing to solve the food waste problem. Under the social norm and cultural shift for food waste reduction, the food service companies would be incentivized to meet both the environmental objectives and financial goals by promoting the ethical consumerism and sustainable lifestyles. Marketing activities are their key resource for food waste source reduction.

High ethical standard should be demonstrated in the foodservice companies. The environmental laws, the Code of Ethics and relevant guidelines should be followed. Some important guidelines include:

- ✓ Promote the right-size food purchase.
- ✓ Edible food should be donated to food bank.
- ✓ Food waste should be recycled instead of landfill disposal.
- ✓ EPR should be adopted to avoid externalizing the food waste disposal cost to the public to demonstrate Corporate Social Responsibility (CSR).
- ✓ The food waste source reduction efforts should be well coordinated to meet the Government and public expectation.
- ✓ Food waste source reduction and recycling knowledge should be exchanged in the catering industry.
- ✓ Buy One Get One free (BOGO) can be changed to “Buy Now, Free Next time” offers.
- ✓ The catering companies can also provide discounts and free drink redeemable vouchers as financial incentives to the customers who can finish their dishes.
- ✓ Customer loyalty, brand equity and corporate reputation can be other motivations for hotels and restaurants.
- ✓ Environmental awards and certification on food waste reduction can be



incentives to promote effective and efficient operation to minimize leftovers.

- ✓ Ethical consumerism can be promoted by user-friendly take-away services.
- ✓ The food price and serving amount can be directly proportional.
- ✓ Trayless dining can be provided by schools and universities.
- ✓ Split packs, resealable packs, clear packaging label and storage guidance should be provided to extend the shelf life of food.

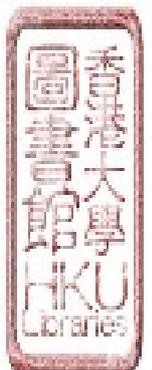
5.1.3 The Government and NGO performance

We assume the MSW generation rate, food waste proportion and Hong Kong population are 0.4kg/day per capita, 40% and 7,200,000 respectively. The daily food waste generation can be 1,152 tonnes. It is thus possible to reduce the food waste daily amount by 2,400 tonnes and 67%. The best landfill rate can be 1% when sufficient incinerators are built to replace landfill disposals. OWTF can be built to provide food waste treatment capacity at 1,500 tonnes. The waste treatment facilities should be fairly shared by all the Hong Kong districts.

Comprehensive environmental policies should be implemented in Hong Kong. Volume-based waste charging system should be adopted to provide adequate financial incentives for source reduction. MGS should be launched to provide proper food waste sorting for collection and recycling. EPR should be widely implemented under the polluter pays principle.

The HKSAR Government environmental measures are:

- ✓ The HKSAR Government Environmental Management Board should be established for effective coordination of source reduction and recycling efforts of the Hong Kong residents, foodservice companies, Government and NGOs to provide synergy on environmental performance.



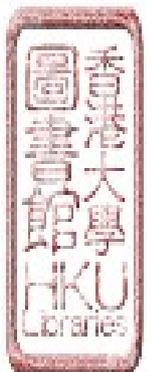
- ✓ Food waste recycling projects in C&I sector and housing estates should be effective and efficient to promote source reduction.
- ✓ Food waste collection system should be well established in the community.
- ✓ Sufficient OWTF should be built to process the daily food waste generated to minimize landfill disposal.
- ✓ Prosperous food waste product market can be encouraged through voluntary partnership agreement of compost export to the Guangdong province.
- ✓ EcoPark can be further utilized to coordinate the food waste recycling efforts at reasonable rent.
- ✓ The Government can provide adequate funding and support to the local universities for environmental research and development.
- ✓ Wastewi\$e label on food waste can be designed and implemented.

The NGO food waste source reduction measures include:

- ✓ Light banquet campaign should be widely adopted to promote sustainable lifestyles.
- ✓ Hong Kong Green Day should be celebrated by the Hong Kong residents to improve their environmental awareness.
- ✓ Food bank should continue to serve the grassroots to reduce the food waste volume.

The HKSAR Government and NGOs can cooperate to implement food waste source reduction programs:

- ✓ Environmental education can be extensively conducted in the formal curriculum with the help of NGOs. Food waste knowledge, for instance, can be included in the HKDSE Liberal Studies examination.
- ✓ Environmental publicity programs like the Food Wise Hong Kong campaign should continue to remind the local residents on food waste



source reduction with the support from the NGOs.

- ✓ Food waste reduction and recycling centers can be established in the community by the HKSAR Government while the operation can be run by the NGOs.

5.1.4 The interdependence relationship

The best practices and policies of consumers, foodservice suppliers and the Government & NGOs are actually inter-related and interdependent (Figure 47). They would be the most effective if being delivered by the stakeholders involved.

Law and regulations with environmental objectives should be appropriately implemented. To quote an example, mandatory garbage sorting (MGS) should be implemented to improve the recycling rate when the food waste collection and treatment facilities are well established. The local residents should abide by the legislation for environmental performance. The food suppliers should also obey the law to provide adequate garbage sorting.

The financial incentives should be allocated to environmental objectives. The HKSAR Government should implement the volume-based waste charging system to influence the consumers and the foodservice companies. The supermarkets and restaurants are encouraged to donate the edible food and recycle the food waste in order to save money. The customers will not casually dispose the edible food to trash because they have to pay for the disposal cost.

High ethical standard should be demonstrated. For instance, the Hong Kong residents should demonstrate ethical consumerism to avoid excessive food purchase. The foodservice companies should promote right-size food purchase to preserve the public environment with high business ethics. Encouraging unnecessary food purchase will generate higher profit for the company; the environmental burden on

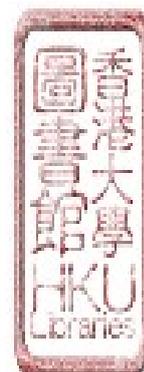


landfills will be higher, however. The public interest and company profit should both be maintained. The HKSAR Government can provide food serving guidelines to promote right-size food purchase with high integrity for public trust.

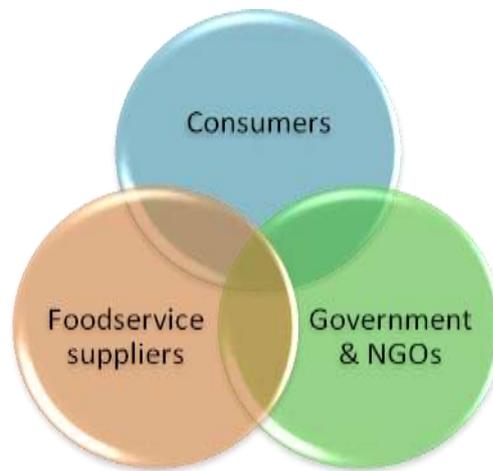
Effective coordination on source reduction efforts should be provided for social mobilization. The local consumers should be enthusiastic in the source reduction activities and develop healthy environmental habits in their daily life. The Government should establish the Environmental Management Board to coordinate the food waste source reduction efforts of the consumers, foodservice companies and the Government & NGOs for economies of scale. Sufficient food waste recycling infrastructure should also be built to encourage social mobilization. The foodservice companies should also develop effective catering operation systems in coordinating the source reduction efforts of the customers, government and NGOs.

Environmental education and promotion should also be strengthened. Training in catering industry can be provided to managers and frontline staff to ensure effective food waste reduction at source. The Government can strengthen the education on food waste in the formal curriculum. Food Wise Hong Kong Campaign should continue to remind the local citizens on food waste source reduction. The Hong Kong residents should actually implement the daily source reduction habits but not simply understanding the environmental knowledge.

Sustainable lifestyles should be promoted in the Hong Kong community. The catering companies should implement the user-friendly and sustainable source reduction measures according to the government guidelines in Food Wise Hong Kong Campaign. The Hong Kong citizens should shift to sustainable lifestyles instead of consumerist ones. The Environment Bureau (ENB) and the University of Hong Kong (HKU) can publish official sustainable lifestyle manuals to provide guidelines on correct environmental behaviors.



Strategy for Best Practice in Food Waste Reduction at Source



Consumers	Foodservice suppliers	Government & NGOs
<ul style="list-style-type: none"> • Support the food waste policies and legislation • Take the financial incentives to minimize food waste generation • Adopt ethical consumerism for right-size food purchase • Encourage social mobilization in food waste reduction and recycling activities • Equip sufficient environmental knowledge and awareness • Shift to sustainable lifestyles from consumerist ones 	<ul style="list-style-type: none"> • Follow the food waste policies and guidelines • Take the financial incentives and promote EPR for food waste reduction • Adopt corporate social responsibility and donate food in daily operation • Cooperate with the government, NGOs and customers • Provide training to strengthen the environmental knowledge and awareness • Provide user-friendly and sustainable food waste source reduction measures 	<ul style="list-style-type: none"> • Implement the food waste policies, laws and regulations • Apply the volume-based waste charging system in the community • Continue the Food Wise Hong Kong Campaign to promote moral motives • Coordinate the source reduction efforts and develop leftover recycling infrastructure • Provide environmental education and publicity activities • Publish sustainable lifestyle manuals

Color index:

Red: Laws and regulations

Purple: Social mobilization

Green: Environmental related taxes

Brown: Education and publicity

Blue: Moral motives

Black: Sustainable lifestyles



Figure 47: Strategy for Best Practice in Food Waste Reduction at Source

Source: author

5.2 Evaluating the current situation in Hong Kong using the best practice framework

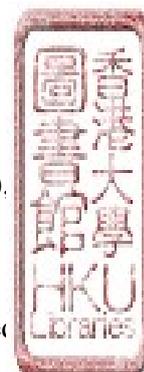
5.2.1 Evaluation Approach and Methodology

The evaluation approach on the current situation is to understand the attitudes, difficulties and decision making on various food waste issues from the Hong Kong residents, foodservice suppliers, the Government and NGOs. So, questionnaire survey, in-depth interviews and site visits are appropriate methods to know their belief and judgment on food waste reduction measures.

Consumers: Questionnaire Survey with Hong Kong residents

The purpose of conducting questionnaire survey with the Hong Kong residents is to understand their opinion on various food waste source reduction measures. Please refer to the appendix I for the actual questionnaire.

According to the Population Census 2011, Hong Kong residents aged between 12 and 74 amounted to 5,981,479 (CSD, 2012). The sample size for this study is set at 0.01% of the total population, i.e. 600. The questionnaire survey was done via two platforms: on-street (200) and online survey (400). Both platforms were introduced in order to collect as many responses as possible: on-street survey was conducted to cater for those age groups who are not frequent computer users and also the opinion from various locations in Hong Kong can be included. The on-street questionnaire survey has been conducted in 5 areas with 6 locations. They covers the Hong Kong Island (Wan Chai), Kowloon (Mongkok), New Territories West (Tuen Mun), New Territories East (Tseung Kwan O) and Island District (Cheung Chau & Tung Chung). with 40 samples in each area. Online survey was performed because this is the most respondent-friendly method in modern days. All respondents were randomly selected



There are 403 and 200 successful responses from the online and on-street survey respectively. The actual number of valid samples is 603 in total (refer to appendix I for the detailed research results).

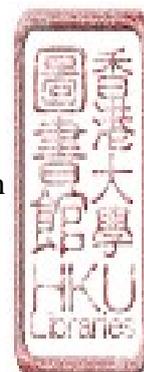
The respondent's profile was set for any Hong Kong residents aged between 12 and 74. There is no specific requirement on the gender, occupation, education level, address, marital status and ethnic identity. The non-resident mainland Chinese and foreign tourists are excluded from the survey.

Foodservice suppliers: In-depth Interviews and Site Visits

The purpose of interviewing the foodservice suppliers is to understand the attitudes, difficulties and decision making on various food waste issues in the commercial operation. Please refer to the appendix II for the question list.

There are six personal interviews on the foodservice suppliers. They include restaurants (Bijas Vegetarian), barbecue site (Green Farm), organic vegetable shop (Go Green Organic Farm), Chinese restaurants & Japanese restaurants (LHGroup & KABUSHIKIGAISHA Ltd.), tuck shop & lunch box supplier (Mangrove tuck shop) and hotel (Holiday Inn Express Hong Kong SoHo). These companies are chosen because they are the important types of catering companies in Hong Kong. Their opinion can reflect the current situation on the food waste issues in the commercial sector. Please refer to the appendix II for the transcripts.

The large-scale catering chain stores (Maxim's Caterers), supermarkets (Park N Shop), bakery (St. Honore Cake Shop), karaoke box (Neway Karaoke Box), coffee shop (Starbucks Coffee), dessert house (Hui Lau Shan), airline catering (Cathay Pacific Catering Services) and many other catering companies are also invited for an interview but were unsuccessful.



Government & NGOs: In-depth Interviews and Site Visits

The purpose of interviewing the Government and NGOs is to understand the environmental policies and NGO comments on food waste issues. Please refer to the appendix III and IV for the actual question list.

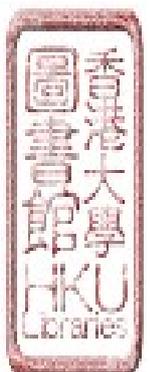
There are one personal interview on HKSAR government official, four personal interviews on NGOs and one site visit on the NGO. The Food Wise Hong Kong Campaign is interviewed. The NGO interviews include green group (Greeners Action), food bank (Food Grace), community network (Tin Shui Wai Community Development Network (TSWCDN)) and catering association (Hong Kong Federation of Restaurants and Related Trades (HKFORT)). The site visit is the food recovery program called Food for Thought sharing program. These organizations are chosen because they are the major food waste source reduction facilitators in Hong Kong. Please refer to the appendix III and IV for the transcripts.

5.2.2 Research results and discussion

The following discussion is based on the questionnaire survey of Hong Kong residents, personal interviews of foodservice suppliers, government & NGOs and site visit of NGO. Please refer to the appendix for details. There is also second-hand information from the media and environmental reports.

Background

From the research findings, Hong Kong residents had moderate level of environmental knowledge (Figure 48) and would participate the food waste reduction at source to some extent (Figure 49). The weighted scores were 3.15 and 2.93 respectively, which are near to neutral. Around 70% of the Hong Kong residents did not have confidence in achieving the food waste reduction target at 40% stated in the



Policy Address 2014 (Figure 50). The foodservice suppliers and green groups generally appreciated the reduction target 40%. They believed it is difficult to achieve and significant effort is required. The interviewed foodservice companies substantially followed the Good Practice Guide. They had various kinds of food waste reduction and recycling measures.

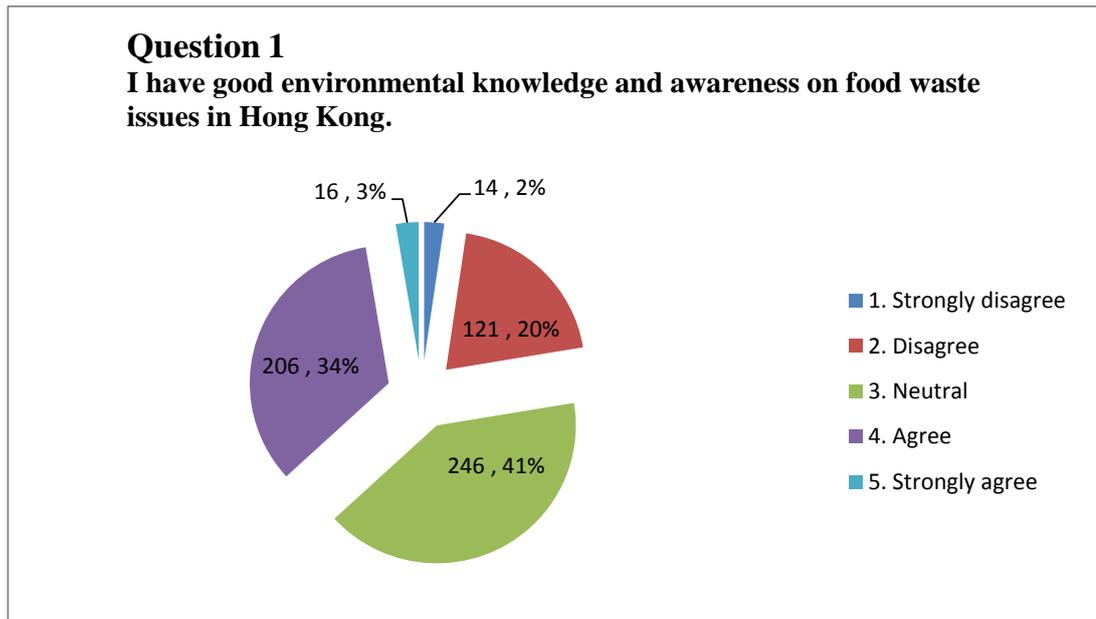


Figure 48: Environmental knowledge and awareness of Hong Kong residents

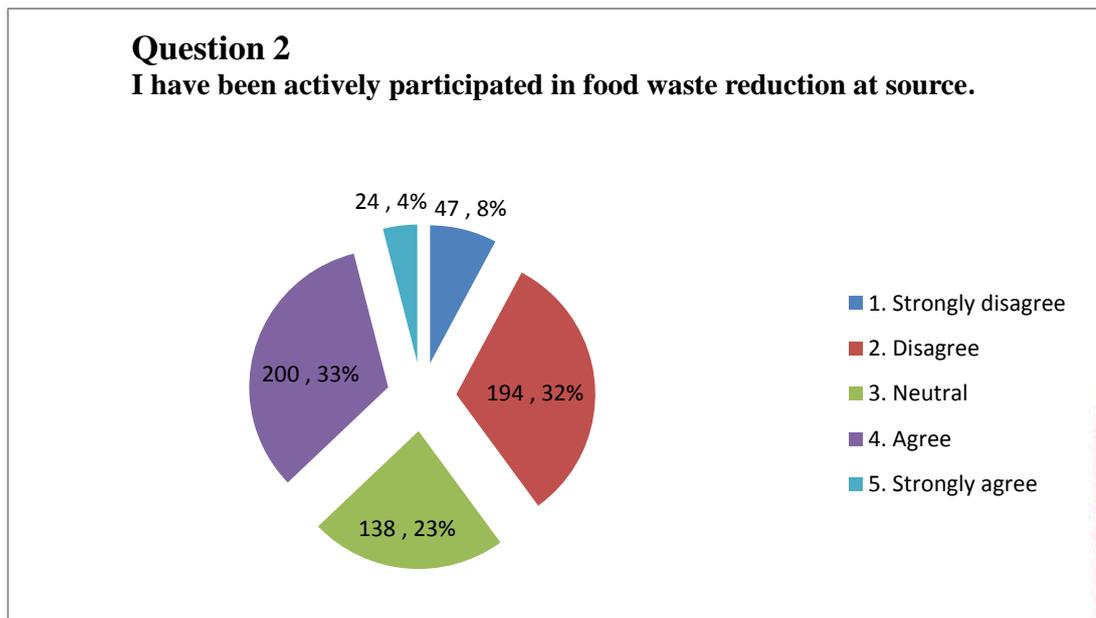
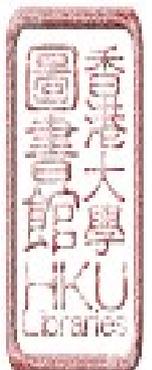


Figure 49: Participation of food waste reduction at source



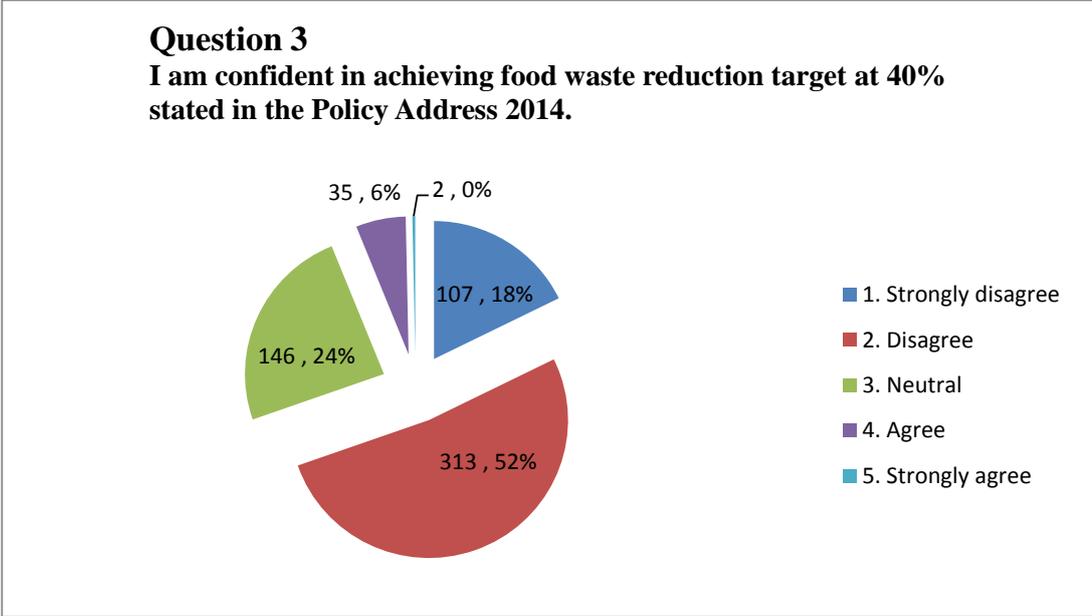


Figure 50: The confidence on food waste reduction target 40%

Laws and regulations

From the framework proposed, the best practice of consumers on laws and regulations is to support the food waste policies and regulations. From the research findings, 68% of the Hong Kong residents thought policies and laws are good methods to solve the food waste problem (Figure 51). Besides, two-third of the respondents supported the mandatory food waste recovery in Hong Kong (Figure 52).

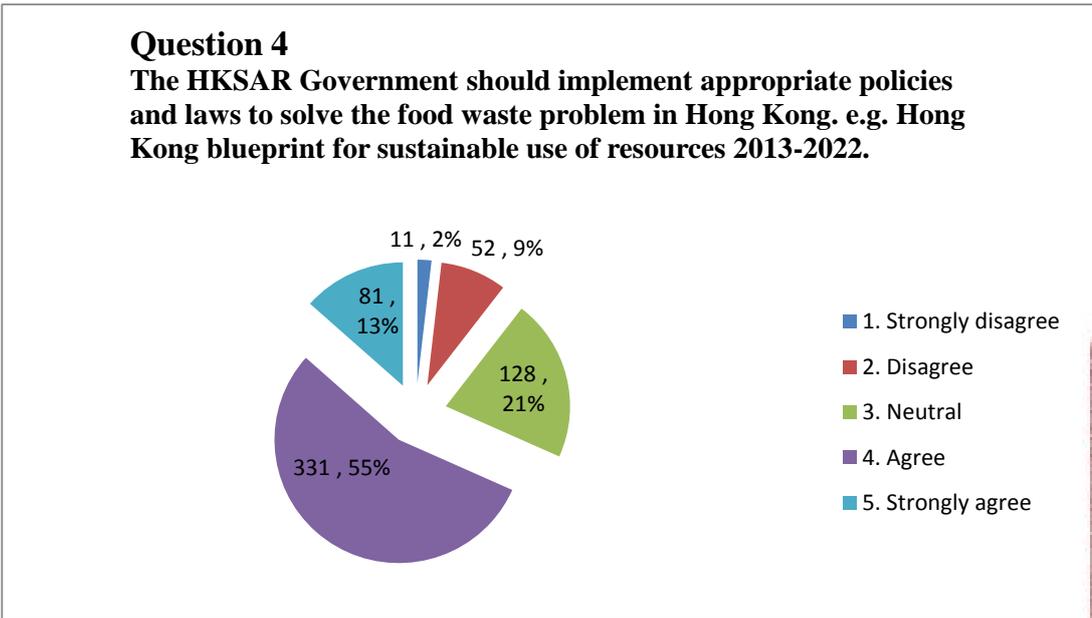


Figure 51: Hong Kong residents' opinion on environmental policies and laws



Question 5

Mandatory food waste recovery should be adopted in Hong Kong in the future.

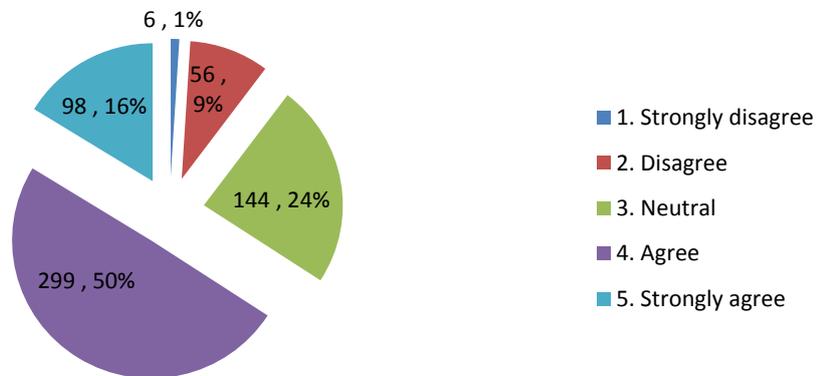


Figure 52: The opinion on mandatory food waste recovery from the respondents

The proposed framework states that the best practice of foodservice suppliers on laws and regulations is to follow the food waste policies, laws and guidelines. In line with the framework, all the interviewees agreed on the implementation of food waste policies and laws. For example, Go Green Organic Farm vegetable shop thought that it is necessary to implement suitable food waste policies to support the environmental education activities in their green farm. They would definitely follow the related environmental policies and laws.

The foodservice suppliers addressed other new areas on laws and regulations. They emphasized the need for Government support on the food waste reduction and recycling. Financial subsidies should be provided to the food waste recycling companies. The Government could subsidize the household to purchase composting machines like the “Scheme \$6,000”. The food waste should be collected three times per day with fixed period of time to ensure the high level of hygiene. Sufficient OWTF should be established in the community.

The catering businesses had to guarantee financial returns. The respondents

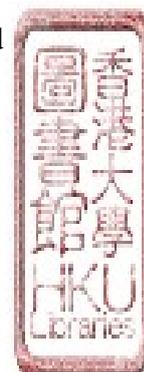


claimed that simply enthusiasm on environmental protection was inadequate. The rent was really high in Hong Kong. The manpower, expenses and spaces were mainly used for profit instead of environmental protection. Reasonableness on process and details, sufficient time to adapt, media concern and public acceptance on environmental policies and laws should be considered.

The proposed framework states that the best practice of Government & NGOs on laws and regulations is to implement the food waste policies, law and regulations. The polluter pays principles should also be promoted. In line with the framework, the Environment Bureau had proposed a combination of food waste management measures in “A food waste & yard waste plan for Hong Kong” in February 2014. The NGOs interviewed generally welcomed the food waste policies. However, it was only in the pilot stage. There were insufficient environmental policies and laws in Hong Kong, which is the gap between the current situation and best practice.

Different from the other interviewees, the Government thought the most preferred option is education and publicity rather than laws and regulations. Voluntary approach was therefore recommended instead of mandatory mode. The environmental responsibility should be fairly shared in all districts. Food waste audit, green procurement, district-based food waste treatment centres and incinerator could be established to work with the food waste plan. The Government responded that laws and regulations should come in a later stage, after territorial-wide education and campaign are carried out. E.g. landfill disposal ban on food waste should be implemented when the OWTF network can properly handle the kitchen waste. Good Samaritan Food Donation Ordinance could be proposed to waive the legal liabilities of the stakeholders to promote food donation then. Adequate penalties could be imposed on those who generate unreasonably great amount of leftover.

TSWCDN claimed that greed of the catering companies is the root of the



problem. The consensus among interviewed foodservice suppliers on laws and regulations is to provide adequate financial subsidies to promote food waste reduction and recycling. The consensus among interviewed NGOs on laws and regulations is to formulate sufficient environmental policies and laws.

Environmental related taxes

From the framework proposed, the best practice of the consumers on environmental related taxes is to take the financial incentives to minimize food waste generation. From the research findings, the respondents were willing to pay for about \$20 per month on waste charging (Figure 53). 79% of the respondents supported the polluter pays principle in the foodservice activities in Hong Kong (Figure 54). Therefore, the consumers were willing to accept the financial incentives and have met the best practice.

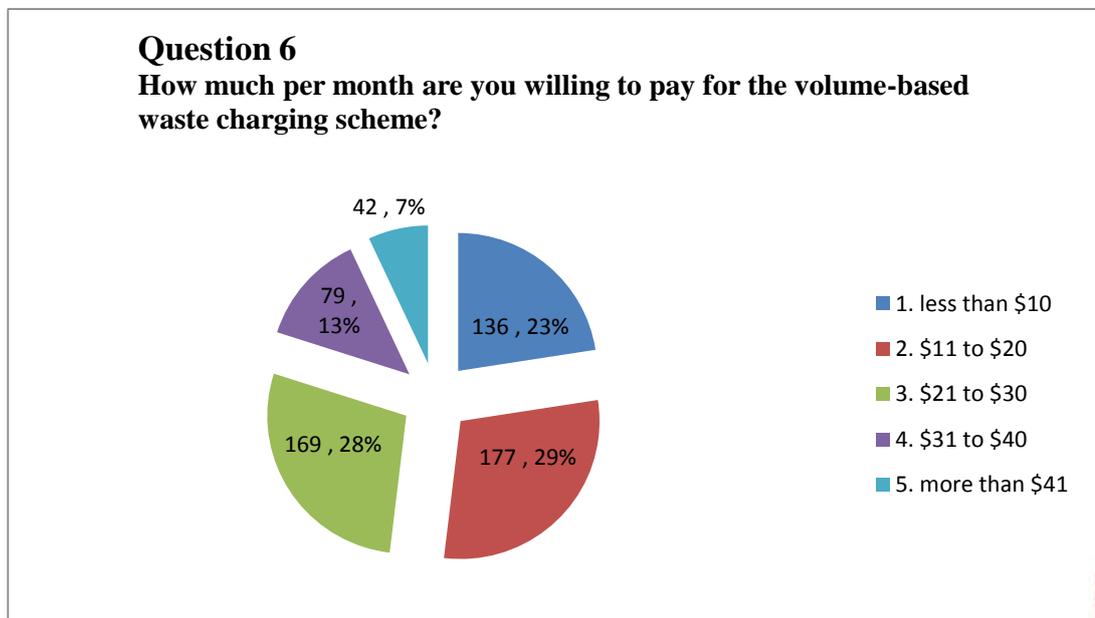
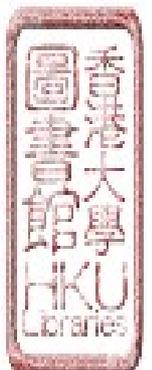


Figure 53: The charging fee of the volume-based waste charging scheme



Question 7

The polluter pays principle should be widely implemented in most of the foodservice activities in Hong Kong.

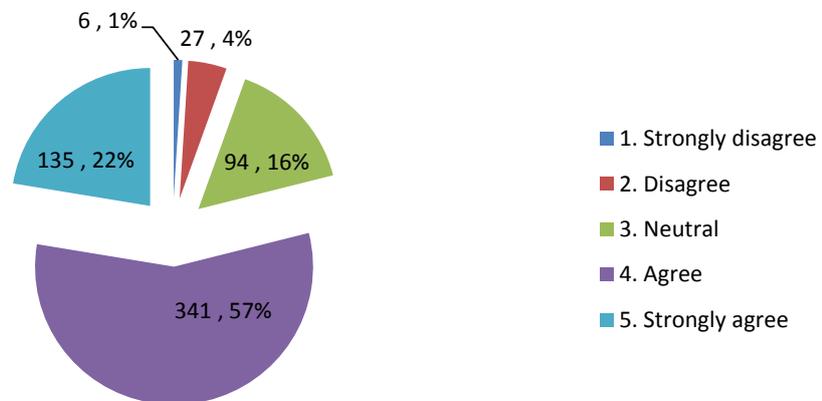
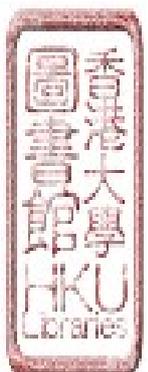


Figure 54: The acceptance level of polluter pay principle in the community

The proposed framework states that the best practice of foodservice suppliers on environmental related taxes is to take the financial incentives and promote EPR for food waste reduction at source. In line with the framework, the interviewees generally supported the volume-based waste charging scheme. The measurement method was negotiable to suit the needs of different catering industries. The interviewees might not agree the EPR on food waste issues. They stated that the food waste generation is determined by the customer purchase and consumption decision. However, if the food waste disposal cost is borne by the foodservice supplier, it was considered unfair to them. The true polluter should be clearly identified to implement the EPR. Besides, they thought it was difficult to implement EPR on the customers with leftover penalty, adversely affect the catering business and human rights. There were obvious gaps between the current situation and best practice on both waste charging and EPR.

A combination of measures including voluntary garbage sorting, OWTF network and garbage bags should be provided to work with the waste charging. It



takes time for Hong Kong residents to adapt to the waste charging. Financial incentives could be provided through both charging and subsidies.

Bijas Vegetarian restaurant has implemented the “Weigh What You Eat” (Figure 55) vegetarian buffet style meal at \$15 per 100 gram (Figure 56) with minimum charge \$20. Unlimited rice, soup and tea were offered (Figure 57). Nearly all the customers finished their dishes (Figure 58) with adequate financial incentives.



Figure 55: Weigh What You Eat
Source: author



Figure 56: Weighing machine
Source: author

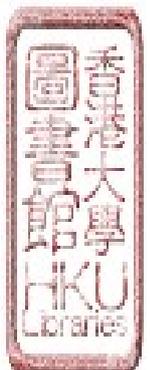


Figure 57: Unlimited rice, soup and tea
Source: author



Figure 58: Sample meal
Source: author

The proposed framework states that the best practice of Government and NGOs is to implement and support the volume-based waste charging scheme to provide financial incentives for source reduction. The NGOs can also promote polluter pays principle through social pressure and media concern. In line with the framework, the

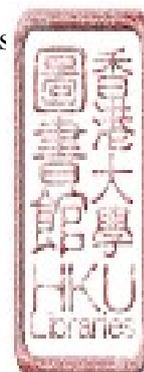


Government stated that the waste charging was still in the pilot stage and public consultation is on-going. The EPR has been implemented in Hong Kong to some extent only such as the sewage charges. The NGOs generally preferred the waste charging measurement by weight. There were inadequate financial incentives to promote food waste reduction at source. Besides, the EPR cannot be fully implemented in Hong Kong on food waste issues. These are the gaps between the current situation and best practice. The Director of Friends of the Earth, Mr. Edwin Lau, said waste charging should be the top priority to provide financial incentive to solve the solid waste problem despite fly-tipping problem (SCMP, 2013b).

The Government stated that the main difficulties on waste charging were the great variety of building types and law enforcement. The fees should be able to cover the waste treatment cost. Greeners Action did not expect large-scale of fly-tipping when there is sufficient education and publicity. Fee exemption could be granted to low-income families below certain waste amount. The trash fee sharing for the whole building or estate was not recommended. The true polluter could not be clearly identified so that the polluter pays principle may not be effectively implemented. The green groups could create media concern and social pressure on the food wastage. HKFORT stated that it is unwise for some restaurants to promote excessive food purchase to boost sales.

Moral motives

From the framework proposed, the best practice of consumers on moral motives is to adopt ethical consumerism for right-size food purchase. From the research findings, over 90% of the Hong Kong people thought wasting food is unacceptable and support Food Wise Hong Kong Campaign (Figure 59). In addition, 93% of the survey participants accepted that the foodservice suppliers should provide green



consumption options and be environmentally friendly (Figure 60). So, the consumers had good moral motives and have attained the best practice.

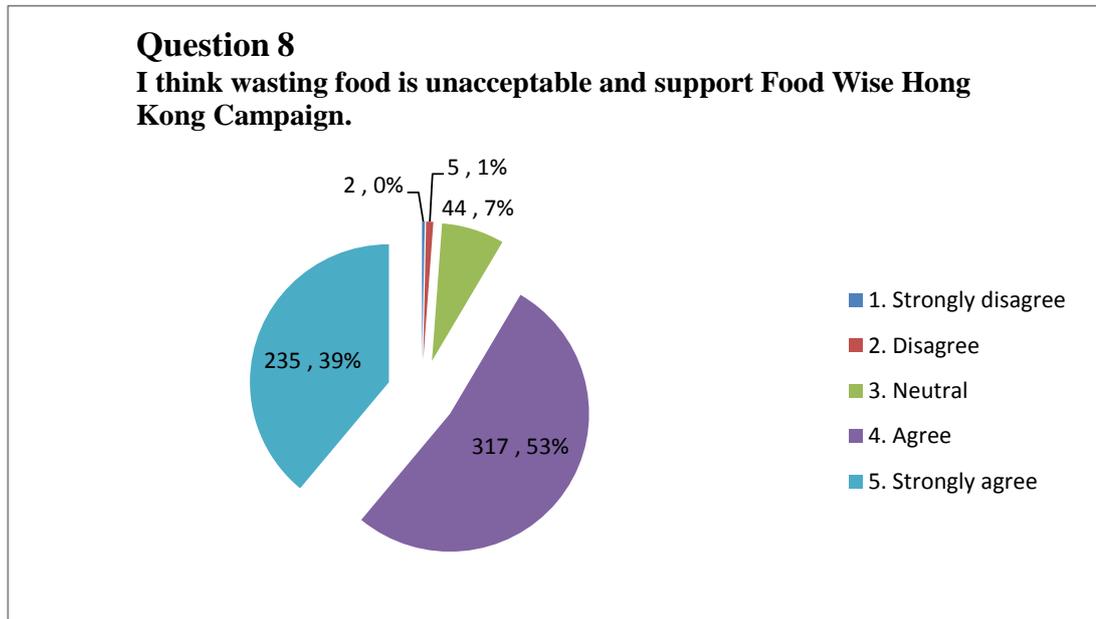


Figure 59: The popularity of Food Wise Hong Kong Campaign

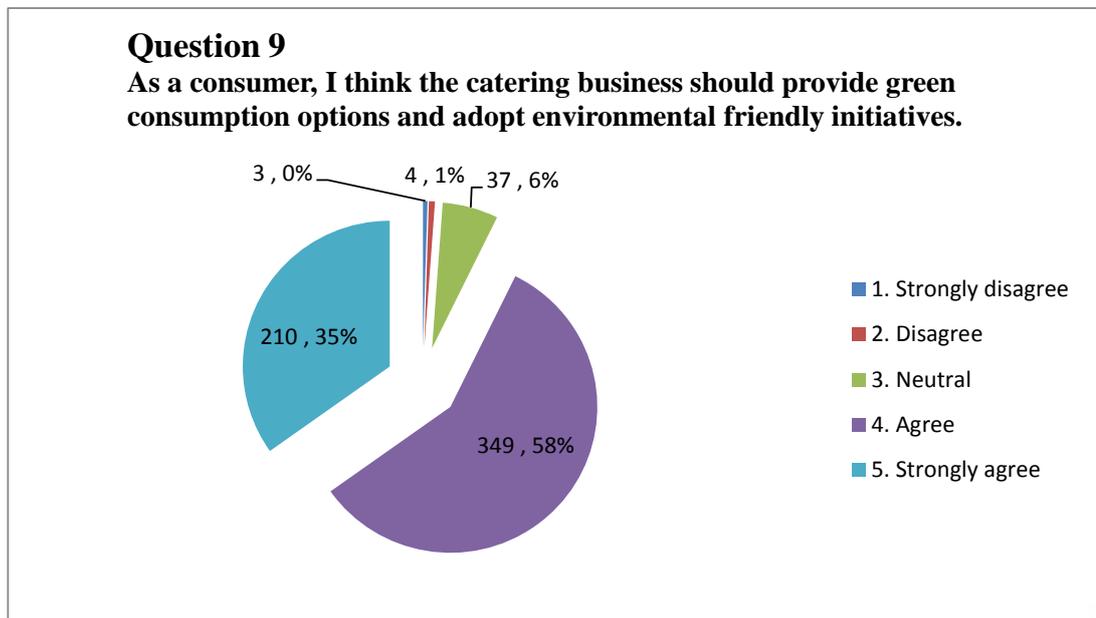


Figure 60: The consumer attitudes on the CSR of environmental protection

The proposed framework states that the best practice of foodservice suppliers on moral motives is to adopt corporate social responsibility (CSR) and donate food in daily operation. In line with the framework, the interviewees have committed to food



waste reduction at source in their CSR principles. They were also willing to donate food to serve the underprivileged communities in Hong Kong. Food safety was their top priority in food donation. However, Friends of the Earth reported that Hong Kong supermarkets disposed 31,000 tonnes of food annually. The low business ethics drove them to send the edible food to landfills instead of food donation. The food shopping shelves were kept full and the food without perfect appearance is usually discarded (SingTao, 2012). In 2013, supermarkets have improved a little on food donation. PARKnSHOP and Wellcome have annually donated 36 and 24 tonnes of food respectively. It reflected that the monitoring function of the NGOs and media is only limited to certain extent (TKP, 2013). There was an obvious gap between the current situation and best practice.

They had environmental friendly operation management like proper food storage, effective menu design and right-size customer orders to reduce food waste. Simple voluntary food waste source separation was used. The staff would dine on the remaining serving food in the restaurants. Whether the company is environmentally friendly was greatly influenced by the management. The LHGroup Banqueting House joined the Green luck banquet (Figure 61) to reduce food waste (GM, 2013). They felt happy to donate food. The risk of food poisoning was low and there was third party insurance on food donation. Sufficient staff training should be provided on food safety and food donation process. Trust and relationship were important in food donation.

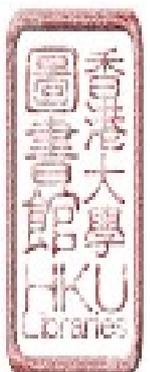
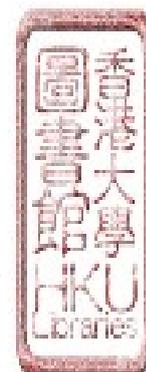




Figure 61: Green luck banquet by the Banqueting House (LHGroup)
 Source: Green Monday (2014)

The proposed framework states that the best practice of the Government & NGOs on moral motives is to continue the Food Wise Hong Kong Campaign and other food waste reduction programs to promote moral motives. In line with the framework, the interviewed EPD officer stated that the Environment Bureau would continue to promote “Don’t be a big waster!” messages to change the daily dining habits of Hong Kong residents to reduce leftover. Greeners Action has launched “No leftover program”, “Save Food Diners instant win”, food waste reduction tips, less rice cheaper by \$1 activities and food waste audit to work with the Food Wise Hong Kong Campaign. The NGOs had various food waste reduction and food donation programs. Therefore, the Government & NGOs have attained the best practices.

The Government would practice what they preach to discourage buffet style serving and excessive number of courses in official occasions. Ethical consumerism was promoted by encouraging simple life and environmentally friendly habits. They



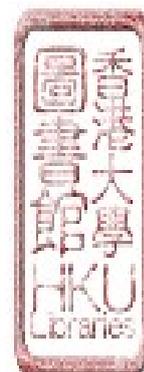
would also act as the facilitator on food donation and maintain the food safety standards. Customers should buy food according to their actual needs instead of the influence of marketing strategies. The cuisine could be prepared in smaller portion first. If it is not enough, we can order more. Six-course banquet could be launched. The Chinese food could be served in western style to minimize food wastage. Preventing excessive food production was more preferred than food donation.

The Chairman of the United Nations World Food Program in Hong Kong, Mr. Kevin Yeung, commented the local charities acts as philanthropy to collect the surplus food to help the socially vulnerable families (Lee, 2013).

The severe competition in the catering industry and minimum wage requirements made them focus on company survival instead of environmental protection. Merely relying on Food Wise Hong Kong Campaign could not provide sufficient incentives on food waste reduction at source.

Social mobilization

From the framework proposed, the best practice of consumers on social mobilization is to participate in food waste reduction and recycling activities. They should also support the establishment of OWTF network even though they are near to their home. From the research findings, around 40% of the Hong Kong residents heard about the Food Waste Recycling Partnership Scheme (Figure 62). Furthermore, only 9% of the Hong Kong residents rejected the establishment of Organic Waste Treatment Facilities (OWTF) even though they are near to their home (Figure 63).



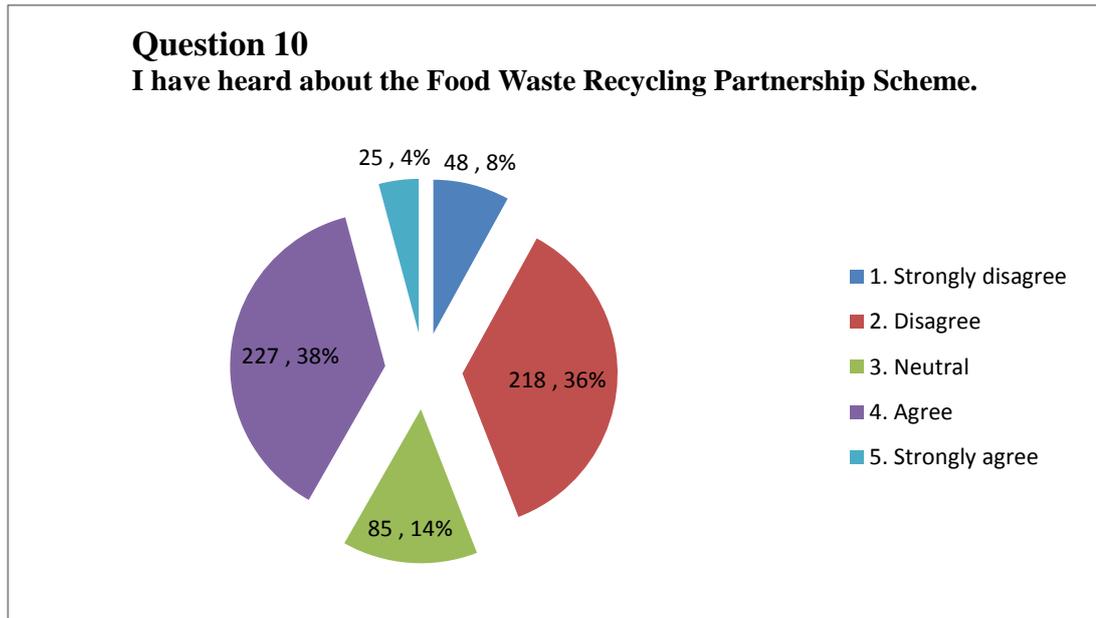


Figure 62: The popularity of the Food Waste Recycling Partnership Scheme

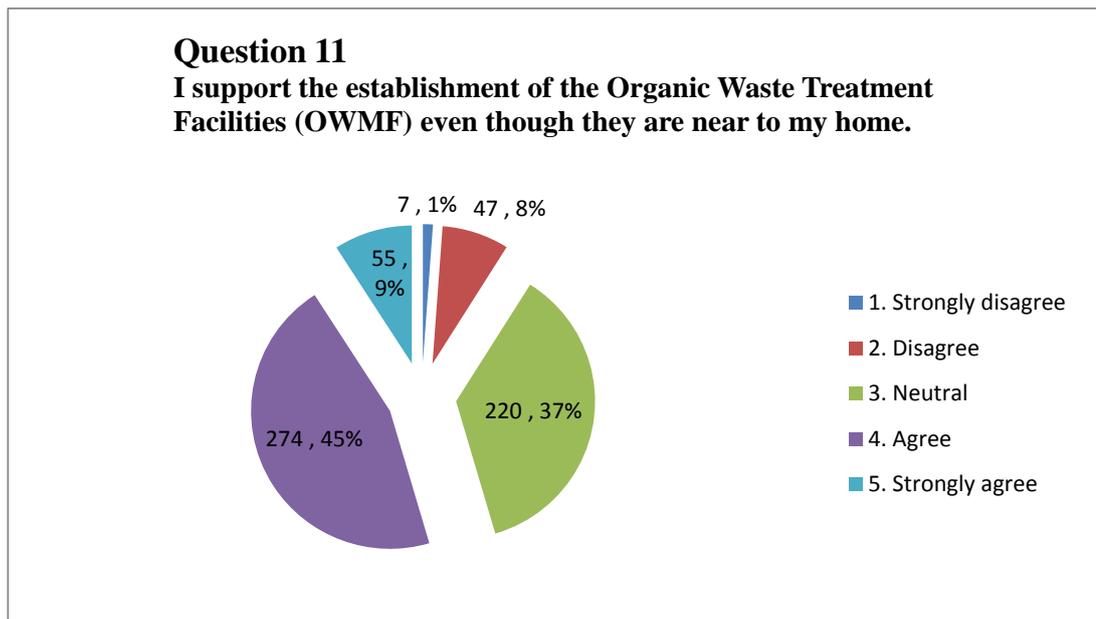
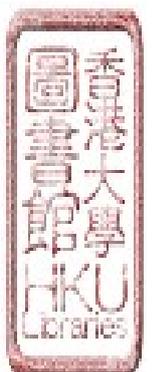


Figure 63: The public opinion on the OWTF establishment

Majority of the respondents (53%) was neutral to the effectiveness of the \$1 billion Recycling Fund (Figure 64). The general public greatly welcomed the social mobilization activities and OWTF infrastructure. The consumers have met the best practices.



Question 12

The \$1 billion Recycling Fund proposed in the latest Policy Address can effectively encourage the wider participation from the community.

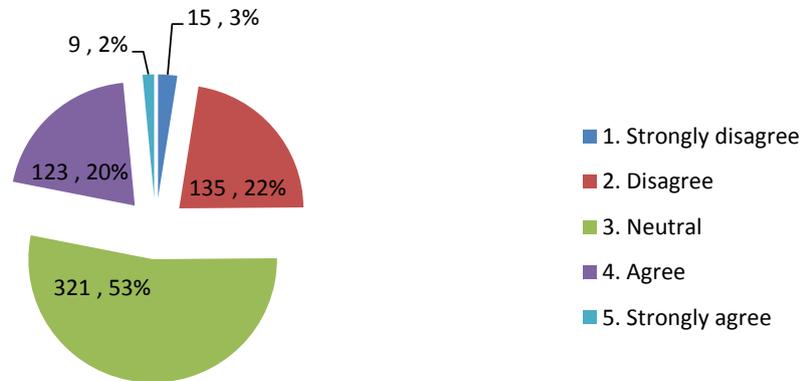


Figure 64: The public comment on the \$1 billion Recycling Fund

The proposed framework states that the best practice of foodservice suppliers on social mobilization is to cooperate with customers, the Government and NGOs to promote social mobilization. In line with the framework, the interviewees had limited collaboration with other stakeholders on the food waste reduction and recycling activities. They had simple voluntary food waste source separation and collection system. They also supported the food waste-to-energy approach and the establishment of OWTF network. There was a gap between the current situation and the best practice.

Merely the environmental award itself could be an incentive. If the eco-labels can significantly improve the corporate reputation, staff loyalty, intangible financial gains and other potential returns, they could be good incentives. The current results of using environmental awards as non-financial incentives were not satisfactory. The Government should be more serious to solve the food waste problem. The OWTF network with sufficient processing capacity should be well established in Hong Kong. Government subsidies and cost saving environmental measures could be



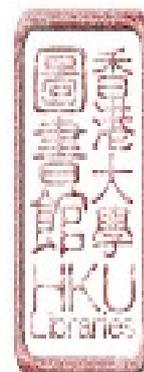
provided to the restaurants and food waste recycling companies. If the restaurants have to incur additional expenses on food waste recycling, they preferred simply throw them to trash. The elderly could be the volunteers for some recycling activities. The hotel buffets were extremely wasteful mode of operation.

Food waste recycling has been an anticlimax in Hong Kong. Senior Project Officer of Greeners Action, Ms. Ying Ying Kwok, said that the Food Waste Recycling Partnership Scheme has been unsuccessful because the operation of the OWTF in Siu Ho Wan has been delayed to 2016. The participants were frustrated and withdrew from the program. The outsourcing contracts should include the food waste recycling responsibility. Food waste buckets were provided in Tin Shing (Allmart) Chinese market. Food waste composting machine was installed in Tai Shing Street Market. These food waste recycling facilities were only limited to certain markets and restaurants in Hong Kong (ODN, 2013).

The foodservice suppliers generally did not have sophisticated food waste source separation and collection system. The most of the restaurants did not have the habits, incentives and space to do the garbage sorting and have to provide additional manpower, space, resources and expenses. When there was insufficient OWTF network, the waste collection company would mix the sorted garbage again.

Some foodservice suppliers merely wanted to build an environmentally friendly corporate image. In fact, they are not interested in food waste reduction and recycling. For example, the hotels bought the composting machines to build an environmentally friendly corporate image. They might not consistently participate in the social mobilization activities.

The foodservice suppliers generally did not know the functions and details of the Steering Committee to Promote the Sustainable Development of the Recycling Industry and the Recycling Fund. The Government should better explain the

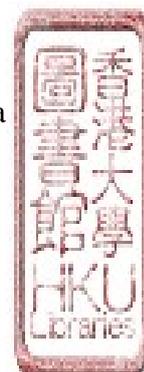


environmental protection measures to the public. Effective and efficient communication among stakeholders should be improved.

The proposed framework states that the best practice of the Government & NGOs on social mobilization is to coordinate the kitchen waste reduction efforts and develop the OWTF infrastructure. In line with the framework, the Food Wise Hong Kong Steering Committee was coordinating the food waste reduction efforts of Hong Kong residents, foodservice companies, the Government and NGOs. The Government was planning to establish the OWTF network and district-based food waste collection centres. The green groups and food banks also had sufficient cooperation among stakeholders. The current situation of collaboration has met the best practice. However, there was a gap between the current situation and best practice on the OWTF infrastructure.

At the current stage, the Steering Committee to Promote the Sustainable Development of the Recycling Industry, the Recycling Fund and the District Recycling Stations focused on the low value recyclables and the recycling companies which face lots of difficulties. Food waste management might be included in the future. Mingpao newspaper on 11 Apr 2014 stated that the \$1 billion Recycling Fund will be used for recycling machine and vehicle purchases (Ma, 2014). The Chief Secretary for Administration, Mrs. Carrie Lam, chaired the first meeting of the Steering Committee to Promote the Sustainable Development of the Recycling Industry on 23 August 2013. It has encouraged the collaboration among government bureaux and departments and the establishment of the Recycling Fund (HKSARG, 2013d). We could see that the food waste recycling industry development was only at the initial stage.

Hong Kong needed incineration facilities to significantly reduce the rubbish volume by 90%, which greatly extend the landfill useful life. There was public



misconception on the incinerators. The Government would use scientific methods and facts to explain the needs and consequences.

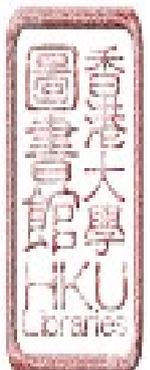
The OWTF Phase I & II will be available by 2017 with daily capacity of 500 tonnes. It is obviously insufficient for the high food waste daily generation rate at 3,854 tonnes (Preston, 2013). Besides, the Government was planning to build a giant incinerator in Shek Kwu Chau at an estimated cost of HK\$15 billion. The environmentalists said the incinerator will cause air pollution and spoil the coastal areas. We could see that the HKSAR Government environmental policy implementation faces lots of hardship (Lanyon, 2013)

Food Resources Recycling Centre has been opened at Lei Muk Shue (II) Estate on 31 July 2013. The Deputy Director of the Housing Department, Mrs. Irene Cheng, said that the Government cooperate with the food bank to collect edible food in the community to minimize food wastage (HKSARG, 2013b).

The Government stated that the local energy demand is great. On the contrary, the food waste product markets and local consumption were small. So, the food waste-to-energy by anaerobic digesters was preferred. The OWTF environmental and operational standards were monitored by the environmental impact assessment (EIA) on environmental acceptability and legal requirements. The NGOs preferred financial subsidy and simple environment funding application procedures to promote food waste source reduction and recycling.

Education and publicity

From the framework proposed, the best practice of consumers on education and publicity is to equip sufficient environmental knowledge and awareness. From the research findings, more than half (55%) of the survey participants thought the recent HKSAR Government food waste publicity activities are unsuccessful (Figure 65).



51% of Hong Kong people promoted food waste reduction messages in family education and support the community green stations (Figure 66). Besides, two-third of the respondents supported the environmental education on food waste in the formal curriculum (Figure 67). The food waste content should also be included in the HKDSE Liberal Studies examination. South China Morning Post (SCMP) has conducted interviews on environmental education in Hong Kong. The interviewee Grace Chan, Louise Mak and Eric Chan said they did not receive sufficient environmental education in the formal curriculum. (Goh, 2013). The environmental education on food waste was generally insufficient. There was a gap between the current situation and the best practice.

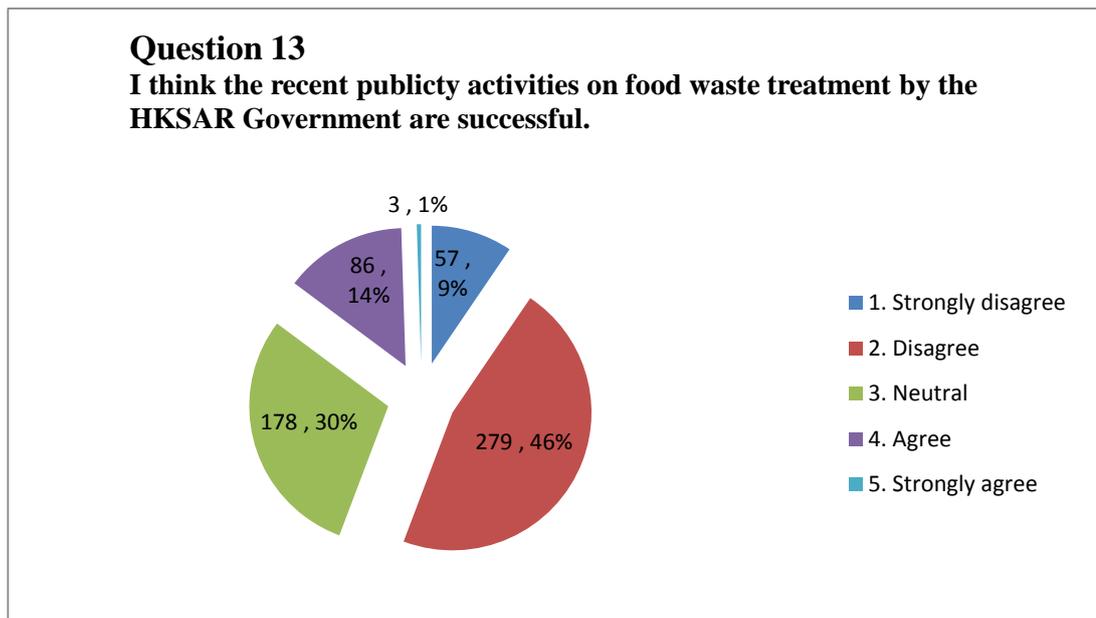
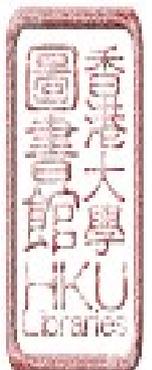


Figure 65: The public evaluation on the food waste publicity activities



Question 14

I will promote food waste source reduction messages in family education and among the friends and relatives. I will also support the community green stations stated in the Policy Address 2014.

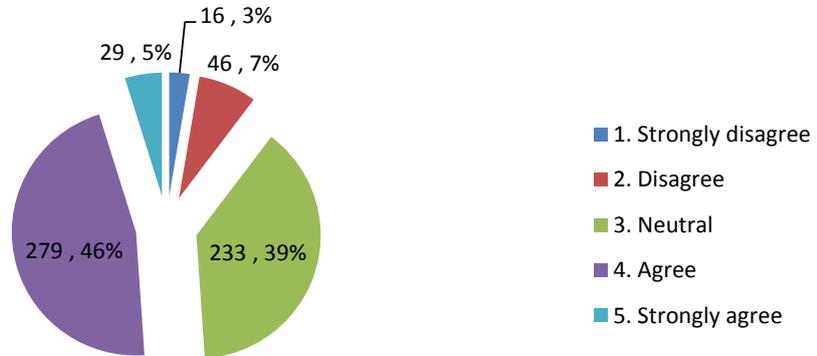


Figure 66: The public opinion on the family environmental education and community green stations

Question 15

Saving food and knowledge on food waste treatment should be included in the primary and secondary curriculum with examination in the HKDSE Liberal Studies subject.

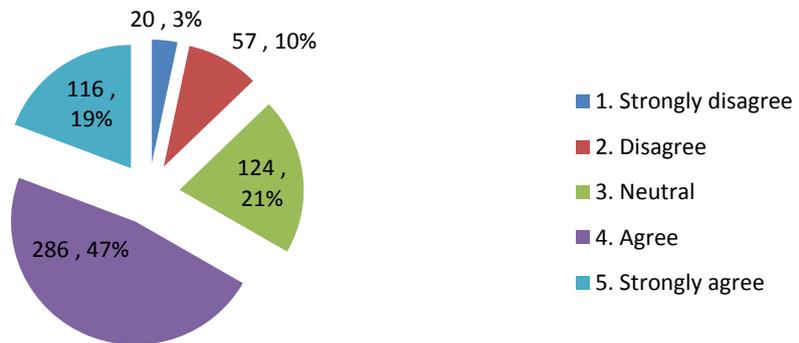


Figure 67: The public opinion on the food waste treatment education in the formal curriculum with the HKDSE Liberal Studies examination

The proposed framework states that the best practice of foodservice suppliers or education and publicity is to provide staff training to strengthen the environmental knowledge and support the community green stations. In line with the framework,



the interviewees generally provided simple environmental staff training, support the community green stations and would participate the food waste publicity activities. The foodservice suppliers have met the best practice.

The content included voluntary food waste source separation and delivery, food donation and food safety, food waste source reduction measures and ISO14001 standards. The training mode was mainly practical on-job training and experience sharing. They would try their best to prevent pre-consumer food waste to reduce cost. Go Green Organic Farm (Figure 68) has operated its own vegetable farm (Figure 69) and vegetable shop (Figure 70) to provide environmental education (Figure 71) to Hong Kong residents. Personal experience on growing vegetable could let them understand it is not easy to obtain food. So, they would treasure food in their daily life (GoGreen, 2014).



Figure 68: Go Green Organic Farm
Source: author



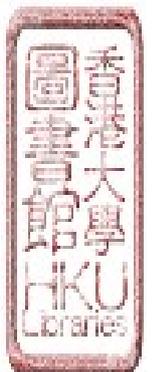
Figure 69: The farmland
Source: author



Figure 70: The vegetable shop
Source: Go Green Organic Farm (2014)



Figure 71: Environmental education
Source: Go Green Organic Farm (2014)

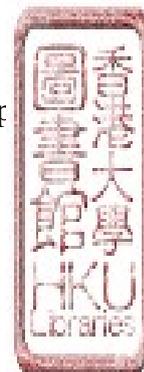


Environmental staff training was actually difficult in Hong Kong. The catering business had to be sustainable before any environmental protection actions. The low education level of catering staff, long working hour and great difficulty on staff recruitment made the environmental staff training difficult. The catering staff simply did not like having lessons and studying. Besides, it was not romantic to use recycled food. So, food waste reduction could only be a part of the life and business.

The proposed framework states that the best practice of the Government & NGOs on education and publicity is to provide adequate environmental education and publicity activities. In line with the framework, the Education Bureau was promoting food waste reduction messages in schools. Food Wise Hong Kong Campaign would continue to promote food waste reduction at source. The green groups were willing to operate the community green stations. They were proficient in environmental education and publicity activities because they have established community connections. The Government & NGOs have attained the best practice.

The Food Wise Charter signees would commit to food waste reduction at source. Food Wise Hong Kong Ambassador Scheme was conducted to train the volunteers. Supportive measures including website, seminars and workshops were also organized. The Community Green Stations would be the district environmental education centers. The NGOs could employ more staff to cope with the increased workload when there is sufficient funding. Each station should be adjusted to suit the local district requirements.

Merely relying on the HKDSE Liberal Studies was inadequate. Personal experience on agriculture and poultry could be included. The feeling and relationship with nature should be strengthened. The food production process and food crisis in developing countries should also be explained to the students.



Sustainable lifestyles

From the framework proposed, the best practice of consumers on sustainable lifestyles is to adopt sustainable lifestyles instead of consumerist ones. From the research findings, 85% of the survey participants claimed that they adopted sustainable lifestyles (Figure 72). Only 6% of the respondents felt embarrassed to ask for takeaway services in restaurants (Figure 73). However, Hong Kong had an ecological footprint of 4.7 global hectares. The ecological deficit was the 9th largest in the world. The per capita ecological footprint has exceeded the biocapacity by more than 150 times under the adverse impact from consumerist lifestyles (Kao, 2013). The Hong Kong ecological footprint report mentioned that food waste was a significant component to the ecological deficit. There was a gap between the current situation and the best practice.

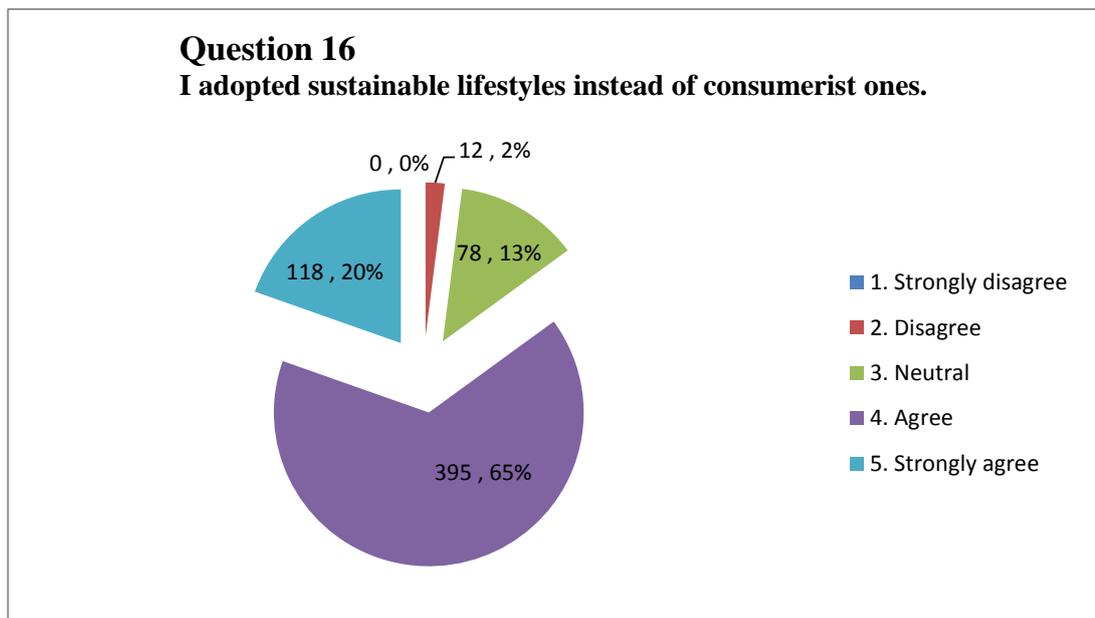


Figure 72: The adoption of sustainable lifestyles by Hong Kong residents



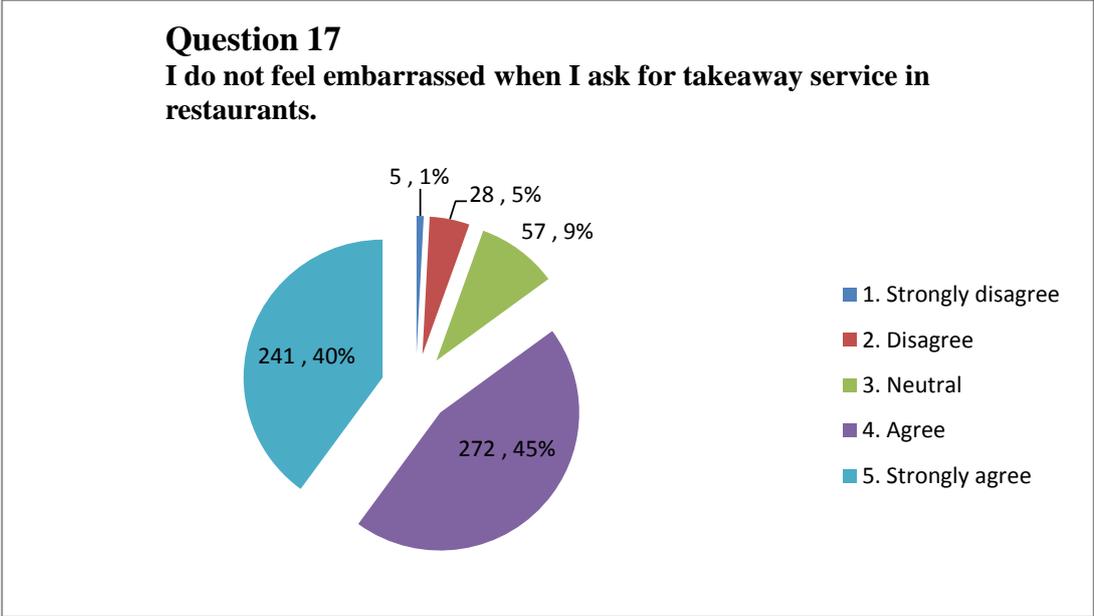


Figure 73: The popularity of takeaway services on leftover

The proposed framework states that the best practice of foodservice suppliers on sustainable lifestyles is to promote right-size food purchase and provide user-friendly food waste source reduction measures. In line with the framework, they had various environmental measures to support right-size food purchase. User-friendly doggy bags were usually provided for leftover takeaways. However, the foodservice companies were only partially mature enough on food waste source reduction. Green marketing on food products was not popular in Hong Kong. The consumerist lifestyles made the local green market demand too small. The symbiotic relationship between consumers and marketers made the environmental measures difficult in the catering industry. The green products were thus expensive, limited in range and difficult to find. The foodservice companies could join the Green Monday campaign to shape the green consumption behavior. The company mission could be changed to sustainable long-term benefits of the company (GM, 2013). There was a gap between the current situation and best practice.

The weight for each meal should be approximately 300g. The buffet style



serving should be discouraged. Light banquet campaign with six courses could be promoted. The interviewed Mou Mou Club has launched the “Red card Green card system” (Figure 74) and “Table for Two” (Figure 75) to promote food waste reduction in shabu shabu (Figure 76). Financial incentive and moral motive were included to encourage the customers to completely finish the meal (Figure 77). On-site meal portioning in schools could be conducted. Environmental education should be provided to improve the customer environmental awareness on right-size food purchase.



Figure 74: Red card Green card system
Source: author



Figure 75: Table for two
Source: author

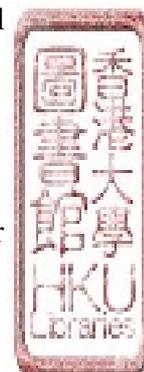


Figure 76: Shabu Shabu buffet serving
Source: author



Figure 77: Completely finish the meal
Source: author

Besides, it was easiest for one person to have right-size food purchase. The difficulty increased when the number of people increases. When it was a banquet for 40 tables, right-size food purchase was very difficult. The Western style individual



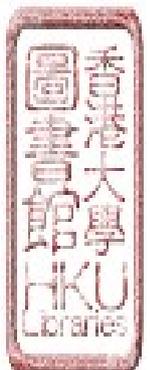
serving style was easier to have right-size food purchase than Chinese food sharing style.

It was stylish to take away the remaining food. The food price was so high and most of us had right-size food purchase awareness. Doggy bags might be charged at \$1 each. Such charging made the takeaway service inconvenient. So, there was a dilemma on whether we should reduce plastic waste or the food waste. The barbecue site (Figure 78) might promote right-size food purchase (Figure 79) but not allow leftover takeaway services (Figure 80) for operational reasons. Animal-loving education (Figure 81) was provided to children to avoid eating endangered species.

The proposed framework states that the best practice of the Government & NGOs on sustainable lifestyles is to promote right-size food purchase and publish food waste reduction practical tips manuals. In line with the framework, the Government greatly promoted the right-size food purchase and sustainable lifestyles to the community. The green groups also promote sustainable lifestyles in environmental seminars and publicity activities. The Government & NGOs have met the best practice.

The Government thought there are basic principles on sustainable lifestyles. First, everyone should treasure food and minimize wastage. Second, some kind of food like bear's paw could be avoided to enhance biodiversity. Finally, local food system should be adopted. When we consume the food produced nearby, the food wastage in transportation, over production and carbon emission could be reduced. Sufficient sustainable lifestyles manuals have been published already.

World Wide Fund Hong Kong Chairman, T.C.H. Yang, believes that Hong Kong could transform itself into the sustainability leader when the HKSAR Government implements the Biodiversity Strategy and Action Plan (BSAP) under the Convention on Biological Diversity (CBD) and relevant policies (WWFHK, 2013).



Hong Kong residents understood sustainable lifestyles but they might not have concrete actions. Financial incentives should be allocated to motivate them. Food recycling trip, eco-enzyme workshops and seminars could be organized to provide practical tips on sustainable lifestyles to Hong Kong residents. Low-income families tended to treasure every part of the food and minimize wastage. The greed in the capitalist society should be removed. It would be a disaster to everyone if Hong Kong is encircled by rubbish dumps.



Figure 78: Green Farm barbecue site
Source: author



Figure 79: Right-size food purchase
Source: author



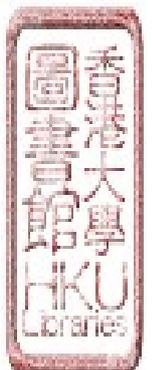
Figure 80: Leftover reduction message
Source: author



Figure 81: Animal-loving education
Source: author

Other comments

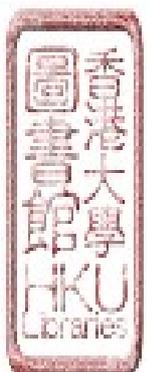
The respondents generally agreed that the most effective method is a combination of measures. Environmental education and publicity, food waste collection and



treatment infrastructure, policies and laws, food donation, waste charging, social mobilization, sustainable lifestyles and landfill disposal ban should work together to promote food waste reduction at source.

5.3 The gap between the Hong Kong current situation and best practice for further improvement

The progress of food waste reduction at source comparing to the framework in Hong Kong is summarized below (Figure 82). The good progress areas and lagging behind aspects are described. The summary will lead to the recommendations.



	Laws and regulations	Environmental related taxes	Moral motives	Social mobilization	Education and publicity	Sustainable lifestyles
Consumers	Good progress. The Hong Kong residents support the food waste policy formulation and legislation.	Good progress. The Hong Kong citizens accept financial incentives and polluter pays principle on food waste reduction.	Good progress. The Hong Kong people support the Food Wise Hong Kong Campaign and green consumption.	Good progress. The Hong Kong residents encourage the OWTF network establishment and social mobilization.	Hong Kong people did not have sufficient environmental education and publicity. It should be strengthened in the formal curriculum.	Hong Kong citizens have great ecological deficit. They should adopt sustainable lifestyles with concrete actions.
Foodservice suppliers	Good progress. The foodservice suppliers agree the food waste policies development and legislation.	There are disputes on waste charging methods and EPR on food waste. Further discussion is needed to solve the problem.	The supermarkets prefer to throw the edible food to trash instead of donation. The business ethics and CSR should be improved.	The catering companies have limited collaboration among customers, Government and NGOs on food waste reduction.	Good progress. The catering industry has provided simple environmental training and supports the community green stations.	The consumerist consumers make the green marketing difficult in the symbiotic relationship.
Government & NGOs	A food waste & yard waste plan for Hong Kong has been issued. Complete food waste policies and laws are needed.	The waste charging should be launched as soon as possible. The Government should solve the EPR disputes on leftover.	Good progress. Food Wise Hong Kong Campaign and food donation have been extensively conducted.	Government should provide sufficient OWTF network. The NGOs actively promotes social mobilization.	Good progress. The Government & NGOs greatly promote the environmental education and publicity.	Good progress. The Government & NGOs greatly encourage right-size food purchase and sustainable li

Figure 82: The summary of food waste reduction at source progress in Hong Kong comparing to the framework

Source: author



Chapter 6 Recommendation and conclusion

6.1 Recommendation

This chapter puts forward an action plan suggesting further actions for each stakeholder involved in the source reduction for food waste, namely the Government, NGOs, consumers and foodservice suppliers. A timeline is also suggested.

6.1.1 The Government

The Government should develop comprehensive food waste policies, implement waste charging and establish the OWTF infrastructure.

Laws and regulations

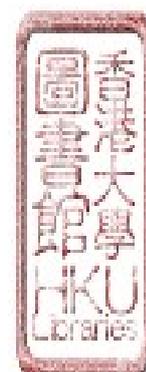
In the short term, financial subsidies can be provided to the food waste recycling companies. The Financial Secretary can provide the funding in the Budget through the ECF next year. The environment grants are used to buy commercial food waste recycling machines (Figure 83) and the current price ranges from US\$10,000 to US\$50,000 per unit (Alibaba, 2014). So, the subsidy amount ranges from HK\$80,000 to HK\$400,000 per application.



Figure 83: Price of commercial food waste recycling machinery

Source: Alibaba.com (2014)

Low-interest loans can also be offered for other necessary machine purchase and company development. The loans range, annual rate and loan period can be \$400,000



to \$4,000,000, 1% and 10 years per application respectively (OECD, 2006).

Given the legislative procedures involved, in the medium term, Good Samaritan Food Donation Ordinance can be proposed to protect the good faith donor and recipient agency from civil and criminal liability. The passage of a bill in the Legislative Council can be completed after a few years. Gross negligence and intentional misconduct are not included. Gross negligence means serious carelessness leading to severe health damage in food poisoning. Intentional misconduct refers to the willful disregard of the food safety in donation. The food includes apparently fit grocery product and wholesome food, which meets all quality and labeling standards imposed by the laws even though the food may not be readily marketable (Fusaro, 1996).

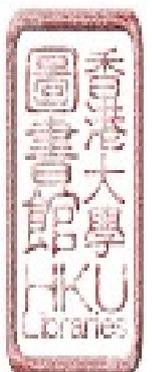
Landfill disposal ban should be executed in the long term. This measure can only be implemented when the OWTF network and supporting facilities are ready to be used. No organic wastes are allowed in regular garbage from household, company and institution. They should send them to the OWTF network or donate the food instead (DTS, 2014).

Environmental related taxes

The volume-based waste charging system should be implemented in the short term. The Secretary for the Environment said it would be probably the earliest by 2016. Based on the findings of this study, such a timeframe is adequate. Trash bags of 5kg, 10kg and 25kg can be used to identify the true polluter. Fee exemption can be granted to households below the Hong Kong's official poverty line (HKSARG, 2012).

6.1.2 NGOs

The NGOs can help deliver education courses to the students to promote

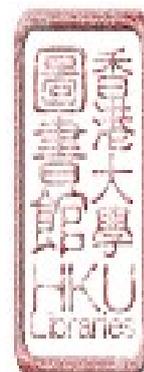


sustainable lifestyles. They can also carry out more campaigns to urge the foodservice operators to do more.

Education and publicity

The green groups can offer “Food waste reduction star awards” to foodservice suppliers in the short term. It can be easily launched with successful overseas experience. Food waste audits will be conducted in participating caterers. They have to satisfy 80% of the assessment criteria on food procurement, storage, cooking, customer orders and other areas in the food waste audit program. For example, the restaurants should make good use of surplus food for second dish like boiling fish bones for soup (FoodWise, 2013a). The catering business may benefit in lower operating costs, better corporate reputation and better local public health. Practical cost saving leftover reduction techniques are provided in the training program. Certificate of Excellence, trophy and eco-labels will be granted to the award winners. The results will be publicly appreciated in the local media press. The employees and customers also enjoys better public environment and health in Hong Kong (GS, 2014).

The green groups can provide guided tours to show the right-size food purchase habits conducted in supermarkets, restaurants and household in the short term. This is the strength of green groups to launch education and publicity activities. The buying habits include menu planning, fridge stocktaking and shopping tips. The dining habits can be food loving attitude, personal hygiene and proper storage. The cooking habits consist of serving size calculator, healthy eating and recipes updates. The guided tours can be included in the Moral and Civic Education of Other Learning Experience (OLE) in the secondary curriculum. Board games and apps games on food waste reduction can also be designed (LFHW, 2014).



CSR training can be provided by green groups and Caring Company Scheme to the foodservice suppliers in the medium term. The purpose is to help manage the environmental business risks. The complete CSR implementation on food waste takes a few years to complete. The content includes customer and public expectation, media and green group concerns, ethical behavior, practical solutions and scandal avoidance on food waste issues. The potential benefits, stakeholder expectation, consequences of unethical behavior, reasons behind and proper responses to environmental issues are introduced. Good business risks management on environmental issues can improve the potential financial gain, corporate reputation and customer satisfaction (Caring, 2014).

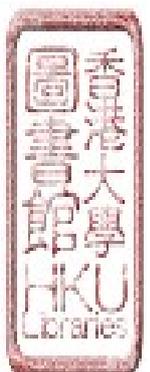


Figure 84: Caring Company Scheme

Source: Hong Kong Council of Social Service (2014)

Sustainable lifestyles

In the short term, the customers can use the Smartphone Apps for Android and iOS developed by the green groups to provide the food supply information of the Guangdong Province and seasonal food calendar (Figure 85) to promote regional and seasonal food system (PF&N, 2014). The Apps can be developed within one year.



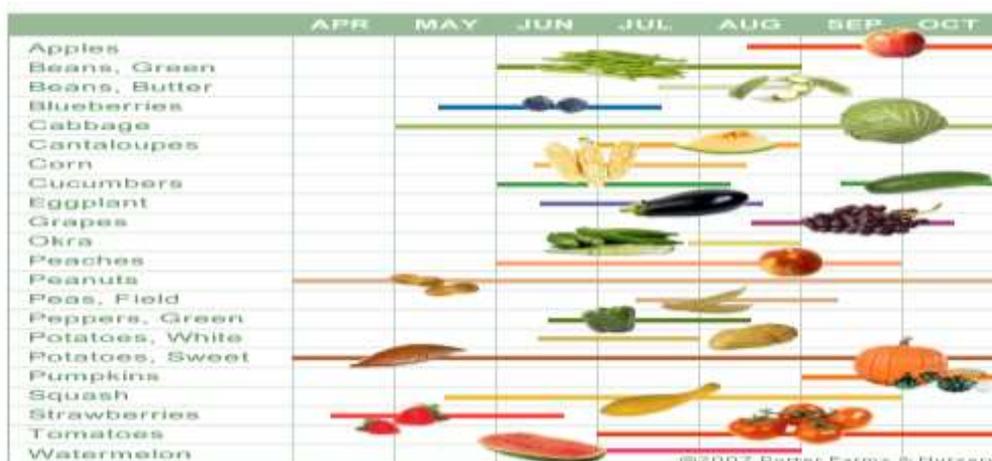


Figure 85: Seasonal food calendar

Source: Porter Farms & Nursery (2014)

Regional food system working group can be established by the green groups to support the long-term connections with the Guangdong food producers, the food distribution system, the food market and Hong Kong consumers in the long term (Leopold, 2014). The environmental awareness should be high enough to make the connection effective.

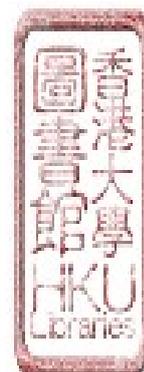
6.1.3 Consumers

The Hong Kong residents should be equipped with sufficient environmental knowledge and awareness. They should also act sustainably in daily life to replace consumerist lifestyles. Specific suggestions on education and publicity are proposed:

Education and publicity

In the short term, schools should implement the waste reduction proactively, e.g. no food waste campaign and school policy should be adopted where students should not leave behind food from their recess and lunch. Once the school policies are updated, they can be immediately implemented.

In the medium term, the students should be equipped with agricultural experience (Figure 86) in local organic farms to make them understand it is not easy



to obtain food. The farming facilities and curriculum adjustment need a few years to complete. The food waste content should be included in Module 6: Energy Technology and the Environment of the HKDSE Liberal Studies examination. A four mark data-response question on food waste can be provided in Paper 1 (Yu & Cheung, 2010).



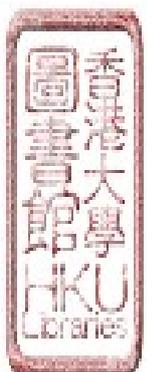
Figure 86: Agricultural experience

Source: author

The learning and teaching (L&T) should be improved to train the students to become environmentally responsible person and autonomous learner in the long term. High-order thinking, problem-solving skills and leftover reduction habits can be equipped so that the students can interact with the society on environmental issues. These advanced techniques requires a long time to cultivate through direct teaching, newspaper reading, problem-based learning (PBL) and group discussion (EDB, 1999).

6.1.4 Foodservice suppliers

The catering companies should improve the CSR on environmental protection, strengthen the collaboration and promote green marketing.



Moral motives

Food waste reduction items can be included in the performance appraisal in the medium term. Outstanding managers and frontline staff should be publicly commended with appreciation letters and rewarded with year-end bonuses and environmental awards (Lepak & Gowan, 2010). The company cultural change takes a few years to complete.

Social mobilization

In the short term, the foodservice suppliers should not simply aim at building environmentally friendly corporate image but really participate in social mobilization. Such attitude changes can be quickly reflected.

The catering companies can encourage the Food Wise Hong Kong Steering Committee to provide a collaboration platform for various stakeholders in the medium term. The mature platform needs a few years to gain experience. The platform can provide successful food waste reduction experience, share the food waste recycling facilities and help each other to overcome the leftover reduction difficulties (FoodWise, 2013c).

Sustainable lifestyles

In the short term, free and convenient doggy bags can be offered for leftover takeaway. The restaurants can waive the doggy bag charges immediately.

In the medium term, weight watchers menu can be used to show the serving size and provide variable amount of cuisines (Figure 87) like the practices of steakhouse (Billman's, 2014) for easier right-size food purchase. On-site meal portioning can replace individual lunchbox services. These arrangements have to gain substantial community support for a few years.

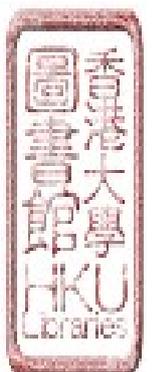




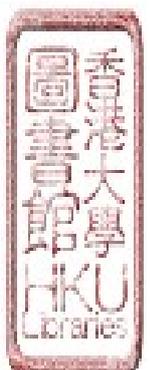
Figure 87: Menu showing the serving size

Source: Billman's steakhouse (2014)

The serving size per person should be limited to 300g in the long term. This dining culture can only be cultivated after a decade.

6.1.5 Timeline

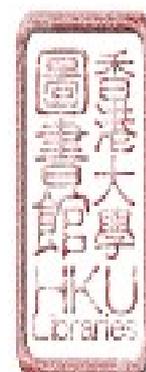
The timeline (Figure 88) of food waste policies and measures is classified into short, medium and long term. Short term refers to the upcoming 1-2 years. Medium term means the coming 2 to 8 years. Long term is the period over 8 years.



Short-term (2014-2016)
Consumers
✓ The food waste reduction practices are reflected in school administration.
Foodservice suppliers
✓ The catering companies really participate in social mobilization.
✓ Free doggy bags can be provided for leftover takeaway.
The Government
✓ Financial subsidies and loans can be provided to leftover recycling companies.
✓ Volume-based waste charging scheme is launched.
NGOs
✓ Food waste reduction star awards are offered to foodservice suppliers.
✓ Guided tours and board games on right-size food purchase are provided.
Medium term (2016-2022)
Consumers
✓ The students should have some agricultural experience.
✓ The food waste questions appear in the HKDSE Liberal Studies examination.
Foodservice suppliers
✓ Food waste reduction items are included in the performance appraisal.
✓ Collaboration platform is launched to promote synergy.
✓ The serving size is shown in the menu and variable food amount are offered.
✓ On-site meal portioning can replace lunchbox services.
The Government
✓ Good Samaritan Food Donation Ordinance is implemented.
NGOs
✓ CSR training on environmental business risks is offered to catering companies.
✓ Smartphone Apps on regional and seasonal food system are created.
Long term (2022 onwards)
Consumers
✓ The students become environmentally responsible persons.
Foodservice suppliers
✓ The serving size is limited to 300g per person.
The Government
✓ Landfill disposal bans on food waste is implemented.
NGOs
✓ Regional food system working group is developed.

Figure 88: Timeline for food waste policies and measures

Source: author



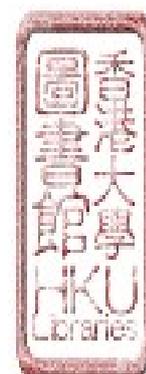
6.2 Conclusion

The food waste problem in Hong Kong is pressing. It received great attention in the public policy agenda. The HKSAR Government's Policy Address has emphasized the importance of food waste source reduction to alleviate the landfill pressure. Sustainable lifestyles and ethical consumerism should thus be promoted to replace the consumerist behaviors.

The theoretical and analytical framework provided the research background on the related concepts including food waste, source reduction, sustainable waste management, consumerism and consumer behavior. Under such a framework, financial incentives, moral motives, simple user-friendly system, social environmental belief and specific educational information are identified as the necessary principles guiding the best practice in food waste source reduction of the involved parties.

The study reviewed the current effort of Hong Kong in food waste management. A food waste & yard waste plan for Hong Kong (2014-2022) is the main government policy on food waste management. "Use less, waste less" is the core concept in the HKSAR environmental policy to promote food waste source reduction. Social mobilization, policies & legislation and infrastructure are the action plans on food waste. Food Wise Hong Kong Campaign aims at changing the wasteful dining habits of Hong Kong residents. Food banks, charities, environmental groups and food waste recycling companies are the major public participants in the food waste reduction and recycling activities.

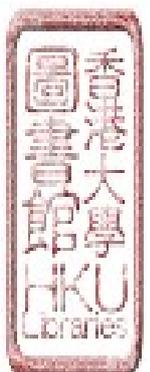
Taiwan case study illustrated the path of success on food waste source reduction. The Resource Recycling Four-in-One Program, Per-bag trash collection system, Mandatory garbage sorting (MGS), Extended producer responsibility (EPR), Recycling Fund Management Board (RFMB) are the major Taiwan environmental policies & legislation which substantially reduced the amount of food waste. The



effective household participation, green consumption, food waste collection system, environmental education and research & development have demonstrated the enthusiastic public participation on social mobilization. The composting plants, pig farms and anaerobic digesters are also adequately established as food waste infrastructure investments. The Taiwan food waste management therefore has gained international appreciation.

The research methodology focuses on the consumer behavior and facilitator performance through literature review, questionnaire survey, in-depth interviews and site visits. Comparing against the proposal analytical framework, in general, Hong Kong's performance on food waste management is below the best practice standards. The study found that there are insufficient environmental policies and laws in Hong Kong. The public interest is often sacrificed for private gains. There are insufficient financial incentives for food waste source reduction because the volume-based waste charging scheme is not implemented in Hong Kong. The moral motive is not strong enough for the waste reduction. The inconvenient kitchen waste collection and recycling system result in low intention to reduce food waste. The environmental awareness of Hong Kong people remains low because of insufficient environmental education on food waste in the formal curriculum. The Hong Kong residents do not fully understand the effective ways of food waste source reduction and recycling habits and method. The consumerist lifestyles of Hong Kong citizens lead to excessive kitchen waste produced. The demand and supply side behavior forms a symbiotic relationship on food waste source reduction.

The recommendations on the Government include financial subsidies and loans, Good Samaritan Food Donation Ordinance, landfill disposal ban and volume-based waste charging scheme. The NGOs can launch food waste reduction star awards, right-size food purchase guided tours, CSR training on environmental business risks,

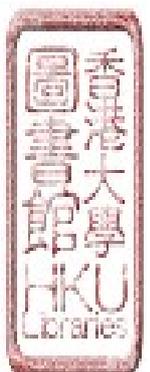


Smartphone Apps on regional food system, seasonal food calendar, food waste reduction board games and regional food system working group. The Hong Kong residents and students can have eco-schools policies, agricultural experience, food waste questions in public examination, advanced L&T on environmental protection. The foodservice suppliers can provide food waste items in performance appraisal with year-end bonus, collaboration platform, free doggy bags, weight watchers menus and serving size limited to 300g.

6.3 Future research and studies

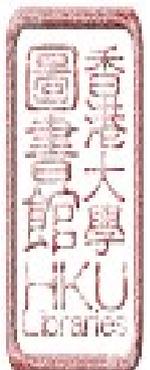
This research study provides a comprehensive and fundamental review for source reduction on food waste in Hong Kong. A few topics are identified as important future research areas on the subject of food waste. These topics include the details of food waste recycling industries, food donation, OWTF network and environmental education.

The specific possible topics for future research are “Food waste recycling industries and future development in Hong Kong”, “A critical review of food donation activities in Hong Kong”, “The Organic Waste Treatment Facilities infrastructure development in Hong Kong” and “Environmental education on food waste reduction in Hong Kong”.



Bibliography

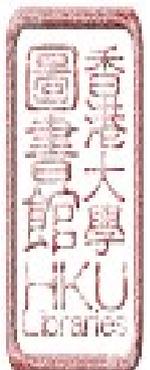
- Ahmed, Raisuddin. (1979). *Foodgrain supply, distribution and consumption policies within a dual pricing mechanism: a case study of Bangladesh*. Washington D.C.: International Food Policy Research Institute.
- Al. Ansari, Mohammed Saleh. (2012). Improving solid waste management in Gulf co-operation council states: developing integrated plans to achieve reduction in greenhouse gases. *Modern Applied Science*, 6(2), 60-68.
- Alibaba. (2014). Alibaba.com website on commercial food waste recycling machinery. Retrieved 05.05.2014, from http://www.alibaba.com/trade/search?fsb=y&IndexArea=product_en&CatId=&SearchText=commercial+food+waste+recycling+machinery
- ATV. (2005). Food bank. Hong Kong: ATV News & Public Affairs production.
- ATV. (2012). Wasted food recycling. Hong Kong: ATV News & Public Affairs Production.
- Banwell, Cathy, Dixon, Jane, Seubsman, Sam-Ang, Pangsap, S, Kelly, Matthew, & Sleigh, Adrian. (2013). Evolving food retail environments in Thailand and implications for the health and nutrition transition. *Public Health Nutrition*, 16(4), 608-615.
- Barrett, Alan. (1997). *The fiscal system and the polluter pays principle: a case study of Ireland*. Aldershot: Avebury Pub.
- Bates, Margaret P, & Phillips, Paul S. (1998). Waste minimisation in the food and drink industry. *Nutrition and Food Science*, 98(6), 330-334.
- Bates, Margaret P, & Phillips, Paul S. (1999). Sustainable waste management in the food and drink industry. *British Food Journal*, 101(8), 580-589.
- Beck, Glenn, & Parke, Harriet. (2012). *Agenda 21*. New York: Threshold Editions/Mercury Radio Arts.



- Billman's. (2014). Billman's steakhouse website. Retrieved 01.05.2014, from <http://www.idahofallssteakhouse.com/menu.html>
- Boden, Sharon. (2003). *Consumerism, romance and the wedding experience*. Basingstoke, Hampshire ; New York: Palgrave Macmillan.
- Buzby, Jean C., Hyman, Jeffrey, Stewart, Hayden, & Wells, Hodan F. (2011). The value of retail- and consumer-level fruit and vegetable losses in the United States. *Journal of Consumer Affairs*, 45(3), 492-515.
- Caring. (2014). Caring Company Scheme website. Retrieved 08.05.2014, from <http://www.caringcompany.org.hk/>
- Carrier, James G., & Luetchford, Peter G. (2012). *Ethical consumption : social value and economic practice*. New York: Berghahn Books.
- Caruana, Daniel J., & Olsen, Amanda E. Olsen. (2012). *Anaerobic digestion : processes, products, and applications*. New York: Nova Science Publishers.
- CFS. (2013). Food Safety Guidelines for Food Recovery. http://www.cfs.gov.hk/english/programme/programme_haccp/files/Food_Safety_Guidelines_for_Food_Recovery_e.pdf
- Chen, H.W. Chen, Chang, H.C., & Chang, J.E. (2007). Taiwan's Policy on Excessive Packaging Restriction - mandatory garbage sorting. *Taiwan Environmental Protection Administration*.
- CityU. (2014a). Biotransformation of food waste and cellulosic materials to bioenergy. Retrieved 4.3.2014, from http://www6.cityu.edu.hk/see/personal/Patrick_Lee/research.html
- CityU. (2014b). Dr. Carol LIN. Retrieved 4.3.2014, from http://www6.cityu.edu.hk/see/personal/Carol_Lin.htm
- Concilio, Joan. (2006, 25.10.2006). NEIGHBORS, *York Weekly Record*.
- Cowan, A. Keith. (2010). Bio-refineries: bioprocess technologies for waste-water

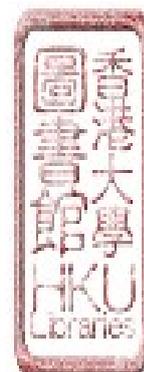


- treatment, energy and product valorization. *AIP Conference Proceedings*, 1229(1), 80-86.
- CSD. (2011). *Annual report on the Consumer Price Index 2011*. Hong Kong: Census and Statistics Department.
- CSD. (2012). *2011 population census: summary results*. Hong Kong: Census and Statistics Department.
- Dietz, Frank J, & van der Straaten, Jan. (1992). Rethinking Environmental Economics: Missing Links Between Economic Theory and Environmental Policy. *Journal of Economic Issues*, 26(1), 27.
- Drichoutis, Andreas C, Lazaridis, Panagiotis, & Nayga, Rodolfo M, Jr. . (2007). An assessment of product class involvement in food-purchasing behavior. *European Journal of Marketing*, 41(7/8), 888-914.
- DTS. (2014). Massachusetts bans food waste from landfill. Retrieved 01.05.2014, from <http://danielstraining.com/blog/massachusetts-bans-food-waste-from-landfill/>
- Dudlicek, James. (2010). Haste Makes Waste. *Dairy Foods*, 111(6), 94-98.
- ECF. (2010). *Environment and Conservation Fund trustee report*. Hong Kong: Environmental Conservation Fund report.
- ECF. (2013). Environmental Conservation Fund website. Retrieved 13.4.2013, from <http://www.ecf.gov.hk/en/home/index.html>
- EcoPark. (2013). *Leading to a greener future of EcoPark*. Hong Kong: Environmental Protection Department.
- EDB. (1999). *Guidelines on environmental education in schools*. Hong Kong: Curriculum Development Council
- Edvardsson, KarinView. (2004). Using Goals in Environmental Management: The Swedish System of Environmental Objectives. *Environmental Management*,



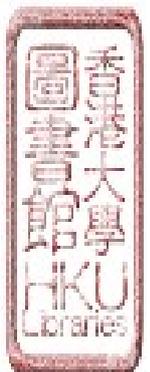
34(2), 170-180.

- EMSD. (2014). HKRE Net - anaerobic digestion. Retrieved 4.3.2014, from http://re.emsd.gov.hk/english/energy/anaerobic/anae_tec.html
- ENB. (2010). *Consultation document : a new producer responsibility scheme for waste electrical and electronic equipment*. Hong Kong: Environment Bureau, HKSAR Government.
- ENB. (2012). *Strengthening waste reduction : is waste charging an option? : public consultation : consultation document*. Hong Kong: Environment Bureau, HKSAR Government.
- ENB. (2013). *Hong Kong blueprint for sustainable use of resources (2013-2022)*. Hong Kong: HKSAR Government.
- ENB. (2014). *A food waste & yard waste plan for Hong Kong 2014-2022*. Hong Kong: Environment Bureau.
- EPD. (2005). *A Policy Framework for the Management of Municipal Solid Waste (2005-2014)*. Hong Kong: Environment Protection Department.
- EPD. (2010). Development of organic waste treatment facilities - Phase I in Siu Ho Wan in Legislative Council of panel on environmental affairs (5172DR).
- EPD. (2012). *Environmental performance report 2012*. Hong Kong: Environmental Protection Department.
- EPD. (2013a). Environmental Protection Department website: Kowloon Bay pilot composting plant. from http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/owt_kowloon.html
- EPD. (2013b). Environmental Protection Department website: Organic waste treatment facilities. Retrieved 28.1.2013, from http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/W



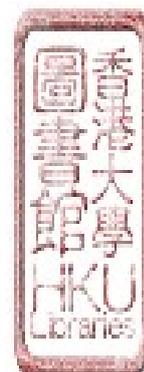
[Fdev_OWTF.html](#)

- EPD. (2013c). Environmental Protection Department website: waste. Retrieved 23.1.2013, from http://www.epd.gov.hk/epd/english/environmentinhk/waste/waste_maincontent.html
- EPD. (2013d). Food Waste Recycling Partnership Scheme. Retrieved 24.1.2013, from http://www.foodwaste.org.hk/Eng_index.htm
- EPD. (2013e). Implementation of waste disposal plan of Environmental Protection Department website. Retrieved 27.05.2013, from http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/iw_dp.html
- EPD. (2014). Green lunch charter website. Retrieved 4.3.2014, from https://www.wastereduction.gov.hk/en/schools/gl_charter.htm
- EPD, & HKPC. (2013). Help-desk service for food waste recycling for housing estates website by Environmental Protection Department and Hong Kong Productivity Council. Retrieved 12.4.2013, from http://hd-fwrs.hkpc.org/index_en.html
- FAO. (2012). *The State of Food Insecurity in the World by Food and Agriculture Organization of the United States*. Rome: Food and Agriculture Organization of the United States.
- FAO, & SIK. (2011). *Global food losses and food waste by Food and Agriculture Organization of the United Nations (FAO) and Swedish Institute for Food and Biotechnology (SIK)*. Rome: Food and Agriculture Organization of the United Nations.
- FF. (2014). Starbucks turns food waste into plastic. Retrieved 4.3.2014, from <http://www.forumforthefuture.org/greenfutures/articles/starbucks-turns-food-w>



[aste-plastic](#)

- FG. (2014). Food for Good website. Retrieved 5.3.2014, from <http://www.foodforgood.org.hk/zh/index.php>
- FoE. (2013a). Friends of the Earth waste no food program website. Retrieved 25.1.2013, from http://foodwaste.foe.org.hk/html/eng/c_school.php
- FoE. (2013b). Friends of the Earth light banquet campaign website. Retrieved 14.6.2013, from http://foodwaste.foe.org.hk/html/eng/c_banquet.php
- FoodWise. (2013a). *Food waste reduction good practice guide of Food Wise Hong Kong campaign*
- FoodWise. (2013b). Food Wise Charter of Food Wise Hong Kong campaign.
- FoodWise. (2013c). Food Wise Hong Kong Campaign website. Retrieved 4.6.2013, from <http://www.foodwisehk.gov.hk/en/index.html>
- Frenkel, Val S, Cummings, Gregg, Scannell, Dennis E, Tang, Walter Z, & Maillacheruvu, Krishnanand Y. (2008). Food-Processing Wastes. *Water Environment Research*, 80(10), 1458-1480.
- FT. (2007). The Statesman: Eco responsibility, *The Financial Times Limited*.
- Fusaro, Dave. (1996). Be a good Samaritan. *Dairy Foods*, 97(10).
- GA. (2011). Recycling guidelines of food waste for commercial and industry sector: food and catering industry by Greeners Action.
- GA. (2013). Food waste reduction program website by Greeners Action. Retrieved 14.6.2013, from http://www.foodwaste.org.hk/foodwaste_reduction/page02_eng.htm
- GC. (2013). Hong Kong Green Day website by Green Council. Retrieved 14.6.2013, from <http://www.greencouncil.org/eng/community/greenday.asp>
- Ghiban, Alexandru, Negoita, Octavian Ion, & Negoita, Olivia Doina. (2012). Management of waste materials. *Journal of Electrical and Electronics*



Engineering, 5(1), 73-78.

GM. (2013). Green Monday website. Retrieved 2.9.2013, from

<http://www.greenmonday.org.hk/index.php>

GoGreen. (2014). Go Green Organic Farm website. Retrieved 11.4.2014, from

<http://www.gogreenlife.com.hk/activities.htm>

Goh, Lilian. (2013). How do you find environmental education in Hong Kong? on 10

August 2013, *South China Morning Post*.

Griffin, Mary, Sobal, Jeffery, & Lyson, Thomas A. (2009). An analysis of a

community food waste stream. *Agriculture and Human Values*, 26(1-2), 67-81.

GS. (2014). Green star website. Retrieved 08.05.2014, from

<http://www.greenstarinc.org/>

Hackes, Bonnie L, Shanklin, Carol W, Kim, Taehee, & Su, Allan Y. (1997). Tray

service generates more food waste in dining areas of a continuing-care

retirement community. *American Dietetic Association. Journal of the*

American Dietetic Association, 97(8), 879-882.

Harrison, Rob, Newholm, Terry, & Shaw, Deirdre. (2005). *The ethical consumer*.

London; Thousand Oaks: SAGE.

HKAEE. (2010). *Wastewi\$e label guidebook*. Hong Kong: Hong Kong Awards for

Environmental Excellence.

HKCTU. (2013). Hong Kong Confederation of Trade Unions website. Retrieved

28.1.2013, from <http://foodrecyclinghk.wordpress.com/>

HKIED, & CSD. (2011). *Sustainable development in Hong Kong: Concepts, contexts*

and challenges by Hong Kong Institute of Education and Council for

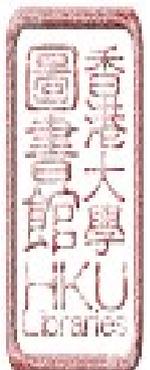
Sustainable Development.

HKOWRC. (2013). Hong Kong Organic Waste Recycling Centre Limited website.

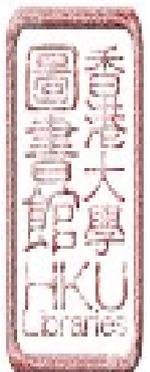
Retrieved 29.1.2013, from <http://www.hkowrc.com/eng-index.html>



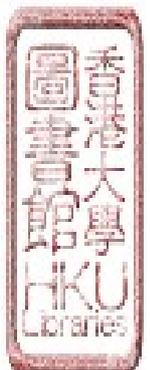
- HKSA. (2013). Hong Kong Housing Authority website on food waste. Retrieved 31.1.2013, from http://www.housingauthority.gov.hk/en/about-us/publications-and-statistics/using-dimensions/article/20120106/20120106_InFocus_5.html
- HKSARG. (2012). Transcript of remarks by the Secretary for the Environment, *news.gov.hk*.
- HKSARG. (2013a). *The 2013-14 Budget*. Hong Kong: HKSAR Government.
- HKSARG. (2013b). Food Resources Recycling Centre opens today (with photo), *HKSAR Government Press Release*.
- HKSARG. (2013c). Hong Kong fact sheets: Environmental Protection.
- HKSARG. (2013d). Steering Committee to Promote Sustainable Development of Recycling Industry convenes its first meeting on 23 August 2013, *HKSAR Government Press Release*.
- HKSARG. (2014a). *The 2014-15 Budget*. Hong Kong: HKSAR Government.
- HKSARG. (2014b). *The 2014 Policy Address*. Hong Kong: HKSAR Government.
- HKSARG. (2014c). EPD to promote community recycling in Islands District, *news.gov.hk*. Retrieved from <http://www.info.gov.hk/gia/general/201203/31/P201203300578.htm>
- Ho, Soon-Ching, Lee, Shou-Chien, & Lai, Ying-Ying. (2007). Zero Waste Policy for Municipal Solid Waste in Taiwan.
- Hu, X, Zhang, M, Yu, J, & Zhang, G. . (2012). Food waste management in China: status, problems and solutions. *Shengtai Xuebao/Acta Ecologica Sinica*, 32(14), 4575-4584.
- Hume, Scott. (2007). A lexicon for 2007. *Restaurants & Institutions*, 117(1), 63.
- Hurst, Karen, & Reils, Paul. (1988). *The next frontier: solid waste source reduction*. California: Community Environmental Council.



- Jackson, Mark, & Campbell, Angus. (2001). *Composting science for industry : an overview of the scientific principles of composting processes*. Sydney, NSW: Recycled Organics Unit, University of New South Wales.
- Jones, Timothy W. (2005). Analyzing retail food loss. *BioCycle*, 46(12), 40,42.
- Kagioglou, Mike, & Tzortzopoulos, Patricia. (2010). *Improving healthcare through built environment infrastructure*. Chichester, West Sussex, U.K.; Malden, MA: Wiley-Blackwell.
- Kao, Ernest. (2013). Hong Kong's 'ecological deficit' dangerously high on 21 August 2013, *South China Morning Post*.
- Lanyon, Charley. (2013). Island divided on 2 August 2013, *South China Morning Post*.
- Lazaros, Edward J, & Shackelford, Ray. (2008). Don't Throw It Away! Raise Recycling Awareness Through Communications Project. *Tech Directions*, 67(6), 19-23.
- Lee, Danny. (2013). Beating waste and putting food on plates for needy on 2 September 2013, *South China Morning Post*.
- Lehmann, Steffen, & Crocker, Robert. (2012). *Designing for zero waste : consumption, technologies and the built environment*. New York: EarthScan.
- Lenzen, Manfred, & Cummins, Robert A. (2011). Lifestyles and well-being versus the environment. *Journal of Industrial Ecology*, 15(5), 650-652.
- Leopold. (2014). The Iowa Regional food systems working group website. Retrieved 02.05.2014, from <http://www.leopold.iastate.edu/regional-food-systems-working-group>
- Lepak, David, & Gowan, Mary. (2010). *Human resources management : managing employees for competitive advantage*. Upper Saddle River, NJ: Pearson/Prentice Hall.



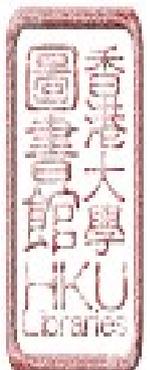
- Leroux, Kivi. (1999). Lettuce recycle: Putting food waste to work. *The American City & County*, 114(12), 52-51.
- LFHW. (2014). Love Food Hate Waste website. Retrieved 08.05.2014, from <http://www.lovefoodhatewaste.nsw.gov.au/>
- Liang, Y.F. (2008). The journey towards zero waste. *Magazine of the Institute of Environmental Management and Assessment (IEMA)*.
- Lin, Angela Yu-Chen, Huang, Susana Tzy-Ying, & Wahlqvist, Mark L. . (2009). Waste management to improve food safety and security for health advancement. *Asia Pacific Journal of Clinical Nutrition*, 18(4), 538-545.
- Linton, April. (2012). *Fair trade from the ground up*. Seattle: University of Washington Press.
- Lowe, Philip, & Goyder, Jane. (1983). *Environmental groups in politics*. London: Allen & Unwin.
- Ma, Yiu Sum. (2014, 11.4.2014). \$1 billion Recycling Fund will be used to subsidize the purchase of recycling machines, *Ming Pao*. Retrieved from <http://news.mingpao.com/20140411/gna1h.htm>
- Macy, Jack. (2002). Food residuals put city on track to over 50 percent diversion. *BioCycle*, 43(2), 40-46.
- Maloni, Michael J., & Brown, Michael E. (2006). Corporate Social Responsibility in the supply chain: an application in the food industry. *Journal of Business Ethics*, 68(1), 35-52.
- Manning, Louise. (2013). Corporate and consumer social responsibility in the food supply chain. *British Food Journal*, 115(1), 9-29.
- Marinova, Dora, Annandale, David, & Phillimore, John. (2006). *The international handbook on environmental technology management*. Cheltenham, UK; Northampton, MA: Edward Elgar.



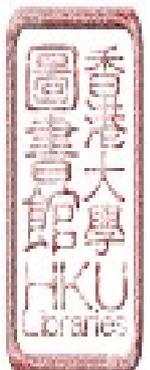
- McGartiy, Thomas. (2004). The goals of environmental legislation. *Boston College Environmental Affairs Law Review*, 31(3).
- Medley, Kimberly E., Zhou, Ying, & Condon, Darcy. (2006). Shared Learning: Feminist Student Research on Household Reuse Behavior. *The Journal of Geography*, 105(5), 209-215.
- Meijer, Diederik, & De Jong, Phillipus. (2009). *Environmental regulation : evaluation, compliance and economic impact*. New York: Nova Science Publishers.
- Mensah, Ishmael. (2007). Environmental management and sustainable tourism development: The case of hotels in Greater Accra Region (GAR) of Ghana. *Journal of Retail & Leisure Property*, 6(1), 15-22.
- Mol, Arthur, Lauber, Volmar, & Liefferink, Duncan. (2000). *The voluntary approach to environmental policy : joint environmental policy-making in Europe*. Oxford; New York: Oxford University Press.
- Morganosky, Michelle A, & Cude, Brenda J. (2002). Consumer demand for online food retailing: Is it really a supply side issue? *International Journal of Retail & Distribution Management*, 30(10), 451-458.
- Nahman, Anton, & Lange, Willem de. (2013). Costs of food waste along the value chain: Evidence from South Africa. *Waste Management*, 33(11), 2493-2500.
- Nassaurer, Sarah. (2012, 21.03.2012). Leftovers: Tasty or Trash? - With Food Prices High, There's Guilt About Waste But Dread of the Reheated Dinner, *Wall Street Journal, Eastern edition*, p. D1.
- NEA. (2014). National Environmental Agency website: waste statistics and overall recycling. Retrieved 26.2.2014, from <http://app2.nea.gov.sg/energy-waste/waste-management/waste-statistics-and-overall-recycling>
- O'Connell, Elizabeth J. (2011). Increasing Public Participation in Municipal Solid



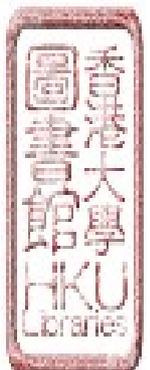
- Waste Reduction. *The Geographical Bulletin*, 52(2), 105-118.
- ODN. (2013). Food waste recycling has been an anticlimax, *Oriental Daily News*.
- OECD. (1975). *The polluter pays principle : definition, analysis, implementation*.
Paris: Organization for Economic Co-operation and Development.
- OECD. (2001). *Environmentally related taxes in OECD countries : issues and strategies*. Paris: Organization for Economic Co-operation and Development.
- OECD. (2002). *Implementing domestic tradable permits : recent developments and future challenges*. Paris, France: Organization for Economic Co-operation and Development.
- OECD. (2003). *Financing strategies for water and environmental infrastructure*. Paris: Organization for Economic Co-operation and Development.
- OECD. (2004). *Economic aspects of extended producer responsibility*. Paris: Organisation for Economic Co-operation and Development.
- OECD. (2006). *Improving recycling markets*. France: OECD Publishing.
- OECD. (2008). *An OECD framework for effective and efficient environmental policies*
- Parfitt, Julian, Barthel, Mark, & Macnaughton, Sarah. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *The Royal Society*, 365, 3065-3081. doi: 10.1098/rstb.2010.0126
- PF&N. (2014). Porter Farms & Nursery website. Retrieved 02.05.2014, from <http://www.porterfarmsandnursery.com/FarmMarket.html>
- Plueddemann, David W. (1994). Creating incentives for waste reduction: State and local perspective. *Journal of Environmental Health*, 57(3), 23.
- Powell, Jand C., Turnera, R. Kerry, & Bateman, Ian. (2001). *Waste management and planning*. Cheltenham ; Northampton, Mass.: E. Elgar Pub.
- Preston, Louise. (2013). Embrace real change to be world leader in waste reduction on 7 June 2013, *South China Morning Post*.



- Price, Jane L., & Joseph, Jeremy B. (2000). Demand management - a basis for waste policy: a critical review of the applicability of the waste hierarchy in terms of achieving sustainable waste management. *Sustainable Development*, 8(2), 96-105.
- Purcell, Arthur H. (1993). Urban solid waste reduction: Applying preventive environmental management. *Ekistics*, 60(358-359), 23-25.
- Quaddus, M.A., & Siddique, M.A.B. (2013). *Handbook of sustainable development planning*. Cheltenham: Edward Elgar.
- Quested, T.E., Parry, A.D., Eastal, S., & Swannell, R. (2011). Food and drink waste from household in the UK. *Nutrition Bulletin*, 36(4), 460-467.
- Raizman, Dave, & Ritvo, Jim. (2005). *The red wagon: facing hunger*. Montpelier, VT: 132 Main Productions.
- Rautenstrauch, Claus, & Patig, Susanne. (2000). *Environmental information systems in industry and public administration*. Hershey; London: Idea Group Pub.
- Raven, Peter H., Berg, Linda R., & Hassenzahl, David M. (2012). *Environment*. Hoboken, N.J.: Wiley.
- RB. (1992). Storage Guidelines. *Restaurant Business*, 24.
- Rimington, Mike, Smith, Jane Carlton, & Hawkins, Rebecca. (2006). Corporate social responsibility and sustainable food procurement. *British Food Journal*, 108(10), 824-837.
- Roberts, Jane. (2011). *Environmental policy*. Milton Park, Abingdon, Oxon; New York: Routledge.
- Ryu, Changkook. (2010). Potential of Municipal Solid Waste for Renewable Energy Production and Reduction of Greenhouse Gas Emissions in South Korea. *Journal of the Air & Waste Management Association*, 60(2), 176-183.
- Salleh, Musdiana Mohamad, Ali, Siti Meriam, Harun, Ety Harniza, Jalil, Muna Abdul,

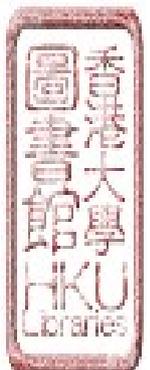


- & Shaharudin, Mohd Rizaimy. (2010). Consumer's Perception and Purchase Intentions Towards Organic Food Products: Exploring Attitude Among Academician. *Canadian Social Science*, 6(6), 119-129.
- Schneider, Daniel R, & Bogdan, Zeljko. (2011). Analysis of a sustainable system for energy recovery from municipal waste in Croatia. *Management of Environmental Quality*, 22(1), 105-120.
- SCMP. (2013a, 22.04.2013). Dealing with Hong Kong's food waste, *South China Morning Post*. Retrieved from <http://www.scmp.com/lifestyle/family-education/article/1218410/dealing-hong-kongs-food-waste>
- SCMP. (2013b). Widespread waste charges are essential on 26 June 2013, *South China Morning Post*.
- Seel, Julie, & Tian, Robert Guang. (2003). Examining consumer behavior in food industry: An anthropological descriptive follow-up case study. *Journal of American Academy of Business, Cambridge*, 3(1), 53.
- Shanklin, Carol W, & Hoover, Linda. (1997). Position of The American Dietetic Association: Natural resource conservation and waste management. *American Dietetic Association. Journal of the American Dietetic Association*, 97(4), 425-428.
- Shen, S.H. (2008). Introduction of the Recycling Fund Management Board by Taiwan Environmental Protection Administration.
- SingTao. (2012). Four major supermarkets discard 31,000 tonnes of food waste annually on 28 May 2012, *Sing Tao Daily*.
- Sive, Mary Robinson. (1977). *Environmental legislation : a sourcebook*. New York: Praeger.
- SLWP. (2013). South London Waste Partnership website. from



<http://www.slwp.org.uk/what-we-do/>

- So, M.Q. (2013). Strategic development of Extended Producer Responsibility. *R-paper of Recycling Fund Management Board (RFMB)*, 2(4).
- Steinberg, Paul F., & VanDeveer, Stacy D. (2012). *Comparative environmental politics : theory, practice, and prospects*. Cambridge, Mass: MIT Press.
- Sterns, Peter N. (2006). *Consumerism in world history: the global transformation of desire*. New York; London: Routledge.
- Stevenson, Robert B., & Dillon, Justin. (2010). *Engaging environmental education : learning, culture and agency* Rotterdam: Sense.
- TCEPB. (2012). *Kitchen waste recycling brochure of Taichung city*. Taiwan: Taichung city Environmental Protection Bureau.
- TCGDEP. (2013a). Food waste collection system by Taipei City Government Department of Environmental Protection website. Retrieved 13.4.2013, from <http://www.dep-web.tapei.gov.tw/ct.asp?xItem=1283446&ctNode=39169&mp=110004>
- TCGDEP. (2013b). Household kitchen waste recycling newsletter by Taipei City Government Department of Environmental Protection.
- TCGDEP. (2013c). Per-bag trash collection fee system discussion forum website by Taipei City Government Department of Environmental Protection. Retrieved 13.4.2013, from <http://www.dep-web.tapei.gov.tw/np.asp?ctNode=38784&mp=110005>
- TE. (2013). Hong Kong inflation rate on Trading Economics website. Retrieved 31.1.2013, from <http://www.tradingeconomics.com/hong-kong/inflation-cpi>
- TEIC. (2013). Mandatory garbage sorting by Taiwan Environmental Information Center. Retrieved 13.4.2013, from



<http://e-info.org.tw/taxonomy/term/1576?page=1>

TEPA. (2007). Taiwan's recycling efforts pay off - Four-in-One recycling plan integrates resources for optimal results. *Environmental Policy Monthly*, 10(9), 3-5.

TEPA. (2008). New EPA Minister Stephen Shu-hung Shen to focus on sustainable development - nationwide promotion of per-bag trash collection fee, toward a resource-recycling society. *Environmental Policy Monthly*, 11(6), 1-3.

TEPA. (2012). Properties of municipal solid waste.

<http://www.epa.gov.tw/en/statistics/c4020.pdf>

TEPA. (2013a). The current status for kitchen waste recycling and reuse by Taiwan Environmental Protection Administration website. Retrieved 8.4.2013, from

<http://www.epa.gov.tw/en/epashow.aspx?list=125&path=9105&guid=2d105564-911d-4536-ae70-798eb75b345c&lang=en-us>

TEPA. (2013b). Food waste wisdom - Green eating habits by Taiwan Environmental Protection Administration website. Retrieved 13.4.2013, from

<http://www.epa.gov.tw/ch/artshow.aspx?busin=331&art=2007091712030431&path=6740>

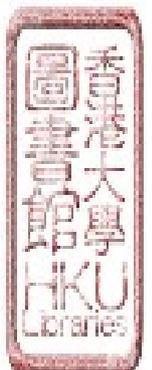
TEPA. (2013c). Greenliving information platform website by Taiwan Environmental Protection Administration. Retrieved 13.4.2013, from

<http://greenliving.epa.gov.tw/GreenLife/eng/english.aspx>

TEPA. (2013d). Kitchen waste recycling and reuse by Taiwan Environmental Protection Administration website. Retrieved 8.4.2013, from

<http://www.epa.gov.tw/ch/SitePath.aspx?busin=331&path=884&list=884>

TEPA. (2013e). Source minimization and resource recycling by Taiwan Environmental Protection Administration website. Retrieved 8.4.2013,



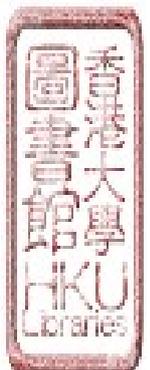
from

<http://www.epa.gov.tw/en/epashow.aspx?list=112&path=162&guid=ea7fe796-431b-4947-a63f-c10726312734&lang=en-us>

- TG. (2002). General waste clearance and disposal fee collection regulations of Environmental Protection Administration Order.
- TKP. (2013). Two major supermarkets donates 60 tonnes of food annually on 30 July 2013, *Ta Kung Po*.
- Ueta, Kazuhiro, & Koizumi, Harumi. (2001). Reducing waste: Japan learns from Germany. *Environment*, 43(9), 20-32.
- UNEP. (2013). *World Environment Day 2013 Think.Eat.Save* United Nations: United Nations.
- USEPA. (2013). US Environmental Protection Agency pollution prevention website: definitions. Retrieved 24.1.2013, from <http://www.epa.gov/p2/pubs/p2policy/definitions.htm>
- USFNS. (2008a, 22.4.2008). Hannaford supermarkets recognized by MassDEP, industry group for recycling efforts in stores throughout Massachusetts, *US Fed News Service, including US State News*.
- USFNS. (2008b, 12.11.2008). Planning menu changes can offset higher food costs of thanksgiving dinner, Wire Feed, *US Fed News Service, including US State News*.
- WB. (1997). *Advancing sustainable development: the World Bank and Agenda 21*. Washington D.C.: World Bank.
- WCED. (1987). *Our common future by World Commission on Environment and Development* (Vol. Oxford University Press): Oxford.
- Wenk, Caspar, Fernández, José A., & Dupuis, Monique. (2000). *Quality of meat and fat in pigs as affected by genetics and nutrition : proceedings of the joint*

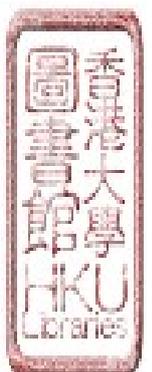


- session of the EAAP commissions on pig production, animal genetics and animal nutrition : Zurich, Switzerland, 25 August 1999.* Wageningen: Wageningen Pers.
- Wie, Seunghye, Shanklin, Carol W, & Lee, Kyung-Eun. (2003). A decision tree for selecting the most cost-effective waste disposal strategy in foodservice operations. *American Dietetic Association. Journal of the American Dietetic Association, 103*(4), 475-482.
- Wolf, Gary. (2009). Landfill ban on plant debris. *BioCycle, 50*(8), 14.
- WRAP. (2009). Household food and drink waste in the UK by Waste & Resource Action Programme. from <http://www.wrap.org.uk/>
- Wu, Yanrui. (2004). Understanding international food consumption patterns.
- WWFHK. (2013). *Hong Kong Ecological Footprint Report 2013*. Hong Kong: World Wide Fund Hong Kong.
- Yale. (2014). Environmental Performance Index 2014 Country profile: Taiwan. Retrieved 25.2.2014, from <http://epi.yale.edu/epi/country-profile/taiwan>
- Yale, & Columbia. (2014). *2014 Environmental Performance Index full report*
- Yang, Lei, Li, Zhen-Shan, & Fu, Hui-Zhen. (2011). Model of Municipal Solid Waste Source Separation Activity: A Case Study of Beijing. *Journal of the Air & Waste Management Association, 61*(2), 157-163.
- Yu, Wai-yin, & Cheung, Ka Man. (2010). *Liberal studies : data-response and extended response questions*. Hong Kong: Hong Kong Educational Publishing Co.
- Yu, Zhaozhong. (2006). *Landfills in Hong Kong*. Hong Kong: Research and Library Services Division, Legislative Council Secretariat.
- Yueh, Mei-Chun Michelle, & Barker, Miles. (2011). Framework Thinking, Subject Thinking and "Taiwan-ness" in Environmental Education. *Australian Journal*



*of Environmental Education, suppl. Special Issue: The "ness" of
Environmental Education, 27(1), 134-148.*

ZWA. (2013). Zero waste alliance website. Retrieved 25.1.2013, from
<http://www.zerowaste.org/>



Appendix I Research on Hong Kong resident consumer behavior

Survey questionnaire on Hong Kong residents

Food waste in Hong Kong – a study on source reduction

《香港的廚餘 — 對源頭減廢的研究》

Introduction 簡介

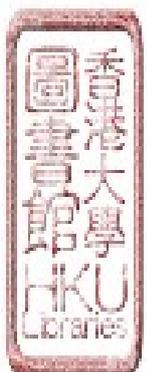
I am the student of Master of Science in Environmental Management of the University of Hong Kong. My name is WOO Pak Keung, Henry. The HKU student ID is 2012921426. The topic of the dissertation is “Food waste in Hong Kong – a study on source reduction.” The purpose of the questionnaire is to understand the opinion of the Hong Kong residents on various food waste issues. The research results will be used to provide conclusions and recommendations on the dissertation.

All information you provide will be treated in strict confidentiality and used for this project only, which will be destroyed in May 2015 that is one year after the dissertation is submitted. Your response to this survey is completely voluntary. If you have any question about this project, please email to pkwheny@hku.hk. If you have questions about your rights as a research participant, please contact the Human Research Ethics Committee for Non-Clinical Faculties, HKU (2241-5267).

I understand the procedures described above and agree to participate in this study.

我是香港大學環境管理碩士的學生，我的名字是鄔柏強。香港大學學生証號碼是 2012921426。碩士論文的題目為《香港的廚餘 – 對源頭減廢的研究》。這份問卷的目的在於去了解香港居民對各項廚餘相關事項的意見，研究結果將會用作碩士論文的結論和建議。

你所提供的資料是絕對保密，只是用在這份論文，並將會在 1 年後，即是 2015 年 5 月銷毀。你的回應是完全自願性，如果你對這份問卷有任何問題，可



以電郵至 pkwhenry@hku.hk。如果你想知道更多有關研究參與者的權益，請聯絡香港大學非臨床研究操守委員會（電話：2241-5267）。

我明白上述的內容，並同意參與這項研究。

Please indicate your response to the following statements.

請選擇你認為正確的答案。

Background 背景

1. I have good environmental knowledge and awareness on food waste issues in Hong Kong.

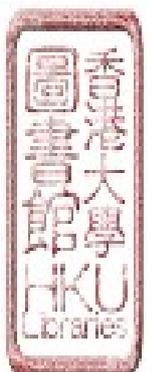
我對香港廚餘議題有很好的環境知識和意識。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

2. I have been actively participated in food waste reduction at source.

我已經積極參與廚餘源頭減廢。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同



3. I am confident in achieving food waste reduction target at 40% stated in the Policy Address 2014.

我對施政報告 2014 訂立的廚餘源頭減廢 40% 目標有信心。

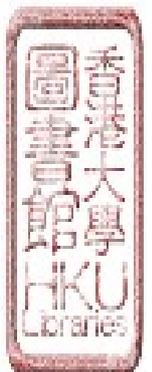
- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

Laws and regulations 法律與政策

4. The HKSAR Government should implement appropriate policies and laws to solve the food waste problem in Hong Kong. e.g. Hong Kong blueprint for sustainable use of resources 2013-2022.

香港政府應該執行恰當的政策和法律去解決香港廚餘問題。例如香港資源循環藍圖 2013-2022。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同



5. Mandatory food waste recovery should be adopted in Hong Kong in the future.

香港未來應該實行強制性廚餘回收。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

Environmental related taxes 環境相關稅項

6. How much per month are you willing to pay for the volume-based waste charging scheme?

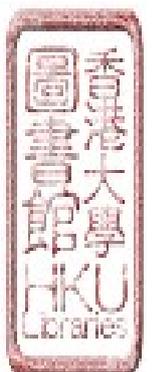
每月願意付多少錢於都市固體廢物按量收費?

- 1. less than \$10 (少於\$10)
- 2. \$11 to \$20 (\$11 至\$20)
- 3. \$21 to \$30 (\$21 至\$30)
- 4. \$31 to \$40 (\$31 至\$40)
- 5. more than \$41 (多於\$41)

7. The polluter pays principle should be widely implemented in most of the foodservice activities in Hong Kong.

污染者自付原則應該在香港各項飲食相關活動廣泛實行。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同



Moral motives 道德動機

8. I think wasting food is unacceptable and support Food Wise Hong Kong Campaign.

我覺得浪費食物是不可接受的，並支持惜食香港運動。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

9. As a consumer, I think the catering business should provide green consumption options and adopt environmentally friendly initiatives.

作為消費者，我認為食肆應該提供綠色消費選擇和實踐環保措施。

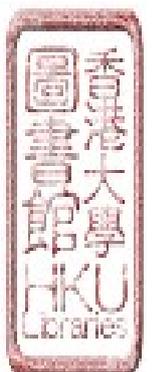
- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

Social mobilization 社會動員

10. I have heard about the Food Waste Recycling Partnership Scheme.

我知道有廚餘循環再造合作計劃。

- 1. Strongly unclear 很不清楚
- 2. Unclear 不清楚
- 3. Neutral 中立
- 4. Clear 清楚
- 5. Strongly clear 很清楚



11. I support the establishment of the Organic Waste Treatment Facilities (OWTF) even though they are near to my home.

我支持建立有機資源回收中心，即使它們很近我的住宅。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

12. The \$1 billion Recycling Fund proposed in the latest Policy Address can effectively encourage the wider participation from the community.

最近的施政報告建議的 10 億元的「回收基金」能夠有效鼓勵社區廣泛參與。

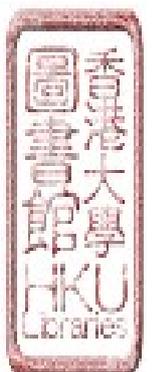
- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

Education and publicity 教育及宣傳

13. I think the recent publicity activities on food waste treatment by the HKSAR Government are successful.

我認為香港政府近期的廚餘處理宣傳是成功的。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同



14. I will promote food waste source reduction messages in family education and among the friends and relatives. I will also support the community green stations stated in the Policy Address 2014.

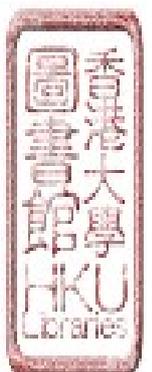
我會在家庭教育中，朋輩親戚間，推廣廚餘減廢的訊息，並支持施政報告 2014 提及的社區環保站。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

15. Saving food and knowledge on food waste treatment should be included in the primary and secondary curriculum with examination in the HKDSE Liberal Studies subject.

珍惜食物和處理廚餘知識應該包括在中小學的課程，並且在香港中學文憑通識科中考核。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同



Sustainable lifestyles 可持續發展生活方式

16. I adopted sustainable lifestyles instead of consumerist ones.

我會實踐可持續發展生活方式以代替消費主義的生活模式。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

17. I do not feel embarrassed when I ask for takeaway service in restaurants.

我在餐廳用膳餘下的食物要求取走，我不感到尷尬。

- 1. Strongly disagree 很不認同
- 2. Disagree 不認同
- 3. Neutral 中立
- 4. Agree 認同
- 5. Strongly agree 很認同

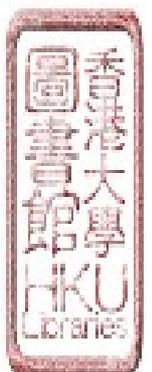
Other comments 其他意見

18. In your opinion, what would be the most effective ways to reduce food waste?

依你的意見，甚麼才是減少廚餘的最有效方法？

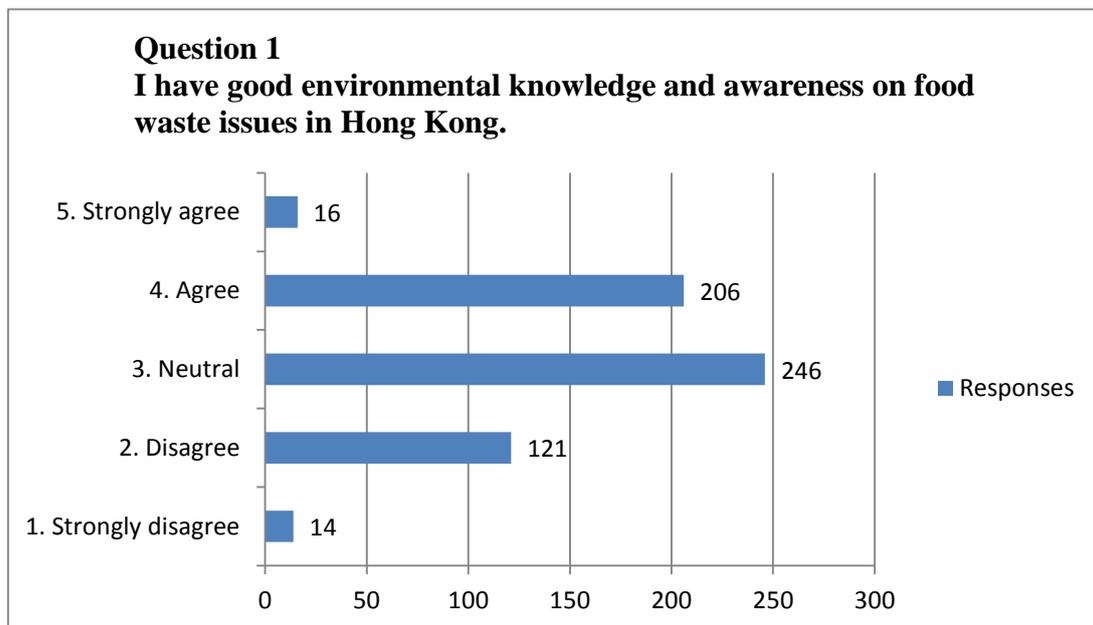
- END (完) -

Thank you very much for your help! 很感謝你的幫忙！

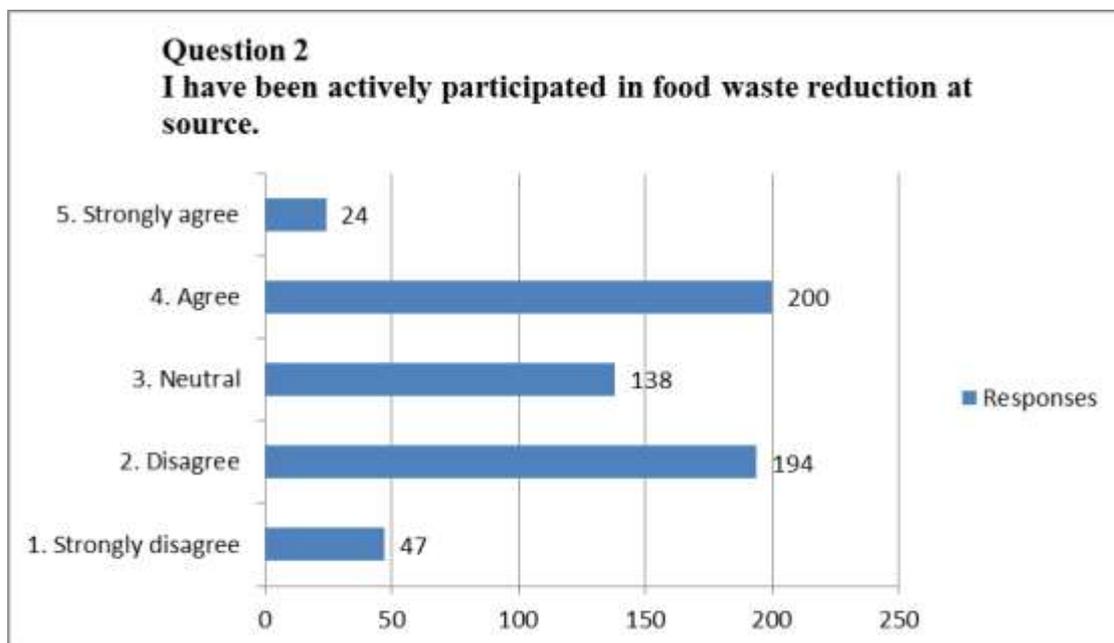


Research results on Hong Kong residents' consumer behavior

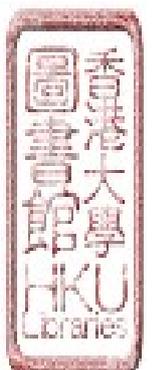
Background

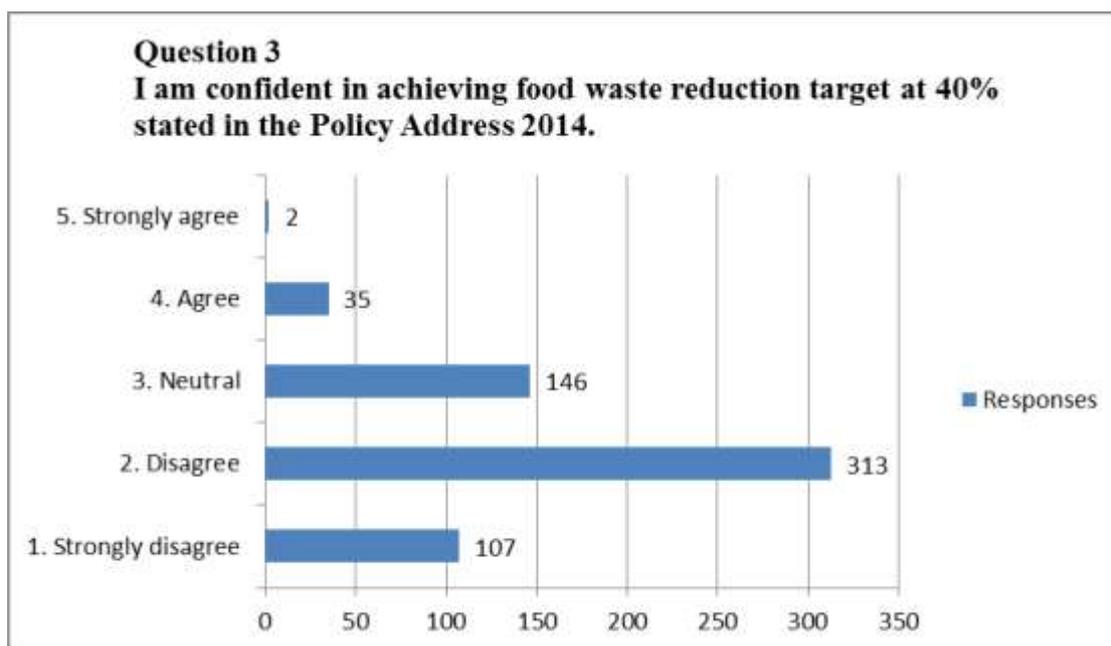


Weighted score = 3.15 (Neutral)



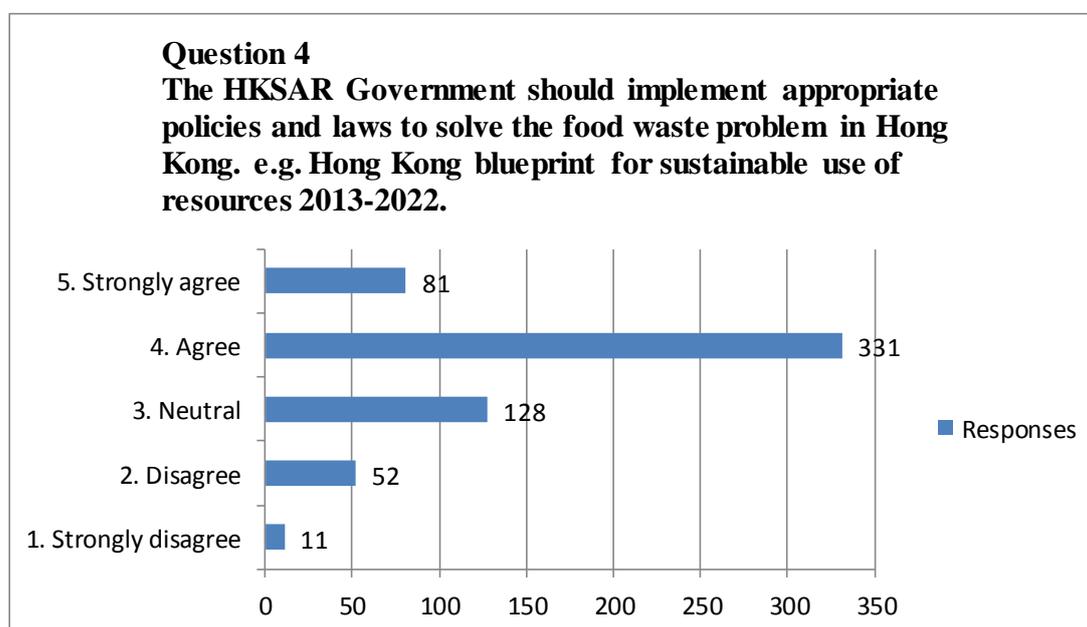
Weighted score = 2.93 (Neutral)





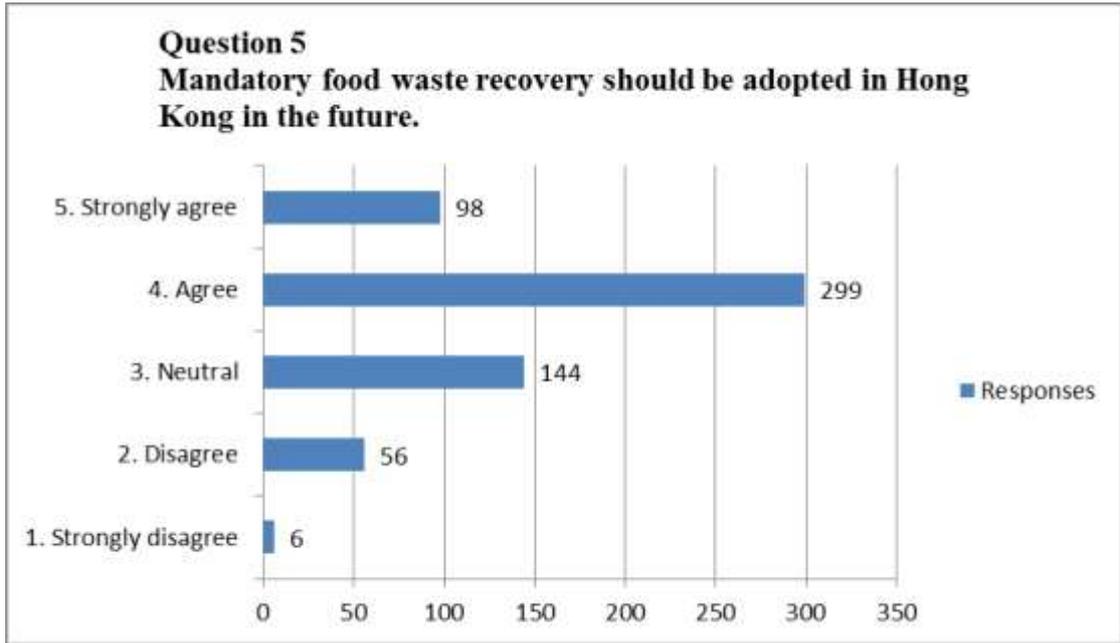
Weighted score = 2.06 (Disagree)

Laws and regulations



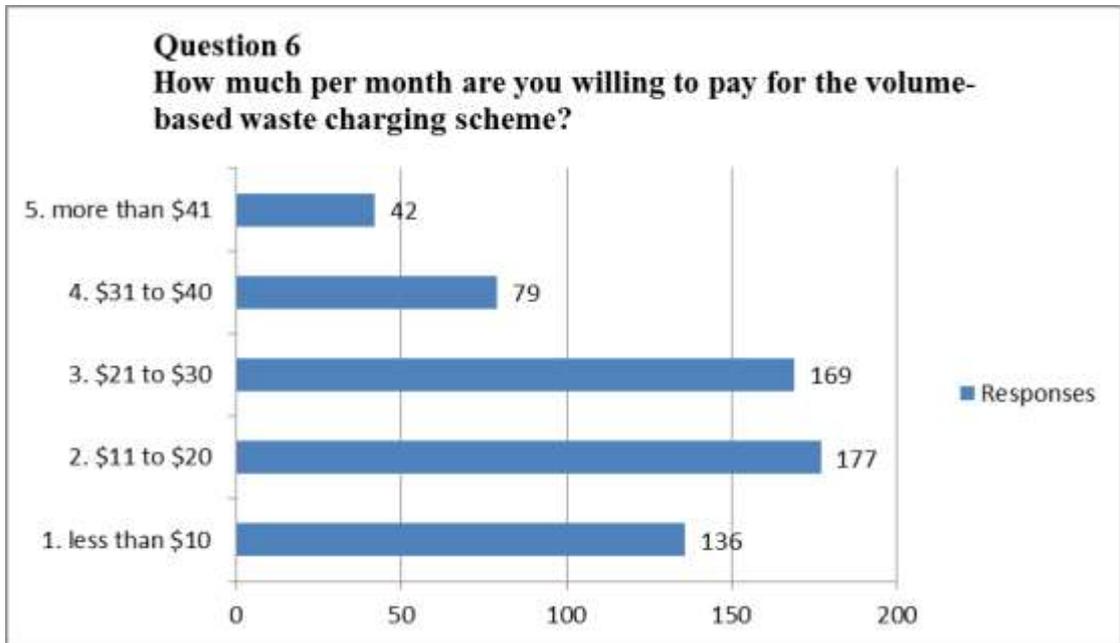
Weighted score = 3.69 (Agree)





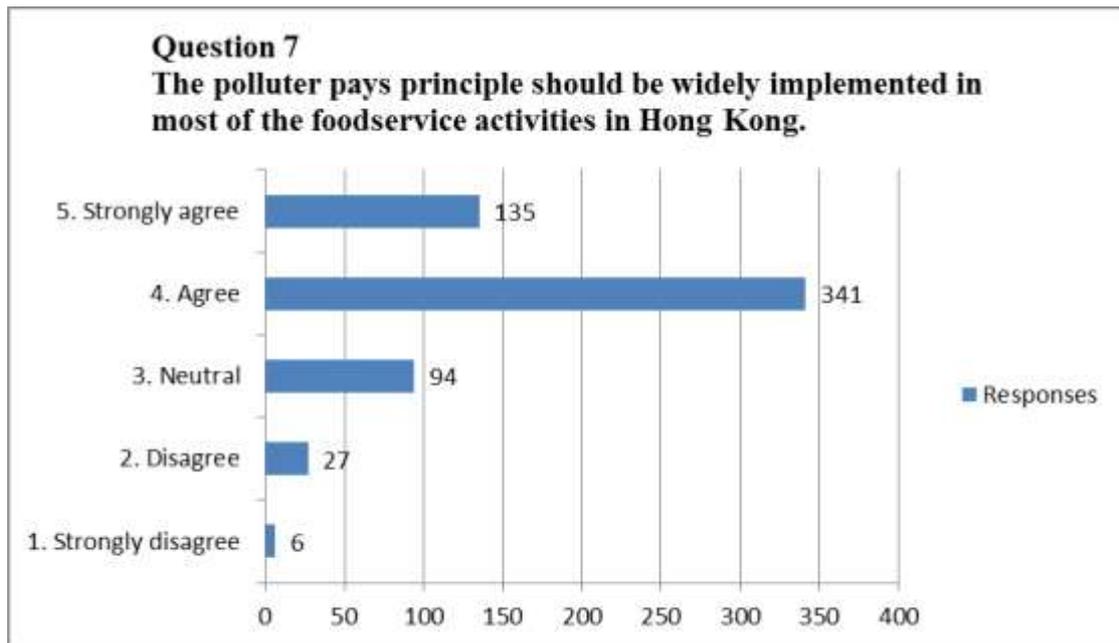
Weighted score = 3.71 (Agree)

Environmental related taxes



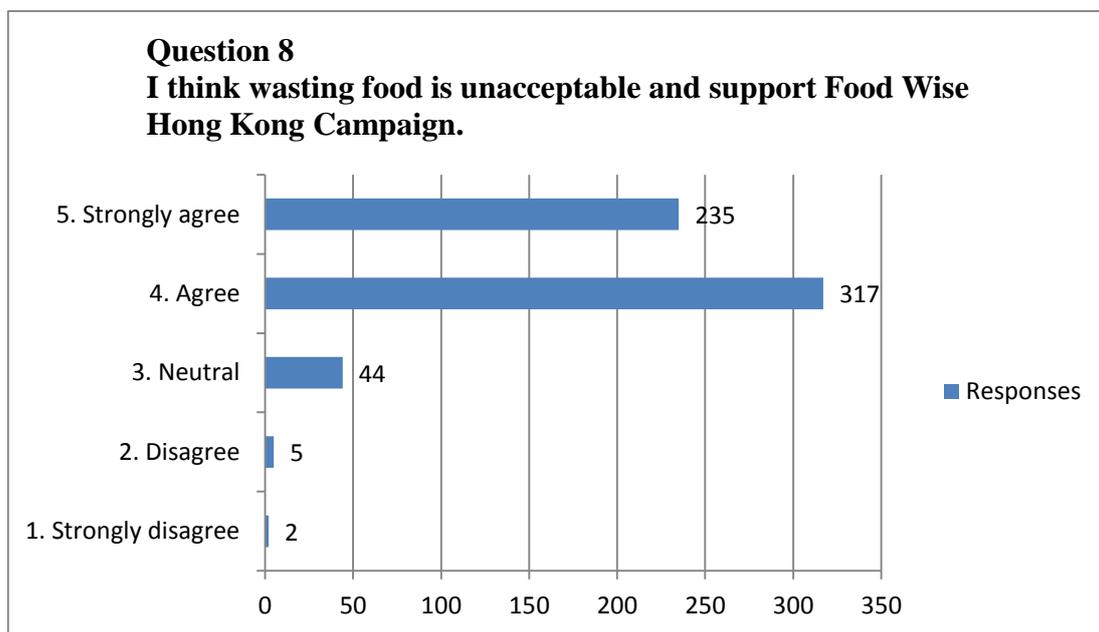
Weighted score = 2.53 (Around \$20)



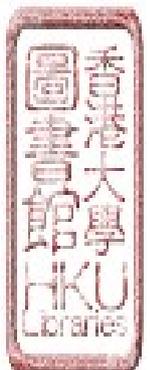


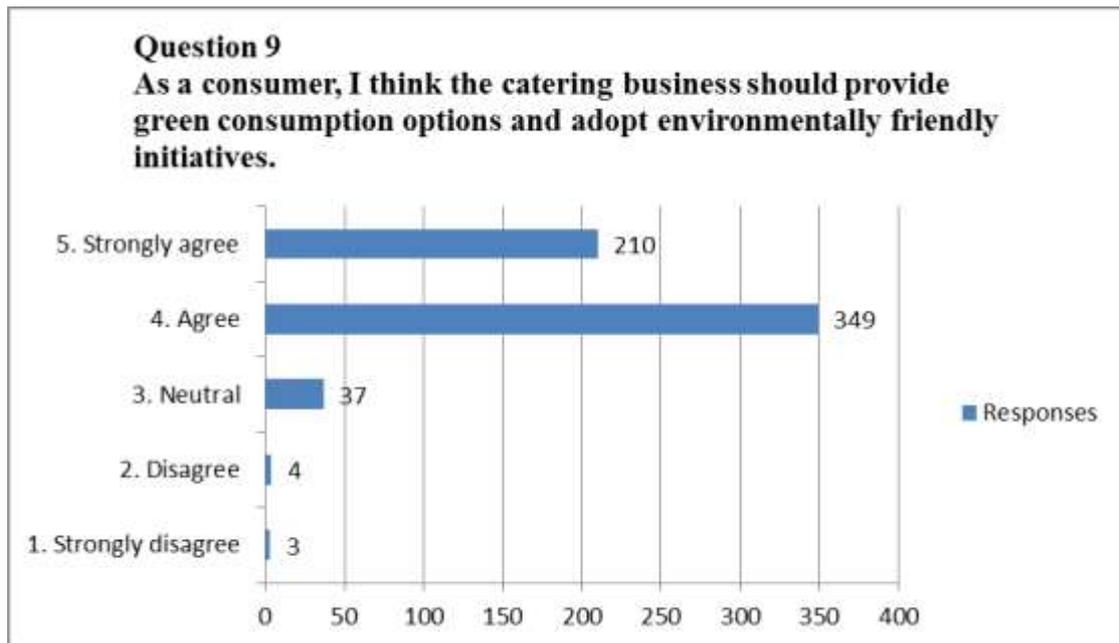
Weighted score = 3.95 (Agree)

Moral motives



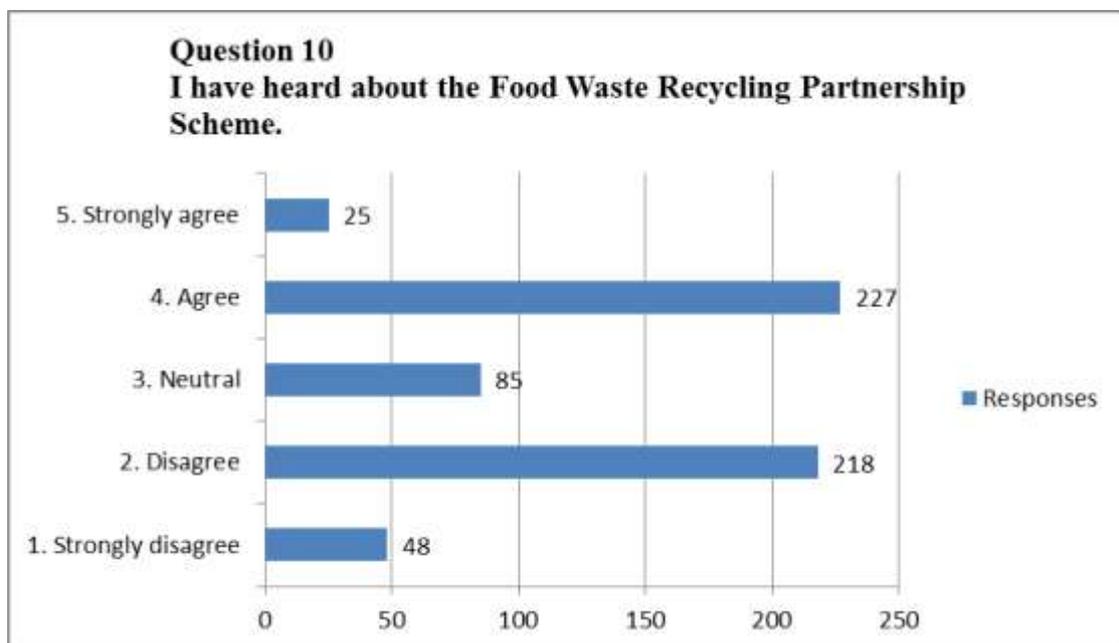
Weighted score = 4.29 (Agree)



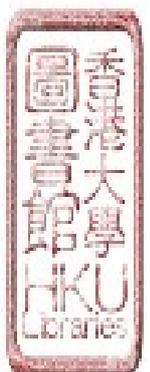


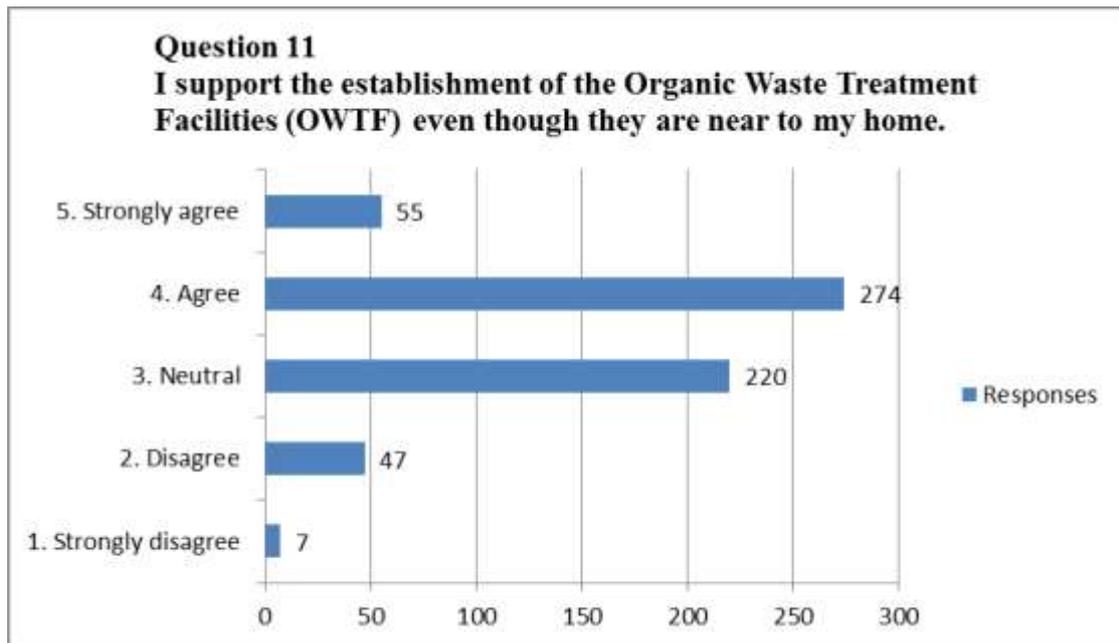
Weighted score = 4.26 (Agree)

Social mobilization

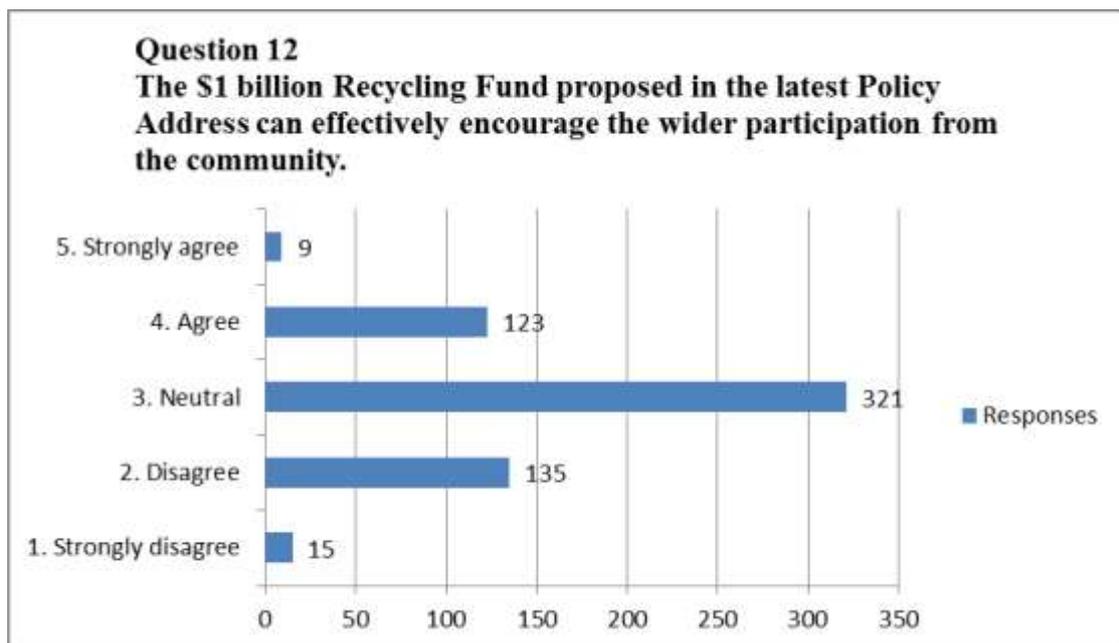


Weighted score = 2.94 (Neutral)

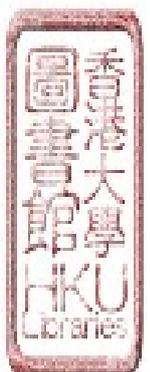




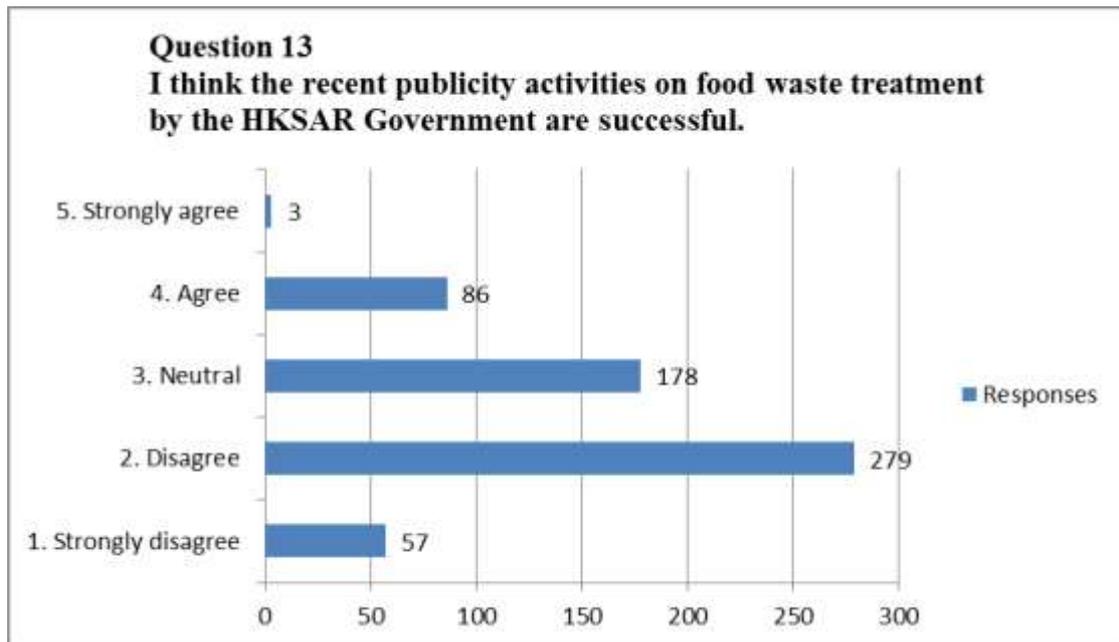
Weighted score = 3.54 (Agree)



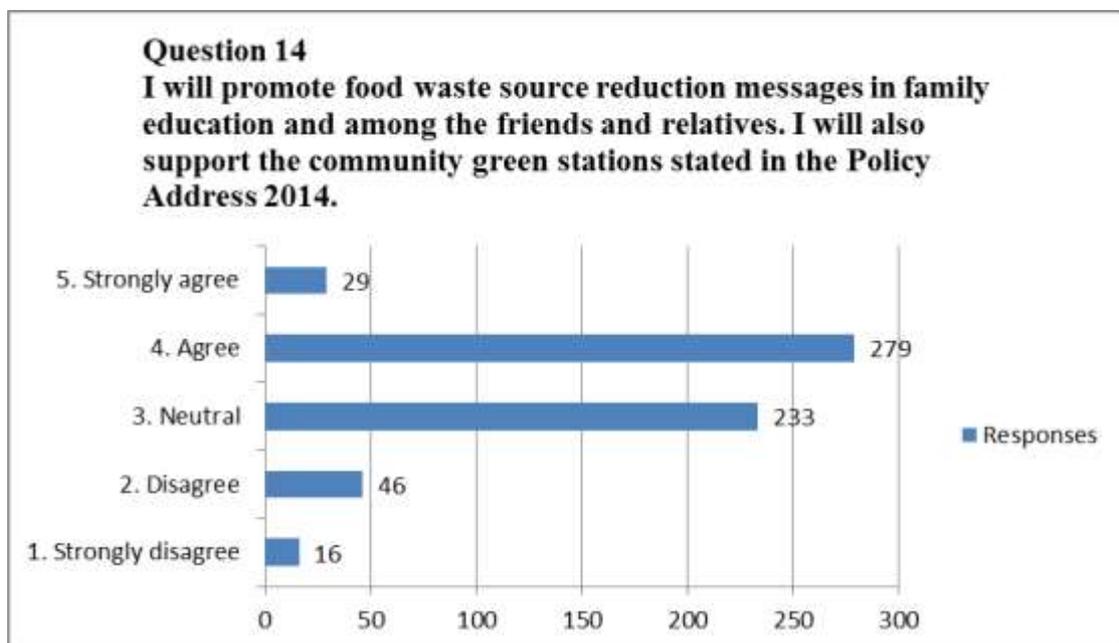
Weighted score = 2.96 (Neutral)



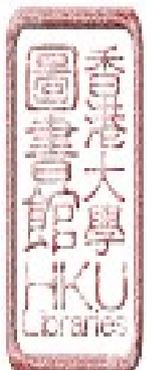
Education and publicity

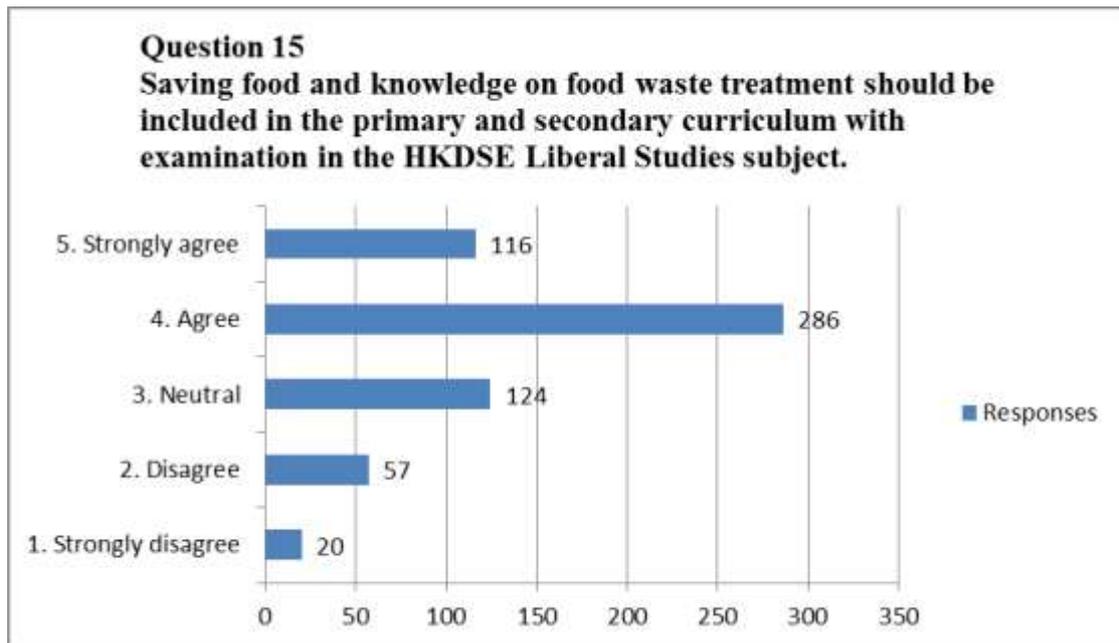


Weighted score = 2.50 (Disagree)



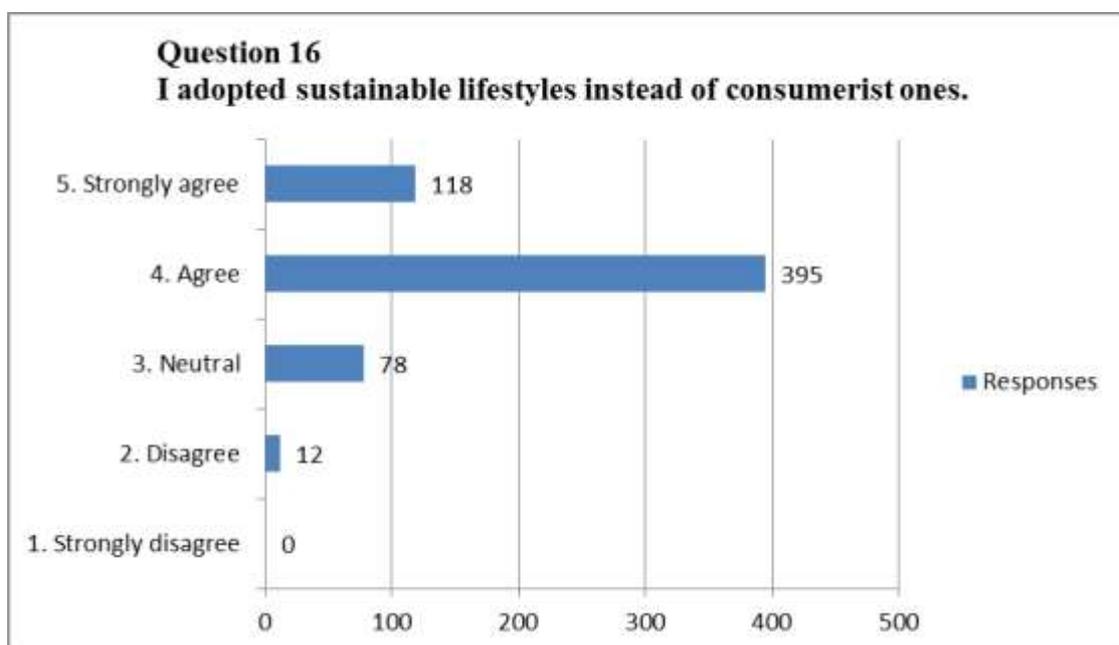
Weighted score = 3.43 (Agree)



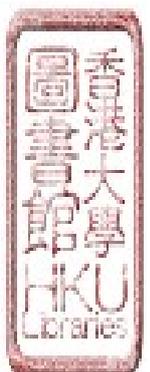


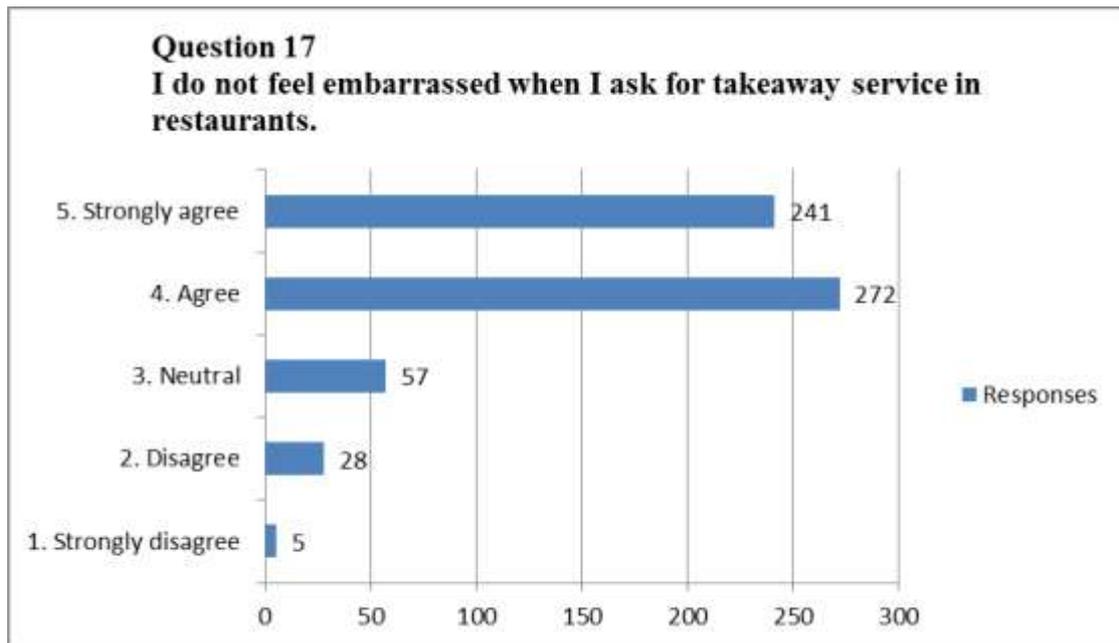
Weighted score = 3.70 (Agree)

Sustainable lifestyles



Weighted score = 4.03 (Agree)



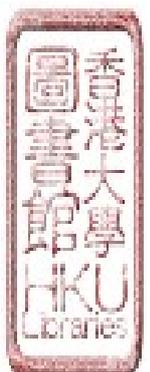


Weighted score = 4.19 (Agree)

Other comments

Other comments include:

1. build incinerators and establish food waste collection system
2. learn from Japan and Taiwan
3. plan before you buy, become self-discipline, bring your own meal box, finish the dish, provide penalty on remaining food, reward those who finish their dishes and provide less rice cheaper by \$1 offer
4. subsidize food waste treatment company by the Government
5. charge the food by weight and provide various size of food for purchase
6. adopt light banquet campaign and discourage buffet
7. adopt right-size food purchase
8. establish community green stations in every estates and support local agriculture
9. improve the foodservice company management, cook the food to be more tasty and use every part of the food



Appendix II Research on foodservice suppliers behavior

Interview questionnaire on the foodservice companies

Date:

Time:

Interviewee:

Position:

Food waste in Hong Kong – a study on source reduction

《香港的廚餘 — 對源頭減廢的研究》

Background 背景

Question 1: Can you introduce the current programmes/initiatives and the operational management adopted by your company on food waste management? The examples can be the Food Waste Reduction Programme and food donation.

問題 1：你可以介紹現時貴公司實行的廚餘管理措施和營運管理嗎？例如廚餘減少計劃及食物捐贈活動等。

Answer: _____

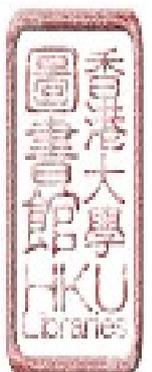
答案：_____

Question 2: To what extent does your company follow the Food Waste Reduction Good Practice Guide of the Food Wise Hong Kong Campaign? Do you think the food waste reduction target at 40% stated in the Policy Address 2014 is realistic?

問題 2：你有多大程度按照惜食香港運動的《減少廚餘良好作業守則》呢？你覺得施政報告 2014 的廚餘源頭減廢目標 40% 是否實際呢？

Answer: _____

答案：_____



Laws and regulations 法律與政策

Question 3: If the Government is considering the setting up of appropriate environmental policies and laws to solve the food waste problem in Hong Kong, e.g. “A food waste & yard waste plan for Hong Kong 2014-2022”, what would be your company’s views?

問題 3：如果政府考慮建立合適的環保政策和法律去解決香港廚餘問題，例如《香港廚餘及園林廢物計劃 2014-2022》，貴公司有甚麼看法？

Answer: _____

答案：_____

Question 4: What are the considerations (pros and cons) from your company’s point of views on using policies and laws to facilitate food waste reduction? e.g. Hong Kong blueprint for sustainable use of resources 2013-2022.

問題 4：貴公司對以法律和政策去鼓勵廚餘減廢有甚麼考慮(優點和缺點)？例如《香港資源循環藍圖 2013-2022》。

Answer: _____

答案：_____

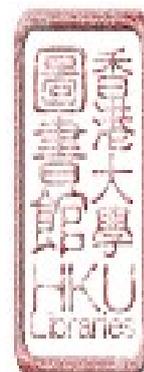
Environmental related taxes 環境相關稅項

Question 5: Would you support volume-based waste charging scheme to provide sufficient financial incentives to make the environmental objectives and financial goal consistent?

問題 5：你會否支持都市固體廢物按量收費去提供足夠財政誘因去令到環境目標和財政目標一致呢？

Answer: _____

答案：_____



Question 6: Would you support the extended producer responsibility (EPR) to avoid externalizing the food waste disposal cost to the public?

問題 6： 你會否支持生產者延申責任去避免轉嫁廚餘棄置成本到公眾？

Answer: _____

答案： _____

Moral motives **道德動機**

Question 7: Does your company have Corporate Social Responsibility (CSR) principles/targets? Is food waste reduction part of your CSR commitment? Is it one of your top prioritized subjects, why/why not?

問題 7： 貴公司有否企業社會責任原則和目標？廚餘源頭減廢是否你們的企業社會責任承諾？這是否你們的首要項目？為甚麼是/不是？

Answer: _____

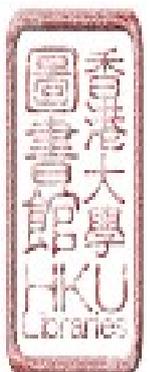
答案： _____

Question 8: Would you donate food to the food banks? What are your considerations? Do you have any comments/concerns to the “food safety guidelines for food recovery” and if your company will donate food, will you strictly follow the guidelines?

問題 8： 貴公司會否捐贈食物予食物銀行？你有甚麼考慮？你對於《食物回收計劃的食物安全指引》有沒有意見呢？如果你們捐贈食物，你會否嚴格遵守指引？

Answer: _____

答案： _____



Social mobilization 社會動員

Question 9: Are you willing to cooperate with the Government, NGOs and consumers to encourage public participation in food waste source reduction and recycling? Have you had any experience? If so, what was the experience? If no, why not?

問題 9：貴公司是否願意與政府、非政府組織和消費者合作，去鼓勵廚餘源頭減廢和回收的公眾參與呢？如有，是甚麼經驗呢？如沒有，為甚麼沒有呢？

Answer: _____

答案：_____

Question 10: Would the environmental awards and certifications offered by the Government and NGOs be your incentive for food waste source reduction?

問題 10：政府和非政府組織提供的環保獎項和證書是否你的廚餘源頭減廢誘因呢？

Answer: _____

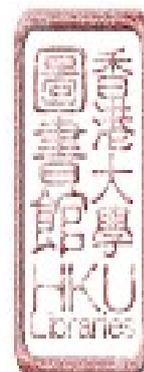
答案：_____

Question 11: Do you think the Steering Committee to Promote the Sustainable Development of the Recycling Industry is capable in solving the food waste problem in Hong Kong? Do you think the \$1 billion Recycling Fund is appropriate?

問題 11：你覺得推動回收業可持續發展督導委員會能否解決香港廚餘問題呢？你覺得 10 億元回收基金是否足夠呢？

Answer: _____

答案：_____



Question 12: Do you have food waste source separation and collection systems and practices for effective delivery and recycling?

問題 12： 你有沒有廚餘分類和收集系統和習慣去推動有效的運送和回收呢？

Answer: _____

答案： _____

Question 13: The Environment Bureau recently plans to recycle food waste mainly into renewable energy in anaerobic digesters in “A food waste & yard waste plan for Hong Kong 2014-2022”. What is your opinion? Do you support the establishment of sufficient Organic Waste Treatment Facilities (OWTF) in Hong Kong?

問題 13： 環境局最近在《香港廚餘及園林廢物計劃 2014-2022》計劃主要回收廚餘在厭氧分解器轉為再生能源，你有甚麼意見呢？你是否支持在香港建立足夠有機資源回收中心呢？

Answer: _____

答案： _____

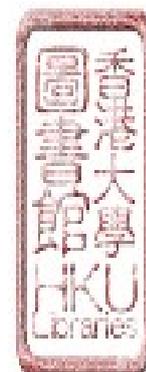
Education and publicity 教育及宣傳

Question 14: Have you provided staff training to strengthen their environmental knowledge and awareness on food waste? Why and why not?

問題 14： 你有沒有提供職員培訓去提升他們對廚餘的環境知識和意識呢？為甚麼有或為甚麼沒有？

Answer: _____

答案： _____



Question 15: How would you cooperate with the community green stations stated in the Policy Address 2014 to promote green consumption in environmental education and publicity activities? Why and why not?

問題 15： 你會否與施政報告 2014 提及的社區環保站合作，在環保教育及宣傳去鼓勵綠色消費呢？為甚麼會或為甚麼不會？

Answer: _____

答案： _____

Sustainable lifestyles 可持續發展生活方式

Question 16: Do you have any operational measures to promote right-size food purchase? What are your considerations?

問題 16： 你有沒有營運措施去鼓勵準確份量的食物購買？你有甚麼考慮？

Answer: _____

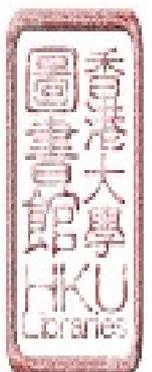
答案： _____

Question 17: Do you provide user-friendly take-away services for sustainable lifestyles? Why and why not?

問題 17： 你會否提供方便的打包去鼓勵可持續發展生活方式？為甚麼會或為甚麼不會？

Answer: _____

答案： _____



Other comments 其他意見

Question 18: In your opinion, what would be the most effective ways to reduce food waste?

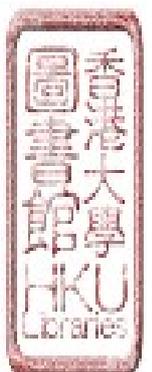
問題 18： 依你的意見，甚麼才是減少廚餘的最有效方法？

Answer: _____

答案： _____

- END (完) -

Thank you very much for your help! 很感謝你的幫忙！



Personal interview on Bijas Vegetarian restaurant

Date: 27.01.2014

Time: 3pm to 4pm

Interviewee: Mr. Thomas Ling

Position: Manager

Food waste in Hong Kong – a study on source reduction

Background

Answer 1: The food waste will be delivered to the composting machines in the HKU campus. The composts produced will be used as fertilizer in HKU Rooftop Farming Project.

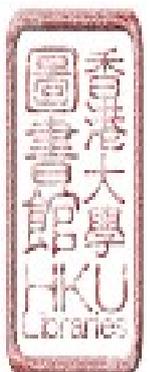
Answer 2: The restaurant substantially follows the Good Practice Guide. For example, they charge the customers by weight so that most of the customers finish their dish.

The manager think it is difficult to achieve 40% reduction target because of inadequate environmental knowledge and awareness on Hong Kong residents, negative news on wasting food by foodservice companies and insufficient recycling facilities.

Laws and regulations

Answer 3: It is good to establish and implement well-developed environmental policies and laws to solve the food waste problem in Hong Kong. The government may also subsidize the recycling companies and put more effort on promotion of food waste reduction at source.

Answer 4: The environmental performance of Hong Kong is low compared to Japan and Singapore. Appropriate policies should be developed to improve the environmental awareness of the Hong Kong residents, allocate fixed period of time to collect the trash and provide



government subsidy on recycling industry.

Environmental related taxes

Answer 5: Bijas Vegetarian supports the waste charging scheme. The experience of “Weigh What You Eat” Vegetarian Buffet Style at \$15 per 100 gram with minimum charge \$20 is excellent. Nearly all the customers finish their dishes in this “Weigh What You Eat” system.

However, the operation mode can be improved to include garbage sorting, charging per volume or weight and subsidizing the recycling companies by using the proceeds received.

Answer 6: Suitable laws and regulations should be developed to support the EPR to encourage food donation to help the needy.

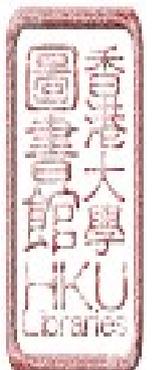
Moral motives

Answer 7: The Company has food waste source reduction commitment as their CSR principles. Vegetarian style is already an environmental friendly arrangement to eat less meat. The chefs and staff would have their lunch after 14:30 to eat the remaining food serving in the restaurant. They would also change their menu to minimize food wastage.

Answer 8: They did not donate food to the food banks simply because they do not have much food waste.

Social mobilization

Answer 9: Bijas Vegetarian has the experience to cooperate with So Soap. So Soap is a social enterprise which collects edible food from Tai Po market. The food is then cooked and delivered to the poor in the



community free of charge or at \$10. They would also make detergents and hand washes from the food waste.

Answer 10: They are not interested in these environmental awards. Their environmental performance is mainly intrinsically motivated.

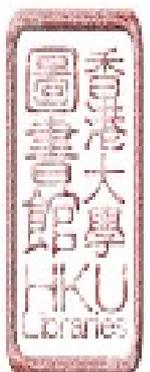
Answer 11: The details of the \$1 billion Recycling Fund are unclear. So, he is unsure whether the Steering Committee and Recycling Fund is capable of solving the food waste problem. If the restaurants have to pay additional expenses to deliver the food waste to recycling facilities and donate food, most of them prefer simply throw them to trash. The recycling activities will be enhanced if there is government subsidy from the Recycling Fund.

Answer 12: They have simple food waste source separation and collection system to support the hygienic and efficient recycling activities. The well-prepared food waste in their own recycling bins will be delivered to the HKU campus composting machines. The composts will be used as fertilizer in the HKU Rooftop Farming Project.

Answer 13: They encourage the food waste-to-energy approach and support the establishment of the OWTF network and anaerobic digesters.

Education and publicity

Answer 14: They have comprehensive environmental staff training in the restaurant. They have their own recycling bins. The well-sorting garbage will be delivered to the main recycling bins in the HKU campus. The food waste produced will be delivered to the composting machine in the campus. The staff generally has good environmental knowledge and awareness.



Answer 15: If the HKSAR Government invites them to participate in the environmental education and publicity activities in the community green stations, they would join the discussion and provide concrete actions. It is good to have the community green stations to promote environmental publicity activities.

Sustainable lifestyles

Answer 16: They recommend the customers to purchase 250 to 350 grams of food per meal for right-size food purchase.

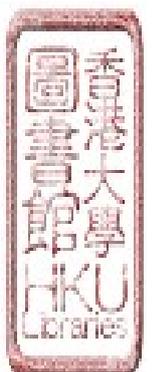
Answer 17: They have user-friendly doggy bags for the leftovers to encourage customers to take away the remaining food.

Other comments

Answer 18: Hong Kong residents should improve the environmental performance step-by-step. Social mobilization and community green stations are very important to the success of food waste source reduction.

– END –

Thank you very much for your help!



Personal interview on Green Farm barbecue site

Date: 22.02.2014

Time: 3pm to 4pm

Interviewee: Mr. Ip Yun Wah

Position: Manager

Food waste in Hong Kong – a study on source reduction

Background

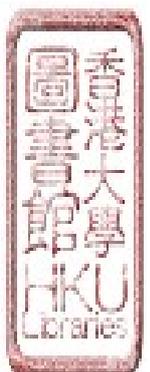
Answer 1: There is financial penalty on remaining food in the barbecue site. The customers have to pay for \$100 per pound. The edible remaining food will be donated to neighbors and dogs in the village.

Answer 2: It is difficult to say whether the HKSAR Government can achieve the target 40%. Just hope the government can achieve it. Hong Kong residents have wasteful food consumption habits. The barbecue site follows the Good Practice Guide to a great extent. They support “Don’t be a Big Waster” and persuade the customers to “Think before you buy food.” and “If you can’t finish your food, don’t waste it.”

Laws and regulations

Answer 3: He has a friend who operated environmental business in Hong Kong. However, the company liquidated due to lack of government support. The expenses are too high that the food waste companies can hardly survive. Actually, there are lots of people who are interested in environmental businesses. The application procedures are too complicated which discouraged them.

Answer 4: He totally supports the environmental policies and laws on food waste reduction at source. For example, he thinks the law in the United States “The Good Samaritan Food Donation Act” is good to waive the legal



liability of the food service suppliers to promote food donation. The food receivers should have the responsibility to check whether the donated food is safe to eat.

Environmental related taxes

Answer 5: It is good to implement the waste charging scheme in Hong Kong per household. It is more convenient to receive the trash fee per area of the companies.

Answer 6: He thinks the food waste disposal cost should be charged according to the company size per area.

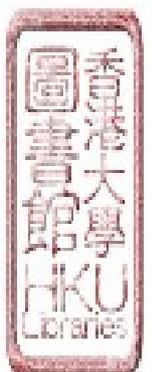
Moral motives

Answer 7: The barbecue site is committed to environmental protection like organic farming and saving electricity. They have good food waste operation management with proper food storage, food waste source separation and food donation to local villagers. The food waste generation rate is very low.

Answer 8: There is no food donation to food bank because the food waste generated is too little. Food donation is carried out to give the remaining avoidable leftovers to local residents and dogs.

Social mobilization

Answer 9: They mainly perform the food waste source reduction and recycling activities by themselves. The cooperation among stakeholders is limited. The only thing he mentioned is that his friend promised to donate a composting machine to them.



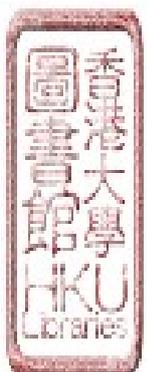
Answer 10: He highly treasures the environmental awards and certification on food waste. They can reflect the environmental performance of foodservice suppliers on food wastes, which may improve the sales. The most important thing is the government support on food waste companies and activities.

Answer 11: The \$1 billion Recycling Fund is completely insufficient to support the food waste recycling industry. The rent and salary expenses are very high in Hong Kong. The transportation fee and relevant expenses on collected food waste are high. On the contrary, the market for food waste products like composts and fish feed is too small. The HKSAR Government was not serious enough to provide adequate support on the recycling industry. Even though there are enthusiastic environmentalists to operate the food waste recycling companies, their businesses simply cannot survive.

He wishes the Steering Committee can be determined to solve the food waste recycling problem in Hong Kong. If they take it seriously, they can solve the food waste problem.

Answer 12: They have established voluntary garbage sorting in the barbecue site. The avoidable food waste, metal cans, papers and plastic bottles are properly sorted. The elderly in the village are the volunteers to collect the edible food. It is their interest to do the recycling activities even though some of them are rich.

Answer 13: They appreciate the food waste-to-energy treatment method. The OWTF network and anaerobic digesters should be well established in Hong Kong.



Education and publicity

Answer 14: The staff is well-trained on various environmental activities on the barbecue sites. They would properly put the edible remaining food in plastic bags and donate to the villagers and dogs. Food safety is also emphasized in the donation process.

Answer 15: They believe the community green stations are very useful on the environmental education in Hong Kong. They would definitely join the environmental activities in the future with the government and green groups.

Sustainable lifestyles

Answer 16: They highly promote the right-size food purchase. It is the personal decision-making issue. The customers usually purchase the actual consumption volume in the barbecue site.

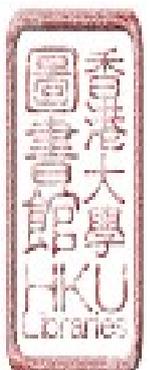
Answer 17: They do not allow any take-away of food. It is the necessary operational requirement of the barbecue site. Any food taken away will be charged at \$100 per pound.

Other comments

Answer 18: Environmental education and publicity activities should be strengthened to promote food waste source reduction to the Hong Kong residents.

– END –

Thank you very much for your help!



Personal interview on Go Green Organic Farm vegetable shop

Date: 27.02.2014

Time: 3pm to 4pm

Interviewee: Mr. Martin Li

Position: Marketing Manager

Food waste in Hong Kong – a study on source reduction

Background

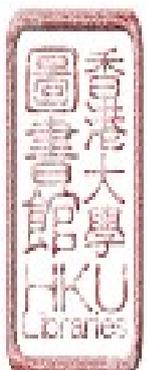
Answer 1: Go Green Organic Farm operates the vegetable shop and the farm. They would donate the edible food to the elderly in the aged home. Some food will be used to feed the dogs. Environmental education is conducted in the green farm. Hong Kong citizens can experience the process of growing vegetables. So, they would treasure food because they understand it is actually not easy to obtain food.

Answer 2: They would try their best to follow the Good Practice Guide and persuade the customers not to waste food. The food waste reduction target 40% is difficult to achieve and it takes time. It is more reasonable to achieve 15% to 20% target.

Laws and regulations

Answer 3: It is necessary to implement suitable food waste policies and laws. The foodservice companies would emphasize the profit and cost. So, they may not have incentives on food waste reduction. The government efforts are critical to the success of the food waste reduction.

Answer 4: The policies and laws would influence their environmental education activities in the green farm. They would include the food waste issues in the school visits. It takes time to educate the Hong Kong people.



Environmental related taxes

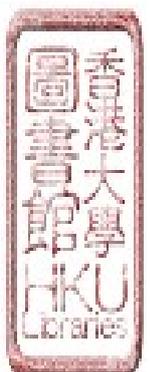
Answer 5: They support the volume-based waste charging scheme. We must solve the municipal solid waste problem in Hong Kong. However, he thinks it is difficult to implement. The manpower, time, trash measurement and coordination should be carefully considered. It takes time for the Hong Kong residents to adapt to the waste charging like the implementation of plastic bag levy.

Answer 6: They support the polluter pays principle and extended producer responsibility. The current situation is strange that the foodservice companies have rights to causally dispose the rubbish without any costs. If there are no EPR, the foodservice suppliers have no incentive to solve the food waste problem.

Moral motives

Answer 7: The Corporate Social Responsibility focuses on organic food production and environmental education. It is a caring company and has CSR commitment on food waste source reduction. They mainly focus on educating the food waste issues to the kids and youth.

Answer 8: They donate food to elderly home but not food bank. There is no food safety problem. They sufficiently follow the “food safety guidelines for food recovery”. The elderly doubt about the food safety on the donated food at the beginning. They begin to appreciate the donation after they tried the donated vegetables several times. Trust and relationship are important in food donation.



Social mobilization

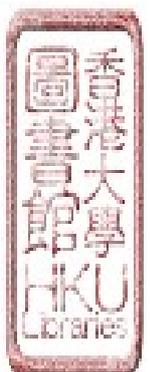
Answer 9: They have little cooperation with other organizations on environmental issues. They cooperated with a primary school to teach the kids about the environmental knowledge. The primary school students spent half day in the green farm. They would occasionally organize seminars with the environmentalists.

Answer 10: They treasure the environmental awards and certificates as one of the incentives. They would like to build up an environmentally friendly and caring company image to the public. These eco-labels are thus critical to the brand image.

Answer 11: They think that merely relying on the Steering Committee may not be able to solve the food waste problem. The food waste problem is complicated which involve various government departments and organizations. For example, the AFCD and EPD are involved. However, they may not have sufficient connections. There are no responses on the opinions from the foodservice suppliers. They think \$1 billion is insufficient. There are 7,200,000 Hong Kong people. Each of them only shares about \$140.

Answer 12: They have simple source separation and collection system on plastic bottle, metal cans and food waste. It is sufficient for the operation of the green farm and vegetable shop.

Answer 13: They support the establishment of anaerobic digesters and OWTF. We must find ways to solve the solid waste problem when the Hong Kong residents strongly oppose the landfill extensions and incinerator building.



Education and publicity

Answer 14: They have morning meeting every week to discuss the environmental issues. The staff is trained in the experience sharing. For example, they discussed about the treatment of remaining food in barbecue activities.

Answer 15: They would participate in the environmental education activities in the community green stations. The details can be discussed with the government and green groups.

Sustainable lifestyle

Answer 16: They support right-size food purchase. For example, they would purchase the amount of food according to their consumption needs in barbecue activities. They discourage buffet style barbecue to avoid food wastage.

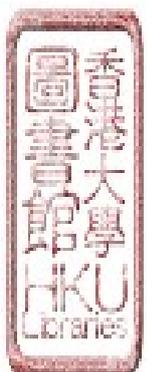
Answer 17: They have simple take away services on the dim sum and flower tea bags.

Other comment

Answer 18: Environmental education and publicity should be strengthened to promote food waste source reduction. TV advertisements on food waste issues are important. The schools should provide environmental education to equip the food waste knowledge on the next generation.

- END -

Thank you very much for your help!



**Personal interview on LHGroup Chinese restaurants & KABUSHIKIGAISHA
Japanese restaurants**

Date: 14.03.2014

Time: 11am to 12:30pm

Interviewee: Mr. Simon Wong

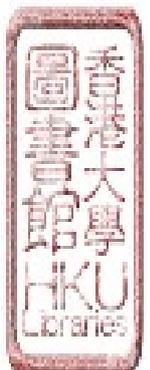
Position: Executive Director (LHGroup)

Managing Director (KABUSHIKIGAISHA Ltd.)

Food waste in Hong Kong – a study on source reduction

Background

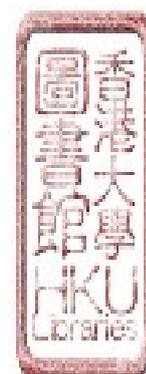
Answer 1: The LHGroup business mainly includes the Chinese restaurants and banquet services. The KABUSHIKIGAISHA Ltd. provides the Japanese shabu shabu, sushi and robatayaki in Hong Kong. Food waste is the most difficult part of the corporate waste management because there is not enough food waste policy in Hong Kong. The food waste management should be sustainable. If we only spend money on environmental publicity activities which are not sustainable, most of the companies will not continuously reduce food waste. The company has joined the “Save Food Day” of Greeners Action. They also joined the food recovery program of the Foodlink and become the 1st Chinese restaurant to cooperate with them. Foodlink has comprehensive regulations to ensure high standard of food safety, human rights and performance. For example, they have to ask the customers whether they need the food. Once the food is distributed to their dishes, even though the customer actually did not eat it, the food cannot be donated. In the last generation, there was rag and bone man



who buy the edible food from Chinese restaurants. The rag and bone man reheats the food and resold again. This environmentally friendly measure was accepted by the society before. However, the Hong Kong society may not accept this method now because of low food safety and human respect. The lack of respect is because they serve recycled food to other people. They have sufficient food boxes and large refrigerators. The beneficiaries should also follow the high standard of food safety like reheating. The food donation should have consent from the customers.

They have joined the “Table for two”, which originates from Japan. It assumes a hungry kid from rural China and some countries in Africa to dine with you. It promotes right-size food purchase with sufficient nutrients. There will be \$2 donated to these poor for every right-size dishes we buy. There is a “Win-Win-Win” situation for the customers, foodservice suppliers and environment.

The company would classify pre-consumer and post-consumer food waste. For the pre-consumer food waste, the amount can be determined by the company policy and the chefs. For example, the vegetables are chopped around 60%, which is the highest quality, to serve the customers. The decision on the remaining 40% determines on the amount of food waste. Whether we simply throw the remaining 40% away or think of other uses will make a difference. If the nutritional value and taste of the food is good but without perfect appearance, they can be used to make soup, dim sum and other dishes. The roast sucking pig legs can also be used to make dim sum. Generally, most of the foodservice companies would reduce the pre-consumer food waste



because the food price is high. When there is lower pre-consumer food waste, the net profit will be higher.

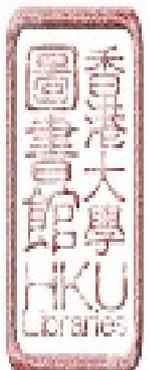
The company has developed “Treasure food campaign” internally. We should not call the “pre-consumer food waste” as leftover. It should be called as “edible food” instead. There is life of every part of the food. These “edible food” are cooked and eaten by the staff. There are awards on the best dishes on the pre-consumer food waste.

For post-consumer food waste, the “Mou Mou Club” is the buffet style hot pot, which easily generates food waste. He also witnessed the wasteful behavior of the customers. The food waste generated is estimated to be about the meal for 8 persons. So, the company launched the “Red card, Green card campaign”. The customers should take the amount of food they actually consumes. How much they eat is not a problem. However, they should really eat the food and do not waste it. When the customers finish their food, the red card will be changed to the green card. There will be \$10 discount for next purchase and \$5 will be donated to Greeners Action.

Answer 2: They have substantially followed the Good Practice Guide.

It is acceptable to set the food waste reduction target at 40%. There should be a learning process for food waste management. The food waste volume in Hong Kong is comparatively higher than other cities.

It is mainly due to the Chinese food selling operations and dining habits. In the western countries, the meat is properly cut and packed in food factory. The customers purchase the properly prepared meat in the shops and usually eat all of them. In Hong Kong, the pig is displaced in shops. The food selling mode makes it easier to generate food waste.



Besides, the Europeans usually eat fish fillets and cream soup. The Chinese people usually cook the fish with bones and make soup. The fish bones and soup residues make the food waste volume greater.

Laws and regulations

Answer 3: He gives his opinion from an environmentally friendly businessman and Hong Kong resident point of view. The environment should be sustainable in the long-term. However, we should handle the short-term challenges first. The rent in Hong Kong is really high. So, the businessmen would try their best to use the space for business. When we do the food waste source separation, we need recycle bins, space and staff. These would incur significant expenses to the company. Besides, Hong Kong is a densely populated city. There is problem in storing food waste. If the food waste is not collected 2 to 3 times every day, there would be hygienic problem. Overseas cities have much larger area for them to do the environmental work. Hong Kong Government has great financial surplus and reserves. So, Hong Kong can solve the environmental problem using the rich man methods. The current government tends to use financial penalty and conservative. There should be sufficient food waste treatment facilities in Hong Kong. For example, the sewage charge applies the polluter pays principle. However, the sewage amount did not drop significantly because of insufficient infrastructure. He recommends that the government can subsidize the Hong Kong household to buy a composting machine for each family. Each composting machines cost around HK\$3,000 to HK\$5,000. If the



Government can provide “Scheme \$6,000”, it is feasible to subsidize each family to have a composting machine.

Answer 4: It is excellent to formulate appropriate policies and laws to facilitate food waste reduction. For example, it would be great if there is “Good Samaritan Food Donation Ordinance” to provide liability protection to good faith donor.

Besides, he thinks the purpose of food donation should not be mainly food waste reduction and the feeling is not good. It should be caring to the needy and poor. Objectively, there is an effect on food waste reduction at source.

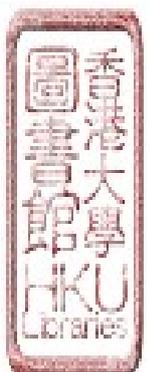
The Government should provide sufficient support and incentives to the companies like rent-free recycling area and rate reduction. The company should survive first before they participate in environmental activities.

Environmental related taxes

Answer 5: It is reasonable to implement the volume-based waste charging scheme.

The environmental awareness significantly improved in Seoul when there is waste charging to provide adequate financial incentive. It is similar to the effect of “Environmental Levy on Plastic Shopping Bags” in Hong Kong, in which the number of plastic bags significantly reduced. Besides, a combination of measures should be implemented to work with the waste charging like sufficient OWTFs and voluntary garbage sorting.

The Hong Kong Government does not aim at a new tax but provide financial incentives to reduce the waste volume. Financial incentive



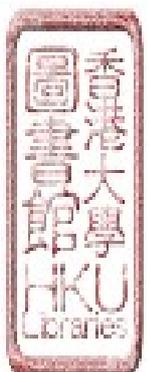
can also be provided through subsidies and deductions. For example, the rates can be reduced for food waste source reduction as a financial incentive.

Answer 6: They do not agree EPR on food waste issues. The food waste generation is determined by the customer purchase and consumption decision. However, if the food waste disposal cost is borne by the foodservice supplier, it is unfair to them and the effect will not be good. In Germany, the customers will be penalized legally when there is unreasonable leftover. It may not be suitable in Hong Kong because it will adversely affect the catering business and human rights. Since 70% of the food waste comes from household, the EPR should start from the household but not the C&I sector.

Moral motives

Answer 7: Environmental protection and food waste reduction are very important components in the CSR. Whether the company is environmentally friendly is greatly influenced by the management. He was a civil engineer and understands the importance of environmental protection. It relates to the worldwide human survival. LHGroup has been the Gold Winner of the Hong Kong Awards for Environmental Excellence (HKAEE) – Sectoral Awards (Restaurants). They are enthusiastic in food waste reduction at source. However, the purpose is not for getting the environmental awards. They think it relates to all the people in Hong Kong, who share similar environmental responsibility. It does not relate to their wealth, education level and occupation.

Answer 8: They agree that food safety guidelines should be strictly followed.



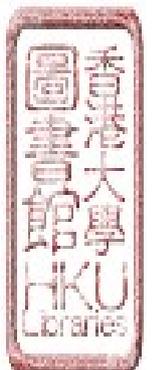
Foodlink is chosen as the food bank because they think it has good control on food safety in the food recovery process. Even the poorest family in Hong Kong also needs food safety. The situation is different from the African people, who may die from hunger but not diseases. So, the food safety standard should not be high in African countries. Good health of the Hong Kong grassroots should be ensured in food donation.

Social mobilization

Answer 9: He is the member of Support Group on municipal solid waste charging of the Council for Sustainable Development. He is also the Chairman of the Hong Kong Green Building Council (HKGBC) Task Force: Green Initiative for Restaurants Occupants. He would also cooperate with Town Gas and HK Electric to promote environmental protection in advertisements.

Answer 10: They do not regard the environmental awards and eco-labels as incentives for food waste reduction at source. He was a member of the eco-label committee in catering industry. The results are not satisfactory after three years. The restaurants have to pay \$3,000 for the eco-label. However, it makes no significant difference in their daily operation and profit. They need government support to provide them knowledge and measures to both protect the environment and reduce operation cost at the same time.

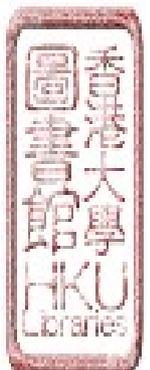
Answer 11: It is good to establish the Steering Committee for the recycling industry by the Government. The Chairman is the Chief Secretary for Administration, which shows great enthusiasm of the Government to



promote the recycling industry. The Chief Secretary for Administration only chair three similar committees like Fight Crime Committee. It is absolutely correct to provide financial support in the Recycling Fund. Solving problem through financial support is effective and efficient. He does not know whether it is appropriate because the operation mode of the Recycling Fund is unknown. If the \$1 billion is directly used, it will be sufficient. If the \$1 billion is used to set up a funding and only the interest portion can be used, it would be insufficient.

Answer 12: They currently have no food waste source separation and collection systems. The C&I food waste source separation is totally different from the household ones. The company has to provide additional manpower, space, resources and expenses to do the garbage sorting. Besides, they understand that there will be no effect to do the source separation at this moment. They hope the Government can provide subsidy and recycling infrastructures to promote source separation. They currently pay several thousand dollars per month to the waste collection company. If you do the source separation, the waste collection company would mix them together before any recycling work.

Answer 13: He does not comment on the technical feasibility because of insufficient knowledge. However, the concept on renewable energy is correct. There is little agriculture and poultry business in Hong Kong. So, the demand of compost and animal feed is small. Besides, when you export the food waste products to overseas and mainland China, there would be great carbon emission. Moreover, the locally produced

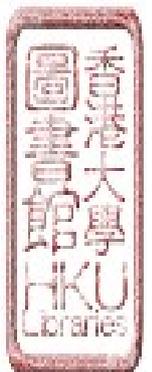


compost and animal feed in mainland China is much cheaper than the Hong Kong food waste products. So, there is no market for the Hong Kong compost and animal feed. The aquaculture and raising chicken in Hong Kong can consume some of the food waste products like fish feed and chicken feed. The Hong Kong energy supply mainly relies on coal, natural gas and nuclear energy. It is good to explore new energy sources like food waste-to-energy, even though the proportion is little. They support the establishment of sufficient OTWF in Hong Kong.

Education and publicity

Answer 14: They have environmental staff training but not in a systematic way. The catering staff is mainly from the lower class family. Their education level may not be high and they may not like having lessons and studying. Besides, the learning would emphasize the basic knowledge on food and the food waste issues are less important. The staff training is difficult because it is not easy to recruit staff. They have long working hours and it is difficult to spare some time to attend training sessions. They have a training centre in Fo Tan on catering business. The food waste reduction issues therefore rely on the staff cooperation. So, the mode is mainly on-job training. The training on food waste issue is very practical, which is similar to telling them when to switch off the air-conditioner.

Answer 15: They would participate in the activities of the community green stations. However, the catering business has to be sustainable before any environmental actions. They have experience on being invited on food waste reduction activities. They assessed the situation and think



that the activities are commercially infeasible. The location is in remote area. Besides, it is not romantic to use recycled food. So, food waste reduction can only be a part of the life and business.

Sustainable lifestyle

Answer 16: They have some measures to promote right-size food purchase. The ‘Red Card, Green Card system’ in Mou Mou Club is an example. They have light banquet campaign in which six courses are provided. Customer environmental awareness is important on right-size food purchase. For example, a customer has phoned to the company to request a light banquet campaign for environmental purposes. However, the customer worries there may not be insufficient food. So, he requested to have extra portion of the light banquet campaign. It was basically a superstition. Besides, it is difficult to have right-size food purchase. It is easiest for one person to have right-size food purchase. The difficulty increases when two persons dine together. It would be even more difficult for a table of people. When it is a banquet for 40 tables, the difficulty of right-size food purchase will be very high. The mainland Chinese may have the concept to waste food in order to save face. However, Hong Kong residents do not have this wasteful concept. The food price is so high in Hong Kong and most of us have the right-size food purchase awareness. The Chinese style dining is easier to waste food because we share the dishes. The western style can promote right-size food purchase because the courses are served one by one to each customer.



Answer 17: They have user-friendly take-away services for sustainable lifestyles. They encourage the customers to take away the remaining food. Ten years ago, the Hong Kong residents may think that takeaway services lose faces. However, the environmental values change. It is stylish and smart to take away the remaining food. For family dining, around 8 out of 10 tables are willing to take away the remaining food. For banquets, there will be less people for take-away services because it is inconvenient. The public acceptance on takeaway services improved a lot.

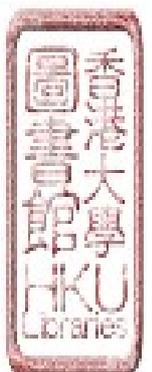
Besides, the restaurants may charge the customers for doggy bags at \$1 each. There is a dilemma on whether we should reduce the plastic waste or the food waste. The most effective way should be right-size food purchase.

Other comment

Answer 18: A combination of measures would be the best way to solve the food waste problem. It is not feasible to implement waste charging only. Only relying on education is too slow. Food waste treatment is passive. The best way is to eat the food and prevent food waste generation.

- END -

Thank you very much for your help!



Personal interview on Mangrove tuck shop

Date: 14.03.2014

Time: 3:30pm to 4pm

Interviewee: Mr. Danny Liu

Position: Senior Area Manager

Food waste in Hong Kong – a study on source reduction

Background

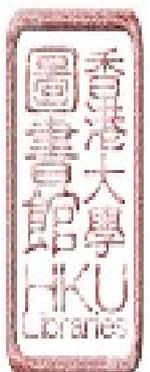
Answer 1: The Company operates a tuck shop and provides lunchbox services. The post-consumer food waste from lunchbox will be collected. The leftover is then delivered to the farm as animal feed. The edible avoidable food waste will be donated to the needy. The company has operated in an environmentally sustainable manner.

Answer 2: They think the food waste reduction target 40% is excellent. We should put great efforts to achieve the target, however. There is about 10% kitchen waste in 2,000 lunchboxes provided. It is quite difficult to allocate the right-size food amount to each student. They would also provide environmental education and publicity to the students. The messages of saving food, the recycling process of food waste and its impact to the earth are explained to the student. They substantially follow the Good Practice Guide.

Laws and regulations

Answer 3: The food waste plan is a good environmental policy. The company operates in an environmentally friendly way. They will support and participate in the activities stated in the plan.

Answer 4: When there is legislation on food waste issues, surely they would follow it. Their main considerations are the operational difficulty and



the public acceptance on the legal requirements.

Environmental related taxes

Answer 5: They support the volume-based waste charging scheme. The Southeast Asian countries are currently implementing the waste charging like Taiwan. The government can provide garbage bags for waste charging.

Answer 6: They do not agree with the EPR on food waste issues. Their food is prepared in fixed amount. The leftover amount, however, is determined by the customer consumption. They cannot control the amount of kitchen waste. It is unfair to the foodservice supplier to bear the food waste disposal cost.

Moral motives

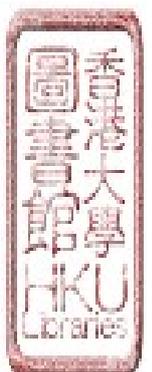
Answer 7: The company management, food factory and office are operated in an environmentally sustainable manner.

Answer 8: The remaining edible snack and lunchboxes will be donated to the Food Angel food assistance program of Charity Foundation.

Social mobilization

Answer 9: They have some cooperation with other stakeholders on food waste reduction and recycling. The existing environmental policy and law, recycling infrastructure and source reduction measures are inadequate.

Answer 10: It is not necessary to have environmental award as an incentive. The success depends on the corporate social responsibility of the foodservice suppliers. We should wholeheartedly reduce food waste at source to protect the environment.



Answer 11: It is difficult to say whether the Steering Committee can solve the food waste problem. If the Recycling Fund is allocated properly, the amount is appropriate. However, we sometimes observe that there is false match resources by the government. The government officials should ensure effective and efficient use of the funding.

Answer 12: For the tuck shop, there is limited space and the operation mode is mainly takeaway. They cannot control the food waste source separation and collection. For the lunchbox services, the food factory has proper source separation and collection systems for effective delivery and recycling.

Answer 13: They support the establishment of anaerobic digesters and OWTFs. The food waste-to-energy approach is encouraged.

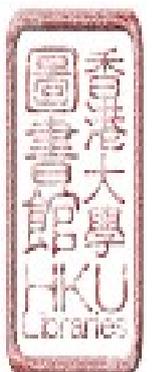
Education and publicity

Answer 14: There is sufficient environmental staff training on food waste in the company. The company has already attained the ISO14001 standards.

Answer 15: They continuously participate in education and publicity activities and will support the community green stations. For example, they have joined the “Green Monday” to promote “eat less meat” to reduce carbon emissions and negative environmental impacts.

Sustainable lifestyle

Answer 16: Their food products have standard weight for right-size food purchase. The lunchbox services will also provide on-site meal portioning in schools. They would educate the students to purchase the exact amount of food they actually consume.



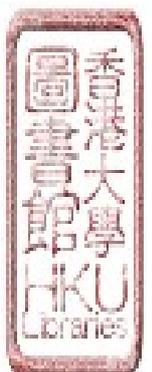
Answer 17: The operation mode of the tuck shop mainly relies on take-away services.

Other comment

Answer 18: “Don’t be a big waster!” and “Hong Kong: Our Home” is the best method to reduce food waste at source.

- END -

Thank you very much for your help!



Personal interview on Holiday Inn Express Hong Kong SoHo hotel

Date: 03.04.2014

Time: 4pm to 5:15pm

Interviewee: Mr. Kaivin Ng

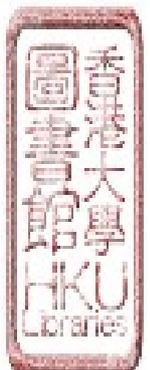
Position: General Manager

Food waste in Hong Kong – a study on source reduction

Background

Answer 1: The hotel does not have any Food & Beverage (F&B) outlets. So, they have no food waste management company policies. However, he understands the attitudes, difficulties and decision making of the hotel on food waste issues. So, appropriate comments can be provided from the view of the international hotel holding company and hotel operator. The hotel aims at profit maximization. Food waste is something which cannot generate revenue anymore. So, the hotel would not put any further resources on the food waste treatment. Food waste management in Hong Kong is only at the initial stage. He is the member of the Food Wise Hong Kong Steering Committee. He thinks there are little benefits and quantifiable results on food waste reduction at source. The campaign simply has the food waste reduction slogans.

Answer 2: If the hotel has F&B outlets, he would respect the Food Waste Reduction Good Practice Guide and try their best to fulfill the requirements. Besides, he thinks the food waste reduction target at 40% is difficult. There are so many buffet serving in Hong Kong. The consumers are not willing to finish their dishes. He believes 20% to 30% reduction target is achievable.



Laws and regulations

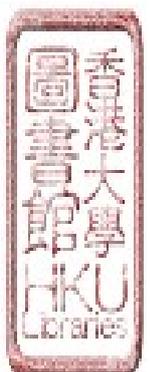
Answer 3: As long as the environmental policies are reasonable and allow sufficient time for the market to adapt, the food waste policies are welcomed. It has to deal with both the individual behavior and corporate behavior. The hotel business has to guarantee the financial returns. So, simply enthusiasm on environmental protection is inadequate. They would welcome food waste legislation if the legal process and details are reasonable.

Answer 4: They consider the legal liabilities and media concerns on the food waste reduction. They think Good Samaritan Food Donation Ordinance is good to waive the legal liability of the hotel operators on food donation. However, the media can provide significant consequences on the hotel if the food waste management is not properly handled.

Environmental related taxes

Answer 5: He does not agree with the proposed waste charging scheme measurement method. The hotel has to pay annual trash fee for about \$1,000,000. He is not very sure about the figures but it seems that the hotel industry would reject the measurement proposal. He admits that the hotels throw away lots of rubbish every day.

Answer 6: The EPR may not be applicable in the hotel industry on post-consumer food waste. When the hotel sells the food to the customers, there is no post-consumer food waste. If the customers can completely finish their dishes, there will be no pollution. If the consumer does not finish their food and takeaway the leftover, there is post-consumer food waste. It is



unfair to the hotel to bear the waste disposal cost on post-consumer food waste because the hotel is not the true polluter.

They agree EPR in other industry. It is acceptable to apply the EPR on the customers on food waste. However, it is difficult to implement.

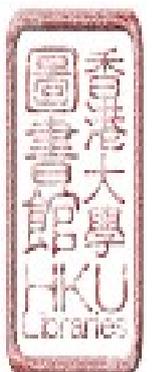
Moral motives

Answer 7: It can be classified as corporate level and individual hotel level. For the corporate level, the hotel is located in the Greater China region of the Intercontinental Group. The headquarter is in Shanghai. So, the customers are mainly the mainland Chinese. They do not have food waste reduction CSR commitment in the Greater China region level. For the individual hotel level, they also do not have food waste reduction CSR commitment simply because they do not have F&B outlets.

Answer 8: If they have F&B outlets, they would simply donate the food and cooperate with food banks. There is third party insurance on the food donation. They feel happy to donate food. The risk of food poisoning on food donation is low. They would strictly follow the food safety guidelines. Sufficient staff training should be provided on food safety, food donation process and its appreciation.

Social mobilization

Answer 9: The hotel has a comprehensive system on environmental protection. They mainly do the environmental works by themselves with limited collaboration. Food waste reduction at source is new to the hotel industry.



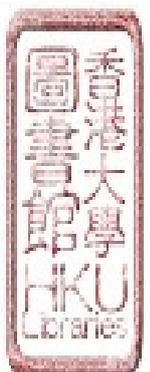
Answer 10: The environmental awards can improve corporate reputation and image, staff loyalty and intangible returns. The eco-labels can become an incentive when these potential returns are high.

Answer 11: It would be better to have the Steering Committee on recycling industry. The success depends on the performance of the leaders. It is also better to have \$1 billion Recycling fund to provide financial support to the recycling industry. However, he is unsure whether the Steering Committee and Recycling Fund would be successful finally.

Answer 12: They have limited food waste source separation and collection practices. It is because the hotel industry does not have the habits and incentives. The hotel industry has operated for a very long time. It is difficult to change the hotel operating habits and environmental education takes time. Hong Kong lacks OWTF infrastructure. So, the hotels mainly donate the food and produce some compost. The hotel buys the composting machines does not aim at food waste recycling. It simply builds an environmentally friendly corporate image.

Answer 13: He thinks the food waste-to-energy approach is correct. However, it is difficult to implement. The initial investment is high and the financial return is low. The Government is still proposing the incineration building and landfill extensions. He doubts whether the Government can effectively establish and operate the OWTF network. The processing capacity is far insufficient to treat all the local food waste. The residence time of food waste is long. If it is only a show to the public, it will be useless. If it is a pilot test, it would be meaningful if the processing capacity is sufficient.

He comments on the hotel buffets in Hong Kong. All the Hong Kong



hotel buffets for one night can serve all the citizens of one African country for one month”.

Education and publicity

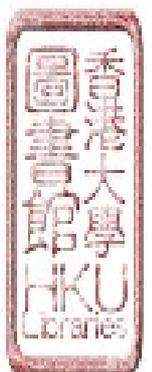
Answer 14: They have some environmental staff training on food waste. They would classify the food waste into pre-consumer and post-consumer food waste. The main objective is to reduce cost. They would prevent pre-consumer food waste to save money. However, the post-consumer food waste generation is not under their control.

Answer 15: They support the community green stations on environmental education and publicity. Whether they would join the program depends on the details. The hotels have to use the resources efficiently. It is good for Hong Kong residents to join the environmental publicity programs.

Sustainable lifestyle

Answer 16: The concept of right-size food purchase is correct. The hotels would cooperate when the implementation methods are feasible. The environmental measures should not disturb residents and place all the responsibilities on the foodservice suppliers.

Answer 17: They appreciate the customers to take away the leftovers for sustainable lifestyles. They have some user-friendly takeaway services to the customers.

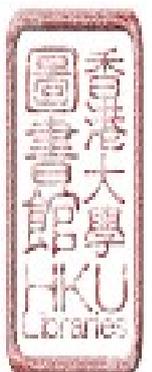


Other comment

Answer 18: Environmental education should be the most effective way to reduce food waste. The avoidable food waste is generated from consumer behavior. Appropriate education can change the wasteful consumer behavior to reduce food waste. However, education takes time. The unavoidable food wastes require proper food waste treatment and infrastructure.

- END -

Thank you very much for your help!



Appendix III Research on HKSAR Government policies

Interview questionnaire on the Government official

Date:

Time:

Interviewee:

Position:

Food waste in Hong Kong – a study on source reduction

《香港的廚餘 — 對源頭減廢的研究》

Background 背景

Question 1: Can you introduce the comprehensive strategies and plans to reduce, recover and treat organic waste stated in the Policy Address 2014?

問題 1：你能否介紹施政報告 2014 提及的有機廢物減廢、重用和處理的完整策略和計劃呢？

Answer: _____

答案：_____

Question 2: What are the main difficulties in achieving the food waste reduction target 40% by the HKSAR Government?

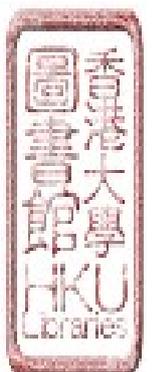
問題 2：香港政府要達致廚餘減廢 40% 目標的主要困難是甚麼呢？

Answer: _____

答案：_____

Law and regulations 法律與政策

Question 3: What is the HKSAR Government's commitment on tackling the food waste problem? Will the initiatives/measures stay at the publicity and "Food Waste Reduction Good Practice Guide" level or it will involve laws and regulations?



問題 3： 香港政府對解決廚餘問題的承諾是甚麼呢？相關措施會留在宣傳和《減少廚餘良好作業守則》層面，還是會涉及法律和政策？

Answer: _____

答案： _____

Question 4: After the issuance of “A food waste & yard waste plan for Hong Kong 2014-2022”, what food waste policies and laws will the HKSAR Government implement? What about the “Resource Recycling Four-in-One Program” and “Recycling Fund Management Board” in Taiwan? What about related laws lifting the liability of food banks, etc? Why and why not?

問題 4： 在推出《香港廚餘及園林廢物計劃 2014-2022》之後，香港政府會執行甚麼廚餘政策呢？例如台灣的「資源回收四合一計劃」和「資源回收管理基金管理委員會」。或者免去食物銀行的相關的法律責任等。為甚麼會或為甚麼不會？

Answer: _____

答案： _____

Question 5: Do you think mandatory garbage sorting is a good measure in Hong Kong? What are your concerns?

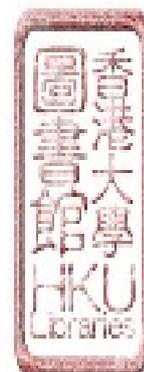
問題 5： 你覺得強制性垃圾分類對香港是否適合的措施？你有甚麼考慮？

Answer: _____

答案： _____

Environmental related taxes 環境相關稅項

Question 6: What are the main difficulties in implementing volume-based waste charging scheme in the Hong Kong community?



問題 6： 在香港社區執行都市固體廢物按量收費的主要困難是甚麼呢？

Answer: _____

答案： _____

Question 7: How would the Government implement the polluter pays principle in the catering and foodservice industry?

問題 7： 政府怎麼在飲食業界執行污染者自付原則呢？

Answer: _____

答案： _____

Moral motives **道德動機**

Question 8: Do you think Food Wise Hong Kong Campaign is effective and successful? How would the Government promote ethical consumerism?

問題 8： 你覺得惜食香港運動是否有效和成功呢？政府怎樣鼓勵良心消費呢？

Answer: _____

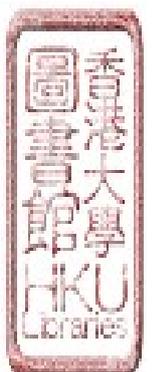
答案： _____

Question 9: How can the government promote food donation with strict adherence to “the food safety guidelines for food recovery” to ensure high level of food safety?

問題 9： 政府怎樣鼓勵食物捐贈，而同時確保嚴格遵守《食物回收計劃的食物安全指引》去肯定高度食物安全呢？

Answer: _____

答案： _____



Question 10: Would the government take the lead and ban all buffets for official occasions, or limit the number of courses per meal, etc.?

問題 10：政府會否帶頭取消所有在官方場合的自助餐式款代，或者限制每餐飯菜式的數量等？

Answer: _____

答案：_____

Social mobilization 社會動員

Question 11: What is the role of the Steering Committee to Promote the Sustainable Development of the Recycling Industry on the food waste management?

問題 11：推動回收業可持續發展督導委員會在廚餘管理的角色是甚麼呢？

Answer: _____

答案：_____

Question 12: How much will be allocated on food waste management from the \$1 billion Recycling Fund?

問題 12：10 億元回收基金中會有多少分配到廚餘管理？

Answer: _____

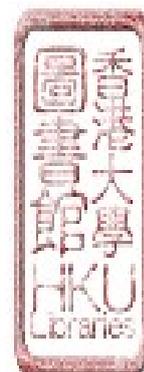
答案：_____

Question 13: What organizations are eligible to apply for the Recycling Fund? Would the government prefer to fund partnerships between the private recycling operators and NGOs?

問題 13：甚麼機構有資格申請回收基金？政府會否更喜歡與私營回收商和非政府組織的合夥基金？

Answer: _____

答案：_____



Question 14: How would you set up and maintain the food waste collection and treatment facilities with high environmental and operational standards in Hong Kong?

問題 14：你怎麼在香港建立和維持高環境和營運標準的廚餘收集及處理設施？

Answer: _____

答案：_____

Question 15: What will the government do on food waste-to-energy? Where will the anaerobic digesters be built? How can the government collect properly prepared food waste for the anaerobic digester? Does the government have confidence in gaining support from Hong Kong residents on this food waste infrastructure?

問題 15：政府會對廚餘轉廢為能做些什麼措施呢？厭氧分解器會在甚麼地區建立呢？政府怎樣獲得妥善準備好的廚餘給厭氧分解器呢？政府有沒有信心令香港市民是否支持這項廚餘基建？

Answer: _____

答案：_____

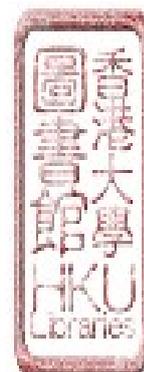
Question 16: Has the HKSAR Government formed any collaboration with the strategic partners on food waste, e.g. NGOs, catering business, etc.?

問題 16：香港政府有沒有與廚餘策略夥伴建立合作關係，例如非政府組織和飲食供應商等？

Answer: _____

答案：_____

Question 17: Will the District Recycling Stations handle food waste/food redistribution as well?



問題 17： 地區回收站會否也處理廚餘和食物重新分配？

Answer: _____

答案： _____

Education and publicity 教育及宣傳

Question 18: Do you think the current Food Waste campaign has been effective and successful? What is the next step? Can you explain the details of the community green stations stated in the Policy Address 2014 for environmental education purposes?

問題 18： 你覺得現時的廚餘相關的宣傳是否有效和成功呢？下一步是甚麼呢？你能否解釋施政報告 2014 提及的社區環保站在環保教育的細節？

Answer: _____

答案： _____

Question 19: What is the Government's strategy in community education, e.g. schools, general public (elderly, housewives, etc.) to encourage public participation in food waste reduction at source?

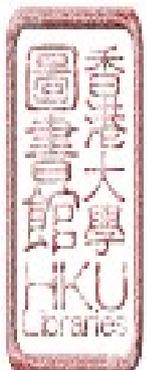
問題 19： 政府在鼓勵廚餘源頭減廢的公眾參與的社區教育策略是甚麼呢？例如學校，公眾如長者和家庭主婦等。

Answer: _____

答案： _____

Sustainable lifestyles 可持續發展生活方式

Question 20: What else can the HKSAR Government do in promoting a sustainable lifestyle on the topic of food waste?



問題 20： 香港政府在廚餘議題上鼓勵可持續發展生活方式可以有甚麼方法呢？

Answer: _____

答案： _____

Question 21: How would the Government change the consumerist behaviors of the Hong Kong residents to sustainable ones?

問題 21： 政府如何改變香港市民消費主義的生活模式到可持續發展的生活方式呢？

Answer: _____

答案： _____

Other comments 其他意見

Question 22: In your opinion, what would be the most effective ways to reduce food waste?

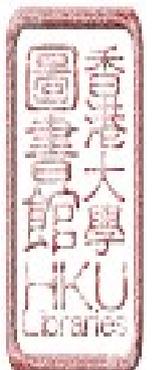
問題 22： 依你的意見，甚麼才是減少廚餘的最有效方法？

Answer: _____

答案： _____

- END (完) -

Thank you very much for your help! 很感謝你的幫忙！



Personal interview on Food Wise Hong Kong Campaign

Date: 06.03.2014

Time: 5pm to 6:15pm

Interviewee: Mr. Matthew Chan

Position: Environmental Protection Officer

Food waste in Hong Kong – a study on source reduction

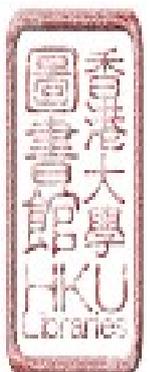
Background

Answer 1: The Environment Bureau has published “A food waste & yard waste plan for Hong Kong 2014-2022” in February 2014 to describe the organic waste treatment strategies stated in the Policy Address 2014. The four main components include food waste reduction at source, food donation, food waste collection & separation and food waste-to-energy. It is similar to general solid waste treatment strategies, which also emphasize 3Rs (reduce, reuse and recycle).

Answer 2: The government believes the 40% food waste reduction target is achievable. The main difficulties involve changing the personal dining habits and catering business operation system for food waste source reduction, developing food waste source separation habits and establishing food waste-to-energy facilities. The OWTF would involve technical difficulties, political issues and other challenges.

Law and regulations

Answer 3: A combination of food waste management measures is implemented simultaneously step-by-step. The most preferred option is education and publicity to promote voluntary food waste reduction at source with guidelines. Then, environmental policy can be implemented. Finally,



legislation can also be a choice to solve the food waste problem.

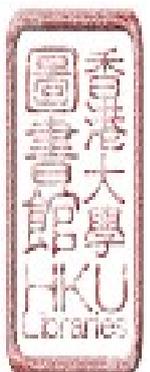
Answer 4: “A food waste & yard waste plan for Hong Kong 2014-2022” is already the environmental policy. It formulates the food waste management in Hong Kong for the coming 8 years. The food waste policy would change to suit the future needs. The government would also consider overseas cases like Taiwan, South Korea and European countries. However, the foreigners’ behavior is quite different from the Chinese.

Answer 5: Theoretically, mandatory garbage sorting is excellent. It highly promotes food waste source separation, which is critical to the effective food waste recycling. In reality, voluntary approach is recommended. When the source separation is already effective using voluntary measures, there is no need to change it to mandatory mode. Public discussion on whether it should be voluntary or mandatory is needed.

Environmental related taxes

Answer 6: Volume-based waste charging scheme should have positive effects on the behavioral change of individuals and companies. There are so many different kinds of buildings in Hong Kong. There are also challenges to enforce the law. The government believes that the challenges can be solved.

Answer 7: The polluter pays principle is actually implementing in the foodservice industry in Hong Kong. For example, there are sewage charges under the Sewage Services Ordinance for the catering companies. The proposed volume-based waste charging scheme also applies the



polluter pays principle. The more the individual pollutes, the higher cost he should pay. The fees should be able to cover the waste treatment cost.

Moral motives

Answer 8: The government thinks the Food Wise Hong Kong Campaign is successful. Most of the Hong Kong residents have heard about the “Don’t be a big waster” messages. They would think about changing their daily dining habits to save food. However, it takes time to obtain quantitative results.

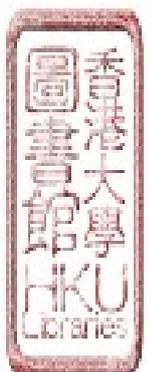
Ethical consumerism is promoted by encouraging simple life and environmentally friendly habits. When the environmental awareness is improved, the ethical consumerism is also enhanced.

Answer 9: The guideline is part of the food safety encouragement. The surplus food should be donated to avoid wastage. The government acts as a facilitator to remind the food donor, recipients and the NGO involved to ensure high level of food safety. If food safety cannot be ensured in the food donation process, the road to hell is paved with good intentions.

Answer 10: The government discourages buffets style serving, excessive number of courses and some kinds of food in official occasions. The guidelines are provided in the government internal circulars.

Social mobilization

Answer 11: The Steering Committee is responsible for all recyclables and recycling industry, which include food waste. At the current stage, it



would help the low value recyclable industry first like plastics and light bulbs and the recycling companies which faces lots of difficulties. The Food Wise Hong Kong Steering Committee would be mainly responsible for the food waste recycling.

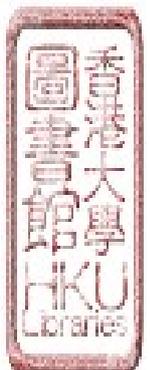
Answer 12: In the short-term, the \$1 billion Recycling Fund would mainly be allocated to the low value recyclable industry and the recycling companies which face severe hardship. There may be funding allocated to food waste management in the future.

Answer 13: Currently there is no execution plan on the Recycling Fund.

Answer 14: The Organic Waste Treatment Facilities (OWTF) establishment is monitored by the environmental impact assessment (EIA). The high environmental and operational standards are ensured by the EIA environmental acceptability and legal requirements. The OWTF operation will be monitored under the pollution control legislation like Water Pollution Control Ordinance (WPCO), Air Pollution Control Ordinance (APCO) and Noise Control Ordinance (NCO).

Answer 15: Hong Kong is a developed city, in which the energy demand is great. However, there is little agriculture, poultry and aquaculture in Hong Kong. The demand for compost and animal feed is thus small. So, the government tends to emphasize energy supply instead of other food waste products.

Anaerobic digestion is common method for food waste-to-energy. In other countries, some of the anaerobic digesters may add some oxygen to make it aerobic. In Northern Europe, they use incinerators to burn rubbish for energy. When there is incinerator, the volume of rubbish can be significantly reduced by 90%. It is very common to have



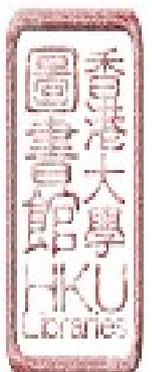
incineration facilities in other countries like Japan and Singapore. It would greatly extend the useful life of landfills. Hong Kong really needs incineration facilities.

There is public misconception on the building waste treatment facilities. The government would use scientific methods and facts to explain the needs. Hong Kong citizens should understand the consequences if there is insufficient waste treatment infrastructure. All the Hong Kong people should actively promote the food waste management activities.

District-based food waste collection centre will be built to prepare suitable food waste. A network of five to six OWTFs will be established. The first facility (OWTF1) will be located in Siu Ho Wan. The OWTF2 and OWTF3 will be set up in Sha Ling and Shek Kong respectively.

Answer 16: The government strongly agrees the collaboration among Hong Kong residents, foodservice companies, the government and NGOs. There is good cooperation among stakeholders on food waste issues in Hong Kong. However, we may not have the program name, which is not important. Food Wise Hong Kong Steering Committee is currently coordinating the catering companies, educational institutions, academic scholars, green groups, food recovery organizers and relevant parties. The community food waste management is promoted through District Councils. The government emphasizes organization and district cooperation.

Answer 17: At the current stage, the District Recycling Stations will not handle food waste/food redistribution. The food donation activities are

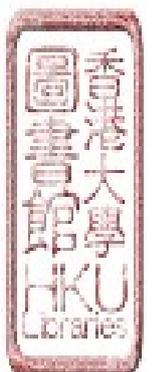


performed by food banks like Feeding Hong Kong and Food Grace.
The stations may handle food waste issues in the future.

Education and publicity

Answer 18: There are positive effects on the publicity activities. There is strong relationship between education and publicity. The government would continue the publicity efforts to promote food waste reduction at source. Besides, the stakeholders are invited to sign the Food Wise Charter. The signees would have commitment on the food waste source reduction. Food Wise Hong Kong Ambassador Scheme also recruits volunteers and provide training workshops to them. The Ambassadors are educated to minimize food waste and make good use of food resources. There are also supportive measures including website, seminars and workshops. Useful materials and information will be put on the Food Wise Hong Kong website.
The Community Green Stations will act as the environmental education centre and collect the recyclables. The recycling part would focus on the low value recyclable first. The recycling companies are not interested in the low value items like light bulb. The recyclables should be dry and clean.

Answer 19: The food waste reduction messages will be educated in schools and the community. The Hong Kong people are invited to participate and learn in food waste programs. The supportive measures will be provided to facilitate these activities.



Sustainable lifestyles

Answer 20: There are some basic principles on sustainable lifestyles on food issues.

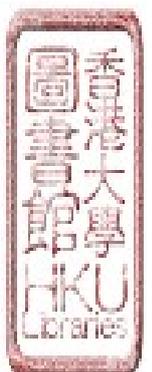
First, everyone should treasure food and minimize wastage. Starvation is severe in some of the developing countries. Second, some kind of food can be avoided. Why eat the tiger and bear's-paw? The biodiversity can be enhanced when we select proper kind of food. Finally, local food system should be adopted. When we eat food produced in nearby area, the food wastage in transportation, over production and carbon emission can be reduced. Chinese and Japanese apples are more preferred than American apple under this principle.

Answer 21: The government would encourage sustainable lifestyles for environmental protection. Many sustainable lifestyles publications have been published already. The government would practice what you preach so that the Hong Kong people would follow. The buffet style serving and excessive number of courses are discouraged.

Other comments

Answer 22: A combination of measures should be the most effective ways to reduce food waste. Food waste avoidance, food donation, food waste source separation and food waste-to-energy should be properly implemented.

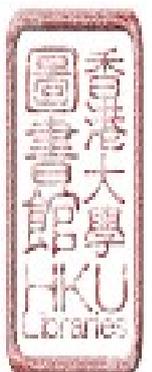
Mr. Matthew Chan shared his personal view on food waste management. The lowest level is sufficient OWTFs. There are always some food wastes due to contamination and decay. So, treatment is always needed. The next one is measures. They include economic, administrative and legal measures. Waste charging and good practice



guide are examples of economic and administrative measures
respectively. The highest level is environmental education. Everyone
should treasure food and avoid wastage.

- END -

Thank you very much for your help!



Appendix IV Research on NGO performance

Interview questionnaire on NGO officers

Date:

Time:

Interviewee:

Position:

Food waste in Hong Kong – a study on source reduction

《香港的廚餘 — 對源頭減廢的研究》

Background 背景

Question 1: Can you introduce the current programmes/initiatives supported by your organization on food waste management? The examples can be the environmental education and publicity activities, food waste recycling and food donation programs.

問題 1：你可以介紹現時機構實行的廚餘管理嗎？例如環境教育及宣傳活動，廚餘回收和食物捐贈活動等。

Answer: _____

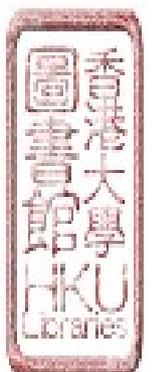
答案：_____

Question 2: Are you confident in achieving waste reduction target 40% stated in the Policy Address 2014? Do you have any comment on the Policy Address 2014?

問題 2：你是否有信心達到施政報告 2014 提及的減廢目標 40%？你對施政報告 2014 有沒有其他意見？

Answer: _____

答案：_____



Laws and regulations 法律與政策

Question 3: If the Government is going to implement “A food waste & yard waste plan for Hong Kong 2014-2022” to solve the food waste problem, what would be your opinion?

問題 3：如果政府將要執行《香港廚餘及園林廢物計劃 2014-2022》去解決廚餘問題，你有甚麼意見？

Answer: _____

答案：_____

Question 4: What are your opinion on using laws and regulations to facilitate food waste reduction? The example can be the waiver of legal liability on donations of food to charitable organizations by the Good Samaritan Food Donation Act in the United States.

問題 4：你對使用政策及法律去鼓勵廚餘減廢有甚麼意見？例如美國的《好撒馬利亞人食物捐贈法》可以免去捐贈食物的法律責任。

Answer: _____

答案：_____

Environmental related taxes 環境相關稅項

Question 5: What is your opinion on the volume-based waste charging scheme?

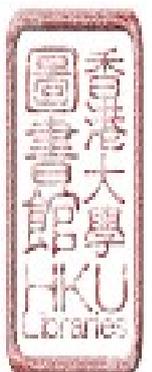
問題 5：你對都市固體廢物按量收費有甚麼意見？

Answer: _____

答案：_____

Question 6: How can the NGO promote the extended producer responsibility (EPR) to reduce the food waste generation in the catering business?

問題 6：非政府組織怎樣可以鼓勵生產者責任制去減少飲食供應商的廚餘量？



Answer: _____
答案： _____

Moral motives 道德動機

Question 7: How can the NGO promote right-size food purchase? What are your considerations? What is your opinion on the Food Wise Hong Kong Campaign?

問題 7：非政府組織怎樣鼓勵準確份量的食物購買？你有甚麼考慮？你對惜食香港運動有甚麼意見？

Answer: _____
答案： _____

Question 8: How can the food bank promote the food donations? What are your considerations?

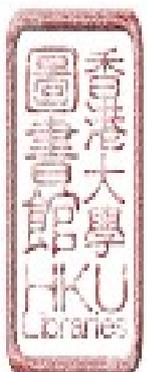
問題 8：食物銀行怎樣鼓勵食物捐贈？你有甚麼考慮？

Answer: _____
答案： _____

Social mobilization 社會動員

Question 9: What is the role of the NGO in enhancing the collaboration between the Government, foodservice companies, consumers and the NGOs to encourage public participation in food waste source reduction and recycling? Have you had any experience? If so, what was the experience?

問題 9：非政府組織對促進政府、食物供應商、消費者和非政府組織的合作，去鼓勵廚餘源頭減廢和回收的公眾參與的角色是甚麼？你有沒有某些經驗？如有，是甚麼經驗呢？



Answer: _____

答案： _____

Question 10: Would you offer environmental awards and certificates to foodservice companies to promote the effectiveness of food waste source reduction?

問題 10： 你會否對食物供應商提供環保獎項和證書去鼓勵有效廚餘源頭減廢？

Answer: _____

答案： _____

Question 11: Do you think the Steering Committee to Promote the Sustainable Development of the Recycling Industry is competent in food waste recycling? What is your comment on the \$1 billion Recycling Fund on food waste issues?

問題 11： 你覺得推動回收業可持續發展督導委員會能否處理好廚餘回收？你對 10 億元回收基金在廚餘方面有甚麼意見？

Answer: _____

答案： _____

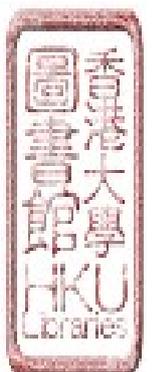
Education and publicity 教育及宣傳

Question 12: How can the NGOs promote environmental education in primary and secondary schools to strengthen their environmental knowledge and awareness on food waste?

問題 12： 非政府組織怎麼在中小學鼓勵環境教育以增強他們對廚餘的環境知識和意識？

Answer: _____

答案： _____



Question 13: The Policy Address 2014 states that the HKSAR Government will set up community green stations for environmental education and to be operated by NGOs. What is your opinion?

問題 13： 施政報告 2014 提及香港政府將會建立社區環保站以推動環保教育，並將交由非政府組織營運，你有甚麼意見？

Answer: _____

答案： _____

Sustainable lifestyles 可持續發展生活方式

Question 14: How can the NGOs promote sustainable lifestyles in the Hong Kong community to replace consumerist ones?

問題 14： 非政府組織怎樣在香港社區鼓勵可持續發展生活方式以代替消費主義生活方式？

Answer: _____

答案： _____

Question 15: Do you provide sustainable lifestyles practical tips to the Hong Kong residents? Any successful initiatives that achieved behavior change?

問題 15： 你會否對香港居民提供可持續發展生活方式具體方法？有沒有成功措施已造成行為轉變？

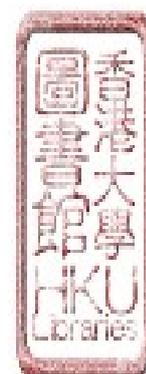
Answer: _____

答案： _____

Other comments 其他意見

Question 16: In your opinion, what would be the most effective ways to reduce food waste?

問題 16： 依你的意見，甚麼才是減少廚餘的最有效方法？

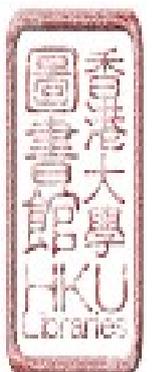


Answer:

答案：

- END (完) -

Thank you very much for your help! 很感謝你的幫忙！



Personal interview on Greeners Action green group

Date: 17.02.2014

Time: 2pm to 3pm

Interviewee: Ms. Kwok Ying Ying

Position: Senior Project Officer

Food waste in Hong Kong – a study on source reduction

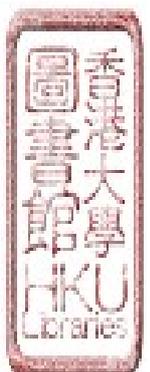
Background

Answer 1: Greeners Action has initiated the “Save Food Day” on every Wednesday. The price will be cheaper by \$1 when the customers request less rice. They also cooperate with the EPD in the Food Waste Recycling Partnership Scheme to promote food waste recycling in the C&I sector. It has implemented the Food Waste Reduction Program in Kwun Tong, Tsuen Wan and Tuen Mun to promote food waste reduction at source. In schools, they established the Bokashi system and food waste buckets for recycling. In housing estates, they implemented the Siu Lun Court Bokashi food waste recycling program. They enthusiastically participate in food waste source reduction and recycling activities.

Answer 2: They welcome this great waste reduction objective and believe it is achievable with suitable timetable. The \$1 billion Recycling Fund and community green station in the Policy Address 2014 are good measures. The environmental performance may not be obvious within two years because Hong Kong lag behind for about 10 years.

Laws and regulations

Answer 3: Simply relying on Food Wise Hong Kong Campaign and Siu Ho Wan OWTF is insufficient. They believe multiple methods should be used



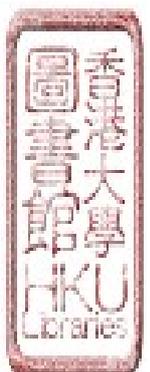
to solve the food waste problem. Food waste audit, policy and law, government subsidy, green procurement, waste charging and other relevant methods should be used together.

Answer 4: Yes. Appropriate laws and regulations should be well-established in the Hong Kong community. Food donation ordinance should be developed. Landfill ban on food waste should also be set up in the future.

Environmental related taxes

Answer 5: They initiated the pilot waste charging scheme for 1 month in a housing estate. The participation rate is up to 90%. Trash bag of 5L and 10L are provided to each family which is similar to the Taiwan practices. They do not recommend the sharing of the trash fee for the whole building or estate, which lacks financial incentives. The waste volume is reduced by 12% to 30% and the recycling rate has improved. They do not expect large-scale of fly-tipping under the scheme as long as sufficient education and publicity activities are provided to Hong Kong residents. The volume-based waste charging scheme is feasible and useful.

Answer 6: The green groups actually have little authority to influence the decision-making of the catering business. They can create social pressure and media concern on the food wastage issues. The most suitable method should be the government environmental policy for the foodservice companies to follow.

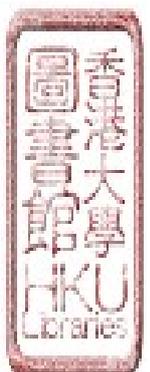


Moral motives

- Answer 7: Right-size food purchase is the ideal situation but difficult to implement. “No leftover program”, Save Food Diners instant win, food waste reduction tips, less rice cheaper by \$1 activities and food waste audits can enhance right-size food purchase. The C&I sector may not be willing to participate in the food waste reduction activities because of severe competition in the catering industry, minimum wage requirements, etc. Simply the education and publicity activities in Food Wise Hong Kong Campaign are insufficient. Suitable food waste policies should be formulated to solve the problem.
- Answer 8: They have food donation programs in Wong Tai Sin and Cheung Sha Wan to collect remaining food in the market. The food is then given to the poor without assets test.

Social mobilization

- Answer 9: They agree effective collaboration among the stakeholders can provide synergy to the food waste reduction and recycling efforts. Greeners Action has conducted the Food Waste Reduction Program. The green group is responsible for social mobilization in publicity activities. The government can finance the program. The foodservice suppliers can implement the food waste source reduction and recycling activities. The Hong Kong residents can actively join the program. The stakeholders are well-coordinated in this program.
- Answer 10: Some of the restaurants like the environmental awards provided by the green group. Greeners Action would also provide certificates to them as an incentive when they request. It can be a good promotion for the



restaurant for ethical consumption.

Answer 11: The Steering Committee may not put much effort on food waste recycling. It would rather focus on other areas like plastic recycling and helping the recycling companies. They would apply the Recycling Fund as usual, which is similar to the ECF and a portion may be allocated to food waste issues. There are too much rules and regulations on the use of the funding, which discourage the environmental activities of the front-line staff.

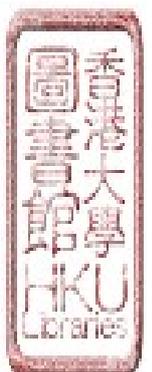
Education and publicity

Answer 12: The green group has limited resources to promote environmental education in schools. It would be the most effective for the HKSAR Government Education Bureau to take the lead to promote food waste knowledge and awareness in the formal curriculum. The current environmental knowledge of Hong Kong students is weak. Merely relying on the HKDSE Liberal Studies module “Science, Technology and the Environment” is inadequate.

Answer 13: They welcome the community green stations, which is their strength on the community publicity. As long as there is sufficient funding, they can employ more staff to cope with the increased workload. Recycling and separation activities can also be included in the community green stations. Each station should be adjusted to suit the local district requirements.

Sustainable lifestyles

Answer 14: They think most of the Hong Kong residents understand the



sustainable lifestyles but they may not have concrete actions.

Appropriate financial incentives can be allocated to motivate them to live in an environmental friendly way.

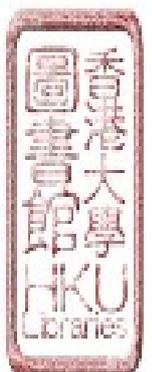
Answer 15: They would offer environmental seminars and publicity activities to promote waste reduction messages. They doubt whether it is necessary to make everything new in the Chinese New Year and throw away lots of usable clothes. The successful example can be the “Environmental Levy on Plastic Shopping Bags”, which has successfully changed their habits to use environmental bags instead of plastic bag.

Other comments

Answer 16: The most effective methods should be landfill disposal bans on food waste, volume-based waste charging scheme and other relevant environmental policies.

- END -

Thank you very much for your help!



Personal interview on Food Grace food bank

Date: 12.02.2014

Time: 3pm to 4pm

Interviewee: Mr. Allen Yuen

Position: Project Coordination Officer

Food waste in Hong Kong – a study on source reduction

Background

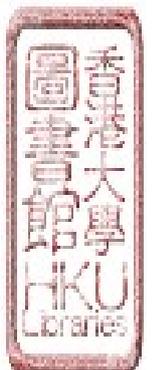
Answer 1: Food Grace is the 1st food bank in Hong Kong to collect edible and avoidable food. They aim at alleviating the landfill pressure and helping the poor in the community. Vegetables and fruits are collected from the wet markets. Education and publicity activities are also conducted to work with the food donation programs.

Answer 2: They are not sure whether the HKSAR Government can achieve the waste reduction target 40%. However, they think that the government is determined to solve the MSW problem in Hong Kong.

Laws and regulations

Answer 3: The prosperity of the recycling industry is the critical factor to the success of waste reduction. Appropriate environmental policies and laws should be formulated to work with “A food waste & yard waste plan for Hong Kong 2014-2022”.

Answer 4: Hong Kong lacks suitable environmental policies and laws on food waste issues. The management of foodservice companies fears of the legal liability on food donation. They do not want to take risk to donate food. So, it is good to formulate appropriate laws and regulations like the Good Samaritan Food Donation Act to promote food donation.



Environmental related taxes

Answer 5: They strongly agree the volume-based waste charging scheme. They recommend the scheme should be performed per household instead of per estate or per building. The financial burden to low-income families is great. So, fee exemption can be granted to those whose waste generation is really low.

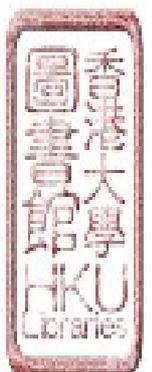
Answer 6: It is difficult for NGO to promote EPR in the catering business. The only thing they can do is to cooperate with the catering companies and encourage them to adopt EPR. Appropriate environmental policies should be formulated to provide penalty on the foodservice suppliers whose food waste volume exceeds certain level.

Moral motives

Answer 7: Right-size food purchase varies among different Hong Kong people. The foodservice suppliers tend to persuade customers to purchase more food for higher profit. Food Grace promotes the message that the consumers should be smart enough to understand their actual need instead of being influenced by the commercial advertisement and promotion.

Food Wise Hong Kong Campaign only remains on education and publicity level. They did not provide sufficient incentive to Hong Kong residents for food waste source reduction.

Answer 8: First, they have agreements with the catering companies. Food safety is emphasized to encourage them to cooperate. Second, they receive less individual food donation because the costs could be higher and the food may not be in an orderly manner.

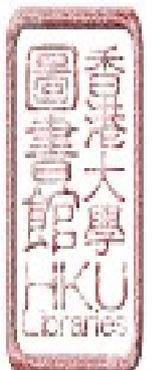


Social mobilization

- Answer 9: Their role is community support and coordination on the stakeholders. They mobilize the customers and foodservice suppliers to facilitate the food donation and consumer education. They act as a bridge among the community, business sector and the government.
- Answer 10: They would offer environmental awards to the food donors through marketing and fund raising activities. These environmental certificates can help promote ethical consumption to the public.
- Answer 11: They attended the meeting of the Steering Committee. There are no concrete measures on the recycling activities and food waste is only a part of them. There is an opportunity for the industrialization of recycling industry, which can contribute to the GDP in the future. The \$1 billion Recycling Fund is excellent to them because they experienced limited funding in the past 4 years.

Education and publicity

- Answer 12: They would emphasize the meaning of food to the students. There is little agriculture and poultry in Hong Kong. The students may not understand how difficult to obtain food. The food production process and the food crisis in poor countries should also be taught in schools.
- Answer 13: They welcome the community green stations. “Big market, small government” philosophy should be supported. They think the green groups are more proficient in environmental education and publicity because they have established good community network.



Sustainable lifestyles

Answer 14: They published the book “Sheng Shi” by Ms. Xiaolei Chen to disclose the food wastage situation to the public. In the capitalist society, the corporate sales strategies promote consumerist lifestyles and generate lots of unnecessary wastes. The companies discard lots of edible food with the fear of food poisoning without disposal costs. They have initiated discussion and try to replace the consumerism step-by-step by sustainable development.

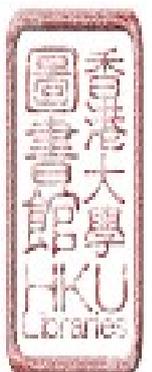
Answer 15: Food recycling trip, eco-enzyme workshops, using compost for growing vegetables, seminars on sustainable consumption patterns, discouraging buffets and no leftover concepts are organized by Food Grace to provide practical tips on sustainable lifestyles to Hong Kong people.

Other comments

Answer 16: Volume-based waste charging scheme should be implemented to provide adequate financial incentives to the realistic Hong Kong people.

- END -

Thank you very much for your help!



**Personal interview on Tin Shui Wai Community Development Network
(TSWCDN)**

Date: 07.02.2014

Time: 3pm to 4pm

Interviewee: Ms. Chung Yuen Yi Position: Chairman

Food waste in Hong Kong – a study on source reduction

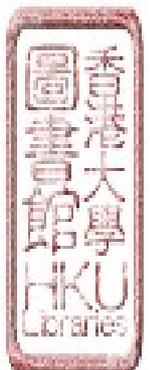
Background

Answer 1: TSWCDN has started the food donation programs in wet markets to collect the vegetables and fruits. They have invited volunteers to support the food donation process. The food collected are mainly unsold items and without perfect appearance. They will give the food to the elderly and single parent families. Environmental education and publicity will also be conducted in the community.

Answer 2: They think that the waste reduction target 40% is nearly impossible. The green groups should cooperate with the HKSAR Government for waste reduction. However, it seems that the government is unable to handle the environmental problem but merely provide funding. The approach that the government cannot handle the situation but order the NGOs to cope with it is not good.

Laws and regulations

Answer 3: The food waste plan seems insufficient by merely providing some directions on waste issues. The government should handle the situation by themselves instead of outsourcing and relying on the NGOs. Effective coordination among stakeholders should be strengthened like the situation in Taiwan.



Answer 4: The government should be stricter on environmental policies and laws to implement EPR on the foodservice companies. In the capitalist market, the catering companies focus on maximizing the profit instead of the actual food need. Lots of food waste is generated in the commercial operation with excess procurement and unsmooth business operation. The greed is the root of the food waste problem. There should be adequate penalty on the foodservice suppliers who produce unreasonably high amount of food waste.

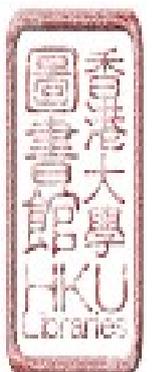
Environmental related taxes

Answer 5: The waste charging scheme is a good measure. The government should strongly emphasize EPR in the commercial sector like the practices in Japan.

Answer 6: It is very difficult for the NGO to promote EPR to the business sectors. Besides, they think it is unreasonable for the NGO to bear this responsibility. The only thing that green groups can do is to disclose the food wastage situation to the public. Media concerns and social pressure may force the catering companies to take the EPR. The HKSAR government should take the lead to enforce the EPR instead.

Moral motives

Answer 7: They can educate the local residents to buy what they actually need instead of driven by the marketing strategies of the supermarkets. However, they have little influence on the business operation like the excessive procurement of the wholesalers. Food Wise Hong Kong Campaign focuses on the Hong Kong residents



instead of the foodservice suppliers. They admit that Hong Kong citizens should change their food purchase habits. However, the government did not disclose the greed of the C&I sector. No concrete action is taken on the unethical operational and marketing activities of the catering business. For example, restriction on buffets can be provided to minimize food wastage.

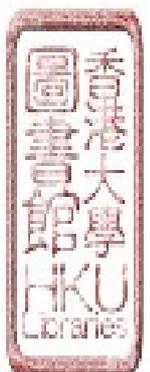
Answer 8: The food bank may not only focus on canned food. They should also provide other choices of food. The social security system is insufficient in Hong Kong. Merely relying on the Comprehensive Social Security Assistance (CSSA) and Statutory Minimum Wage (SMW) to help the low-income families may not be good. So, the food donation from food banks may help the grassroots.

Social mobilization

Answer 9: TSWCDN mainly perform the work by themselves. They simply cooperate with the community neighbors and some food shops.

Answer 10: Small gifts will be given to the food donors in wet market as appreciation.

Answer 11: They are not confident on the Steering Committee on dealing with food waste recycling. The agriculture and poultry industry in Hong Kong is weak. The market of food waste product is not prosperous. Recycling industry should also be developed instead of simply developing finance and property market.



Education and publicity

Answer 12: Ms. Chung grows up from the rural village. She has extensive experience on growing vegetables and raising chicken. Hong Kong students lose the feeling and relationship with the nature. Primary school students only understand the vegetables are from supermarkets. Merely having environmental knowledge is insufficient. Students should have personal experience on agriculture and poultry instead. The government should develop some agriculture and poultry in this highly commercialized city.

Answer 13: The HKSAR Government should take up the environmental responsibility by themselves instead of relying on the green groups in the community green stations.

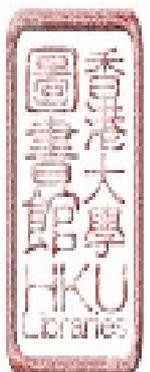
Sustainable lifestyles

Answer 14: Tin Shui Wai district has relatively fewer rubbish. The residents are poor so they generate less waste and use every part of the food. She thinks the Hong Kong society is encouraging unethical behaviors to maximize profits. Dependable manpower is ridiculously discouraged. The sustainable lifestyles can be found in the Tin Shui Wai community.

Answer 15: The greed in the capitalist society should be removed from the mindset. Then, the sustainable lifestyles will be reflected in their behavior.

Other comments

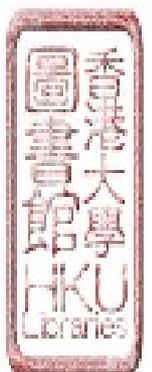
Answer 16: The greed should be removed from the mindset of the businessmen. Besides, the Hong Kong residents should be smart enough and not easily influenced by the marketing strategies of the foodservice



companies. They should make correct food purchase decisions.

- END -

Thank you very much for your help!



**Personal interview on Hong Kong Federation of Restaurants and Related Trades
(HKFORT)**

Date: 28.03.2014

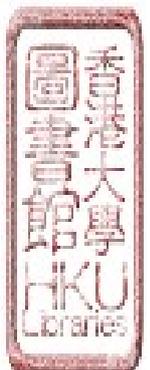
Time: 3pm to 4:30pm

Interviewee: Mr. Wong Ka Wo, Simon Position: Chairman

Food waste in Hong Kong – a study on source reduction

Background

Answer 1: The Hong Kong Federation of Restaurants and Related Trades (HKFORT) has been committed to food waste reduction at source for over 10 years. They cooperate with the foodservice companies and government to organize environmental education and publicity activities. The food waste problem is serious in Hong Kong, in which the C&I sector contributes to around 1,000 tonnes daily. He thinks that Hong Kong people have consumerist lifestyles. When the Hong Kong citizens have high income, they consume the resources without considering the negative environmental impacts. Besides, the Government did not seriously promote environmental protection. There have been inadequate resources on environmental education. The activities are usually in small-scale. The pre-consumer food waste is relatively small. The food price is very high. There is a little food waste generated when the chef care about the appearance of the cuisine. The main part is the post-consumer food waste. The selfishness of the Hong Kong residents is the main reason of food waste problem. For example, there are about 2,300 Chinese restaurants in Hong Kong and around 8,000 Chinese banquet tables respectively. The annual number of Chinese banquet tables amounted to 3,000,000. In each banquet,

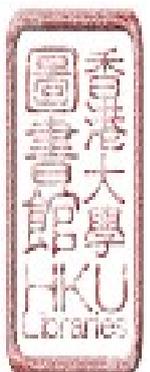


around 30% of the food is wasted. They are currently promoting six course banquets in Hong Kong. They recommend high quality dining instead of excessive amount. It is also unnecessary to serve excessive food in order to save face. Moreover, the timing of banquet is also important. For instance, some banquets start late at 9:30p.m. However, the elderly usually sleep at 10pm. Some guests also need to leave early. So, it generates lots of food waste. If the banquet can starts at 7pm, it can help minimize food waste.

Answer 2: It is difficult to achieve the food waste reduction target at 40% by 2022. The Government should provide a combination of measures to greatly promote food waste reduction at source. Social mobilization and environmental education should be promoted. Hong Kong consumers should have right-size food purchase. The foodservice suppliers should manage the food well. The Government should take the lead in food waste management. There should be sufficient environmental measures and infrastructure to provide adequate food waste treatment capacity.

Laws and regulations

Answer 3: They responded to the Government on the food waste policies. There are around 16,000 restaurants in Hong Kong, in which around 7,000 of them are Eastern and Western restaurants and around 2,000 of them are fast food restaurants. They have no space to do the food waste source separation and put the leftover recycle bins. They recommend that food waste process centers should be established in all 18 districts in Hong Kong. Each district should have around six centers. The food waste treatment capacity of OWTF in Siu Ho Wan and Sha Ling is



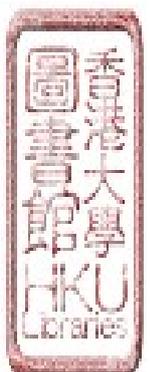
insufficient. The environmental responsibility should be fairly and equally shared in all districts. The Government should seriously and enthusiastically implement the environmental policies. The incinerator can be built in Hong Kong. Revolving restaurants, swimming pool and community facilities can be set up with the incinerator. The incineration technology is advanced and safe enough to minimize the air pollution effects.

Answer 4: They strongly appreciate the implementation of laws and regulations to facilitate food waste reduction. They have conducted the food recovery programs to help the low-income families. However, the staff from the Food and Environmental Hygiene Department stopped the food donation program because the food safety cannot be guaranteed. So, if there is Good Samaritan Food Donation Ordinance in Hong Kong, it is definitely a good measure to promote food donation.

Environmental related taxes

Answer 5: They generally support the volume-based waste charging scheme like Taiwan and Japan. The measurement should be by weight. It cannot be measured by company area size because when the food waste arrives at the OWTF, the treatment cost is related to the weight but not the company size. The charging scheme implementation should starts from household but not the C&I sector.

Answer 6: The food waste is mainly generated by customer decisions but not the restaurants. Some restaurants may persuade the consumers to order more food to boost sales. However, it is not recommended. The restaurants can provide user-friendly takeaway services to minimize



food waste. Actually, everyone is polluter but not simply the restaurants. It should be fair enough to identify the true polluters to implement the EPR.

Moral motives

Answer 7: Right-size food purchase is not easy. The cuisine can be prepared in smaller portion. If it is not enough, we can order more. The customers should think carefully about how much they should order.

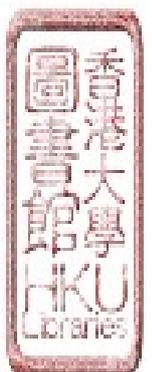
Three-course banquet can also be launched. Western style serving is easier to obtain right-size food purchase. The Chinese food can be served in western style to minimize food wastage.

The Hong Kong residents, foodservice companies, the Government and NGOs should cooperate together to support the Food Wise Hong Kong Campaign. They have participated the Food for Good to serve the disadvantaged and needy with food donation.

Answer 8: He takes bakery as an example. When there is remaining bread, reduce the price first. When there is still remaining bread after discount, the bread should be donated to food bank. The purpose of making bread is not for food donation, but for business operation and profit. The most preferred option is thus preventing excessive food production. The next preferred option is then food donation.

Social mobilization

Answer 9: The members of HKFORT have joined the food donation programs of Food Angel and Food for Good. They also organize seminars and site visits on food waste management. Over 90% of the restaurants are



SMEs. Environmental protection can be cost saving by better food utilization. They also organized the publicity activities in Hollywood Plaza with celebrity chef and members of Legislative Council.

Answer 10: They do not take environmental awards as incentives. Financial subsidy from the Government is much more preferred.

Answer 11: The Steering Committee should support the recycling companies and NGOs in a fair manner. They think it can improve the recycling activities and environmental education. The \$1 billion Recycling Fund should be allocated effectively. It can help lots of organizations to improve food waste management.

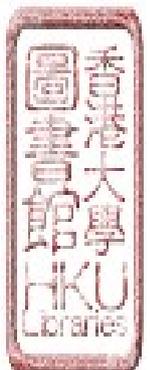
Education and publicity

Answer 12: They mainly concern about the catering industry. They seldom have environmental education in schools.

Answer 13: They mainly focus on the catering industry with corporate social responsibility. They appreciate the establishment of community green stations and are willing to participate the environmental education activities.

Sustainable lifestyles

Answer 14: They think the HKFORT has the responsibility to provide environmental education and publicity to the customers. The catering business cannot simply focus on profit maximization. When the landfill is full, it is a crisis to everyone. The catering industry should persuade the customers to have right-size food purchase and environmental awareness.



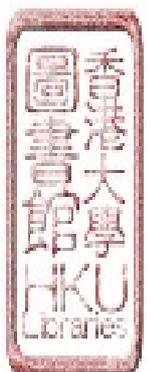
Answer 15: They have environmental publicity in posters and websites to promote food waste reduction at source. Less rice cheaper by \$1 and six-course banquets are promoted. The environmental awareness of the management of catering companies has been improved. They participate in the environmental activities in social enterprises. The Government should support the catering business to help educate the Hong Kong residents not to waste food. Merely penalizing the catering companies is not preferred.

Other comments

Answer 16: The best option is environmental education on food waste reduction at source. Source reduction is the most preferred option in food waste management.

- END -

Thank you very much for your help!



Site visit on Food for Thought Sharing program

Date: 07.02.2014

Time: 7pm to 9:30pm

Venue: Chung Fu (Modern) market **Organizer:** TSWCDN

1. This is the head office of the Tin Shui Wai Community Development Network, where the food donation process is carried out. The address is Room 12, G/F, Yuet Kwai House, Tin Yuet Estate, Tin Shui Wai.



Figure 89: TSWCDN head office

Source: author

2. The volunteer is walking around the Tin Shui Wai Chung Fu (Modern) market with her trolley to look for food donors.



Figure 90: Walking around the market

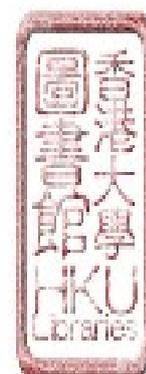
Source: author

3. The unsold vegetables are then donated from the shops in the wet markets. The food is properly put in the basket.



Figure 91: Collecting donated food

Source: author



4. The donated food is transferred back to the head office for further processing.



Figure 92: Going back to head office
Source: author

5. The donated food is weighed to measure the amount of food collected.



Figure 93: Weighing the donated food
Source: author

6. The amount of donated food is then properly recorded.

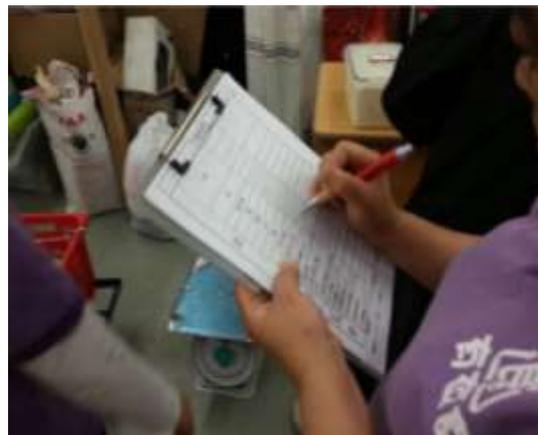
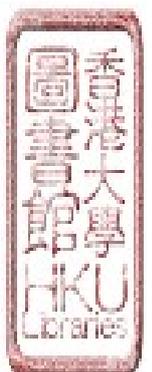


Figure 94: Recording the food amount
Source: author



7. The volunteers separate the donated food properly. Food safety is highly emphasized in the Food for Thought sharing program. The rotted food will be screened out and thrown away.



Figure 95: Classifying the donated food
Source: author

8. The fresh food are well-separated by environmental bags so that the Tin Shui Wai residents can take them away easily.

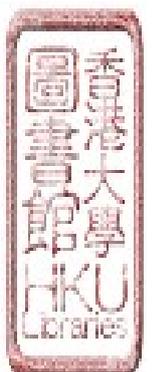


Figure 96: Packing the food with environmental bags
Source: author

9. The volunteer is cultivating friendship with the local residents to build trust and relationship. She develops effective communication with them to update the news of the centre.



Figure 97: Cultivating friendship
Source: author



10. The donated food also includes cooked items like unsold bread and desserts.



Figure 98: Donated bread
Source: author

11. The Tin Shui Wai residents are queuing up and receiving their food one by one.



Figure 99: Receiving donated food
Source: author

12. After they packed their received food well, they will leave the centre and come back later.

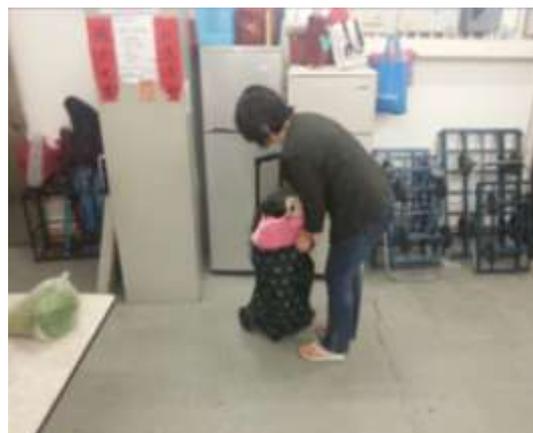


Figure 100: Preparing to leave the centre
Source: author

– END –

Thank you very much for your help!

