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Cambodian Youth Perspectives

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Chapter 13 | A Feasible Action Plan for Phnom Penh's Food Waste

Ty Keithya OUNG

Future Scenario

Several years into a radical reform of the government's food waste management policies and programs, the city of Phnom Penh enjoys a new norm of sustainability in managing its organic and food waste. For the general public, managing organic waste has become a habit rather than an obligation. For the food service industry efficiency is prioritized, limiting food waste through investing in technology and creativity, such as mobile apps that link producers with oversupply to consumers looking for food. Food waste is being sustainably managed and collected by a qualified private agency with frequent oversight by the city government for safety and quality control. The collected food waste becomes a useful commodity for Cambodia's agricultural sector in the form of compost to use as natural fertilizer.

The separation of waste has become mandatory in Phnom Penh. For residents and businesses, each unit is required to have three bins: a trash bin for general non-recyclable waste, a recycling bin for all the recyclable waste, and a compost bin for organic, food, and waste from the kitchen. The waste collection service imposes fees based on the volume of waste; the rate for trash collection is much higher than for recycling and composting bins. This differentiated rate structure proves to be effective in changing behaviors, incentivizing people to do more recycling and composting. Fines and penalties are also put in place for residents and businesses who fail to properly segregate their waste.

Waste collection service remains a public-private partnership. However, the assessment on the performance of the companies in charge has been rigorously monitored by an independent auditing body in order to assure the quality of the service provided. Likewise, recycling and composting has been commercialized into large-scale operations. The same company who is in charge of waste collection also manages recycling and composting duties through processing the collected waste at separating centers. This sole management not only provides a sense of full ownership and accountability but also limits unnecessary administrative and transactional fees and processes, hence proving to be efficient and effective. However, the assessment of the entire process is meticulous and the contract can be revoked through any breach or failure to provide quality services.

The emergence of recycling and composting centers creates thousands of jobs mainly at the outskirts of the city, where these centers are located. These jobs provide opportunities for both skilled and unskilled labor to cover both technical and labor-intensive aspects of recycling and composting. Composting becomes a major success story for the country's agriculture sector as the natural fertilizer is demonstrated to be healthier for soil and propels the growth of organic produce throughout the country.

For food service industries such as restaurants and groceries stores, technology and creativity have created opportunities for many start-ups to help businesses to solve their issues with waste such as limiting overproduction as well as leftover and unsold food. For instance, one start-up has created a mobile app to connect stores with excess food to consumers looking for unsold food or food that is beyond the best-before date at discounted prices. Most restaurants are connected to a food app that notifies consumers when restaurants offer meal discounts an hour before closing instead of turning their leftovers into food waste. Another app connects food donors to charities for a minimal fee. Community and charity organizations have established food banks offering free food for the homeless and those who are in need of food with donations of leftover or unsold food from the food service industry.

Through these policies and programs, Phnom Penh has annually diverted more than 50% of its waste into recyclable products and compost and most importantly, cut down on a dramatic amount of waste previously going into landfill and incineration. The immense reduction in food waste in Phnom Penh has set an example for other cities, municipalities and provinces in Cambodia to adopt and implement similar policies. This snowball effect of sustainable waste management has grown into a nationwide achievement, helping Cambodia to meet its target of reducing its greenhouse gas emissions in line with the Paris Agreement. Achieving high efficiency in food usage and management, Cambodia has managed to save an extensive amount of energy lost through food waste and hundreds of thousands of tons worth of carbon dioxide previously emitted into the atmosphere. This has become Cambodia's success story, making the country an unpredicted champion of sustainability and attracting more sustainable investment for its economy. In addition, this has gained Cambodia regional recognition, inspiring fellow developing countries to replicate this model.

Introduction

Food waste is a global issue. According to a report by the UN Food and Agriculture Organization (FAO) in 2011, 1.3 billion tons of food are wasted each year; equivalent to one-third of world food production (Gustavsson et al., 2011, p.56). At the same time, more than 820 million people do not have enough to eat (FAO, 2019). Food losses and waste from households and retail, catering and manufacturing industries amounts to roughly US\$ 680 billion in industrialized countries and US\$ 310 billion in developing countries, for a total of around US\$ 1 trillion lost (Fox and Fimeche, 2013; Gustavsson et al., 2011). In addition to these social and economic losses, food waste plays a tremendous role in contributing to the effects of climate change. Food production is responsible for 26% of global greenhouse gas emissions, through supply chain (18%), livestock and fisheries (31%), crop production (27%), land use (24%) (Poore and Nemecek, 2018, pp.987-992). Furthermore, food losses and waste accounts for 6% of total global emissions. Food waste is sent to landfills, where it degrades in anaerobic conditions to release methane as a potent greenhouse gas (Ghani et al., 2013). Landfilled food waste can produce methane gas that results in 21 times greater impact on global warming than carbon dioxide (EPA, 2021).

These global indicators are reflected at the national level in Cambodia. In developing countries like Cambodia, landfill is the most common waste-management strategy due to its simple application, cost effectiveness, and accommodation of varied types of waste and available land.

However, landfill operations are neither sanitary nor environmentally safe as they are done with no or irregular soil cover, no leachate treatment facility, no landfill gas-capturing facility, and hundreds of waste scavengers on the sites (World Bank, 2004; Talyan et al., 2008; Zhen-shan et al., 2009; Manaf et al., 2009). Organic waste is the main cause of public health risk and environmental impact through transmission of diseases, emission of greenhouse gases, soil pollution, and contamination of surface and groundwater (Seng et al., 2013, p.216).

This paper will provide an overview of the issue of food losses and food/organic waste in the city of Phnom Penh and propose a set of focused, actionable plans to tackle this issue. First, the paper will briefly present the overview of the current practices of municipal solid waste management in the city. Second, success stories in managing food will be presented along with an introduction to existing policy recommendations on this issue. Third, the research will examine and underline key limitations in the current management of food waste in Phnom Penh and its associated policy framework. Finally, the author will present policy solutions with key action plans to reduce food waste while improving the current management of food losses and waste in the city of Phnom Penh.

Context Analysis

Waste Management in Phnom Penh

Phnom Penh, the capital city of Cambodia, has seen rapid economic growth and urbanization. This growth has resulted in a change in lifestyle of the urban population, mainly an increase in consumption, which in turn has given rise to a rapid increase in waste generation. With regards to waste composition in Phnom Penh, kitchen waste makes up the largest portion at 51.9% (See Figure 1) (Seng, 2015). Categorized by sources (see Figure 2), municipal solid waste in Phnom Penh is generated by: household (55%), hotels/guesthouses (17%), restaurants (14%), markets (8%), shops (5%), offices (1%) (Seng, 2015). In terms of volume, Phnom Penh generates around 4.09 million t/year with a per-capita rate of 0.73 kg/day (EuroCham Cambodia, 2019, p.1).

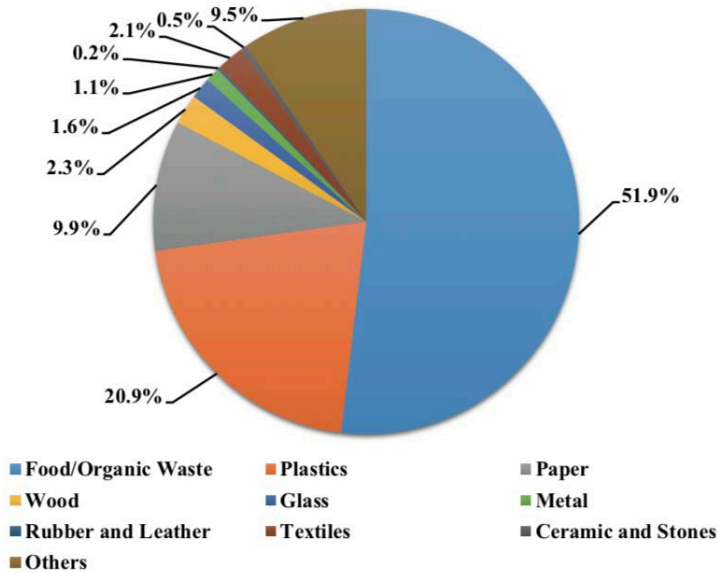


Figure 1. Waste Composition in Phnom Penh
Source: Seng, 2015

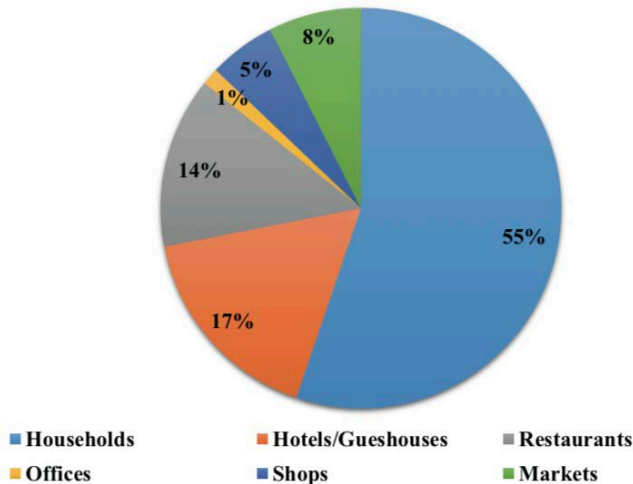


Figure 2. Municipal Solid Waste in Phnom Penh by source
Source: Seng, 2015

Until 1994, Phnom Penh’s municipal solid waste management (MSWM) was the responsibility of the Department of Public Works and Transport of the Municipality of Phnom Penh (MPP) (Seng et al., 2011). However, due to the city’s rapid population growth and subsequent growth of waste generated, MPP outsourced its MSWM to private contractors. CINTRI Co., Ltd. has been responsible for waste management in the capital since 2002, with an exclusive agreement for a term of 49 years, giving the operator major responsibilities to provide garbage collection services

(Singh et al., 2020, p.9). In 2019, the license of Cintri was been revoked by the government due to series of public complaints regarding its poor collection service (Nhim, 2019; Tran et al., 2020; Hutt, 2020). Three companies: GAEA Public Limited, Mizuda Group Co, Ltd. and CINTRI (Cambodia/Everbright (China) have now been granted rights to collect and transport garbage in Phnom Penh. The three will share and divide their duties among 14 districts in the city and have commenced their operations since July 2021 (Chea, 2021).

Landfill is the leading waste disposal option of MPP. Phnom Penh relies almost entirely on the Dangkor landfill site for the final treatment and disposal of MSW generated within the jurisdiction (Phnom Penh Capital Administration (PPCA) et al., 2018, p.19). The landfill, developed with the assistance of Japan International Cooperation Agency (JICA), started operating in July 2009 following the closure of its predecessor, Stueng Mean Chey landfill site, which had reached capacity (PPCA et al., 2018, p.19). However, landfills have many negative impacts such as gas emissions consisting mainly of nitrous oxide (N₂O) which has a global-warming potential 310 times higher than CO₂, and lasts in the atmosphere for around 120 years (IPCC, 1995). It is also important to mention the social impacts associated with landfill sites. Typically, there are communities of waste pickers and scavengers residing at the landfill operations. At the Stueng Mean Chey landfill site, there were about 2000 workers including 600 children, sifting through 700 tons of garbage a day (Bryne, 2009). These waste scavengers face high rates of serious diseases such hepatitis, tuberculosis and even HIV/AIDS due to possible wounds from sharp-edged metals and broken glass (Bryne, 2009).

The majority of the city's waste is dumped in the landfill and the small fraction that is recycled is done by 3,000 informal waste collectors roaming the streets of Phnom Penh gathering recyclable materials (EuroCham Cambodia, 2019). There is limited data on recycling in Cambodia because a large quantity of collected waste is being transported to Thailand and Vietnam due to the lack of domestic recycling infrastructure and facilities (EuroCham Cambodia, 2019). In 2003, the total volume of waste recycled was found to be about 9.3% of the total waste generated, of which 40.3% and 20.9% was paper and metals respectively, whereas only 1.6% (around 0.15% of the total waste generated) was food waste (JICA, 2005). The very low levels of recycling of food waste is probably due to the low-cost recovery of end products, landfill availability, difficulty of waste separation, and/or scarcity of technology and human resources (Seng et al., 2011).

Key Challenges for Waste Management in Phnom Penh

Numerous studies have addressed weaknesses of the current waste management policies in Phnom Penh. According to these studies, there are multiple factors that contribute to the poor status of solid waste management in Phnom Penh including:

- Residents' limited general awareness and understanding,
- Poor waste separation at source as a major obstacle to promote effective waste reduction and recycling activities
- Gaps in the technical and managerial capacity of competent authorities, including in areas such as construction, waste treatment, and operation and management of landfills
- Limited available data and inconsistencies in the data related to illegal dumping, total recycled waste volumes, number of recyclers and recycling operations

(Singh et al., 2020, p.27)

Singh et al. (2020) also point out the lack of capacity and insufficient funding as reasons for the city's poor MSWM. There is also a disparity in waste collection service in the city. While more developed inner khans (districts) in Phnom Penh have almost complete coverage of waste collection, the outer khans with significantly fewer and poorer roads suffer much poorer collection rates (PPCA et al., 2018). A 2019 annual report by Sahmakum Teang Tnaut (STT) on waste management in Phnom Phnom revealed that 99 (35.7%) of 277 urban poor communities still receive no waste management, compared to their wealthier neighbors receiving doorstep waste collection (STT, 2019, p.1). Such communities also tend to be unable to advocate on their own behalf with regards to capacity to pay or in requesting better services or infrastructure (PPCA et al., 2018).

Other reports indicated that employees of the contractor hired by the city authority are often poorly skilled and lack social safeguards further contributing to the city's poor waste management. The company in charge of waste management in Phnom Penh, Cintri (Cambodia) Co., Ltd. has been criticized on numerous occasions for its poor service and the poor working conditions of its employees (Nhim, 2019; Tran et al., 2020; Hutt, 2020). For example, employees were only given a green company shirt and not supplied with any safety materials, such as protective work clothing to adequately mitigate the risks of a dangerous workplace (STT, 2019, p.16). Since 2015, 14 Cintri workers have been killed because of job-related accidents while 380 incidents of injury have been reported since 2016 (STT, 2019).

Prime Minister Hun Sen has publicly announced that Cintri's contract would be revoked and waste management would temporarily be put under state control by dividing the trash collection in the city into four zones and handing over responsibility to four separate companies (Nhim, 2019; Hutt, 2020). Bunrith Seng, a former operations specialist for Cintri said that the issue with poor waste management service was caused by only having one licensed firm – Cintri – allowed to operate (Spiess, 2017). He believed that the waste management sector should be opened up to private sector competition. Seng also stated that the lack of laws and proper guidelines regarding waste management services was an issue, and he would like to see Phnom Penh City Hall become more active in streamlining the process (Spiess, 2017).

Models of Food Waste Management

The Waste Management Hierarchy (see Figure 3) shows the guiding principles for dealing with the issue of food waste is to first aim for reduction (minimization), followed by re-use, recycling and energy recovery and to avoid if at all possible uncontrolled disposal in landfill. Uncontrolled disposal such as landfill is the least favored option because of its negative impacts on health for the residing communities there and the environment in general (PPCA et al., 2018).

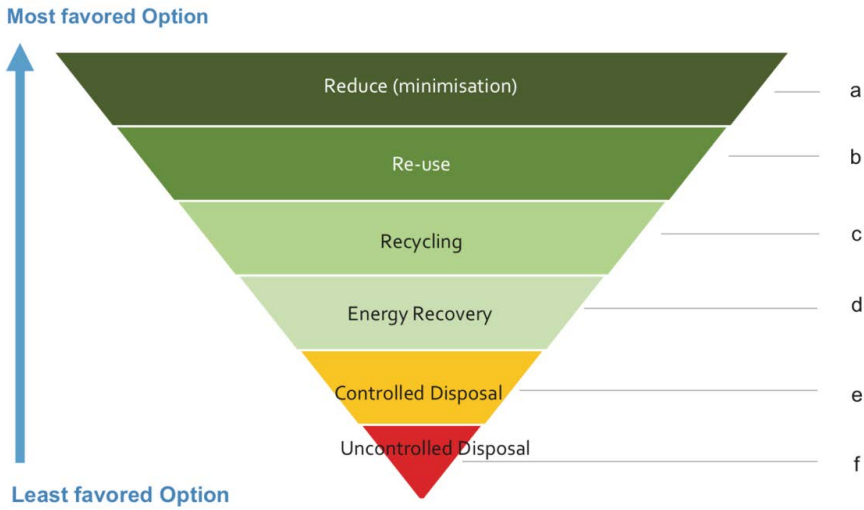


Figure 3. Waste Management Hierarchy

Source: PPCA et al., 2018

In dealing with food waste, many countries’ main aim is to divert biodegradable waste (food and organic waste) out of landfills. For example, the European Union’s waste minimization strategy includes: waste prevention (more efficient production technologies), internal recycling of production waste, source-oriented improvement of waste quality; and reuse of products or parts of products, for the same purpose (Pap et al., 2004). Meanwhile, the US Department of Agriculture announced a collaborative effort called the US Food Waste Challenge to raise awareness of the environmental, health, and nutrition issues created by food waste (USDA, 2013). The Challenge urges participants to: “Reduce” for food loss and waste, “Recover” wholesome food for human consumption, and “Recycle” for other uses, including animal feed, composting, and energy generation (USDA, 2013).

Composting and Waste Separation

The importance of composting, waste separation, and food utilization is commonly understood by those promoting better MSWM in Phnom Penh. A 2014 study on commercial solid waste generation and composition in Phnom Penh proposed methods for treating commercial solid waste in the city such as separation of food waste for animal feed, composting, and bio-digestion (Mongtoeun et al., 2014). The study also noted “composting of recyclable food waste might be the most appropriate option among others for SWM in Phnom Penh since it is low cost and simple” (p.54). The environmental benefits of composting include: improving soil health and structure, and reducing the consumption of fertilizer and pesticides, and reduction of greenhouse gas (GHG) emission (Mongtoeun et al., 2014).

The separation of plastics helps to enhance both composting and recycling rates, as such source separation between plastic and organic waste is strongly recommended. Organic waste can be used as a resource for composting; plastic waste can be used for refuse derived fuel production or direct incineration for energy recovery; and unburnable waste is disposed of in landfill (Seng et al., 2012). Furthermore, composting or organic waste recycling provides both direct and

indirect advantages compared to landfill as it can minimize health risks and environmental impacts, increase job opportunities for local communities, extend landfill life, produce compost products and most importantly minimize GHG emission (Seng et al., 2012).

These findings clearly demonstrate the benefits of composting in treating food waste through its low-cost application and utility benefits as fertilizers. In the meantime, waste separation will be a compulsory and complementary step to achieve effective composting. Therefore, composting and waste separation should be a priority for any strategy addressing food waste in Phnom Penh.

Food Waste Innovations

With regards to solutions to food waste, there are plenty of innovative ideas being implemented in other cities that Phnom Penh can seek inspiration from. Studies show that innovation and technology can contribute to the reduction of food waste (Gould, 2013). For instance, the smartphone application “Too Good To Go” has been developed to help consumers buy prepared meals from restaurants at significantly lower prices at the end of the day, thus reducing waste and waste disposal costs, and increasing sales at the same time (Kilibarda et al., 2019). According to their data, “Too Good To Go” is currently used in 14 European countries, numbering more than 26 million meals sold which is equivalent to 66,000,000 kg of CO₂ emissions prevented — about the same as taking 11,000 cars off the road for a year (Filimonau and De Coteau, 2019). This is one of the many examples showing that business opportunities can be generated alongside solutions to food waste through the use of innovation and technology. Likewise, there is a great potential for local apps and IT developers to explore these innovative ideas in Phnom Penh.

With the complex challenges of poor solid waste management particularly with respect to the working relations with its private contractors, MPP can learn a lot from the case of San Francisco. In 2002, San Francisco set a goal of 75% diversion by 2010 and in 2003 Zero Waste by 2020. The city implemented the first and largest urban food scraps composting collection program in the U.S., covering both commercial and residential sectors. In 2012, San Francisco had a nearly 80% diversion rate - the highest rate of any major U.S. city. San Francisco's success is attributed to a unique and strong partnership between the city and Recology Inc. to collaborate where the city provides oversight, research and outreach and the service provider, Recology Inc., develops infrastructure, provides collection, processing and reporting (EPA, 2020). To ensure success, San Francisco and Recology senior program managers maintain regular weekly communication to oversee performance, review tasks and resolve any outstanding issues. This exclusive partnership between the two allows San Francisco and Recology Inc. to successfully implement innovative policy initiatives such as:

- Ordinances requiring mandatory recycling and composting
- Plastic bag ban and checkout bag charge
- Compostable or recyclable food service ware and polystyrene foam ban,
- Cigarette butt fee
- Technological outreach program covering residences, commercial establishments, schools and events

There are also incentives to food service providers and generators for reducing waste. For instance, businesses will receive a rate discount based on actual diversion, which provides a strong financial incentive to reduce waste, recycle and compost (EPA, 2020).

Policy Recommendations

This paper aims to provide actionable policy solutions to reduce the amount of food waste and to address key limitations of the existing plans to manage solid waste in Phnom Penh.

The paper proposes 5 key actions to tackle the issue of food waste in Phnom Penh:

- Action 1: Enhancing quality of waste collection service through reforming Public Private Partnership between Municipality of Phnom Penh and the Service Provider
- Action 2: Imposing mandatory waste separation duties for all residents and businesses
- Action 3: Commercializing recycling and composting
- Action 4: Promoting technological and innovative ideas in dealing with food waste
- Action 5: Promoting public awareness and engagement on the issue of food waste

Actions for Tackling Food Waste in Phnom Penh:

1. Enhancing quality of waste collection service through reforming Public Private Partnership (PPP) between the Municipality of Phnom Penh and the Service Provider

The initial step toward improving the issue of food waste in the city is to enhance the quality of the service provider responsible for waste collection. The main service provider, Cintri Co. Ltd, has faced accusations of poor service provision and performance due to the lack of strict operational standards and technical capacity in their service provision (Nhim, 2019; Tran et al., 2020; Hutt, 2020). The Municipality of Phnom Penh should transform the waste collection industry by making a drastic reform in the Public Private Partnership in order to identify a competent service provider with technical capability and an adequate workforce.

1.1 Make PPP of MSW collection exclusive to one service provider to achieve better governance and accountability

A narrower governing structure is required to improve the ownership, leadership and accountability of the duties of waste management in the city. In the Public Private Partnership for Municipal Solid Waste Management, there should only be two parties: MPP and the service provider. MPP takes the leadership role, providing technical and performance oversight and outreach to the service provider, while the service provider implements the framework, provides collection service, processing and reporting to MPP. This exclusive ownership of the service can promote effective implementation as it limits unnecessary transactional fees and administrative processes; this has been a key contributor to San Francisco's successful Zero Waste Initiative with Recology Inc. (EPA, 2020). In addition, this type of PPP can be easily assessed and audited to ensure quality service and performance, leading to better accountability.

1.2 Setting proper standard operating procedures and strict assessments for the service provider

In order to ensure the service providers are qualified, equipped with technical capacity and an adequate workforce, MPP shall initiate a reform of the PPP by setting up standard operating procedures and strict assessments for the service provider. The standard operating procedures should outline the entire process of waste collection and disposal service provision with detailed information on technical, machinery, logistical, and safety requirements, labor capacity, procedure of handling different types of wastes, collection methods, with guiding principles of

hygiene and sustainability. The standard operating procedures for waste collection will also be used as an assessment tool to evaluate performance. The assessment should be done by an independent auditor in a regular and timely manner and also include clauses for revocation of the deal in the event that the service provider fails to deliver on fundamental parts of the contract or causes any potential environmental hazards to the public.

1.3 Create an open and competitive selection process for the service provider

MPP should establish an open and fair bidding competition for the selection process of the service provider for SWM. The selection process shall require submissions and review of documents including: working framework, sustainability plan, labor and technical capacity and capability of interested companies. This competitive selection process will enable MPP to hire a qualified company with the right technical capacity and adequate workforce to handle the job.

2. Imposing mandatory waste separation duties for all residents and businesses

2.1 Distributing color-coded and labeled bins for waste separation to households and businesses

According to most studies on food waste management, recycling and composting cannot be made possible without proper waste separation. MPP should impose a mandatory waste separation duty on all residents and businesses in the city. This would require all residents and businesses to separate their waste into 3 categories:

- Recyclables (Blue bin) – for recyclable waste such as bottles, cans, glasses, and other products.
- Compostable (Green bin) – for food waste, food scraps from kitchen, paper and plants
- Trash (Black bin) – for non-recyclable or compostable waste

A citywide education and outreach campaign must be carried out by MPP and the service provider to ensure public know-how and adherence to the proposed law (see Action 5).

2.2 Fees for Service Provided and Fines for Non-Compliance

MPP and the service provider should conduct public engagement involving citizens from different khans, districts, and communes to determine the rate setting for collection fees. The fees shall be determined by the volume of waste. MPP should also utilize a differentiated rate structure by imposing higher fees for trash bins than recycling and composting bins in order to incentivize people to do more recycling and composting. Fines in the form of monthly fees attached with the waste collection bill will be given in cases of non-compliance such as failure to separate waste or improper separation by waste type.

3. Commercializing recycling and composting

Industry-level recycling and composting facilities can be an important contributing factor for achieving a high diversion rate of waste from landfill. Establishing an industry for recycling and composting requires strong government support and private investment to commercialize the waste industry. The emergence of this industry can create job opportunities, in particular it can offer a safer alternative for the communities who are residing and benefiting from scavenging at the disposal sites and landfills. The profitability from commercialization of recycling and composting should be highlighted with possible revenue streams from energy recovery,

production of new products from waste recycling, and turning food and organic waste into revenue from natural fertilizer sales.

3.1 Promoting Investment in Recycling and Composting

The government should create the conditions to welcome either local and/or foreign investors in the waste management industry. The government can incentivize recycling and composting by easing legal and administrative paperwork and by providing tax benefits and credits through eliminating tax barriers. Profits from both recycling waste into new products and making natural compost will be revenue for the operator or the investor. However, a standard operating procedure should be strictly imposed, maintained, and monitored for recycling and composting facilities to minimize GHG emissions and other environmental impacts.

Ideally, a waste industrialization cycle from collecting, processing, sorting, recycling, and composting should be executed by one service provider in order to secure ownership and to enhance efficiency and accountability. Therefore, during the bidding and selection process, MPP should also prioritize candidates with recycling and composting capabilities and facilities.

4. Promoting technology and innovative ideas in dealing with food waste

To incorporate technology and innovative solutions into the issue of food waste, the government should initially organize business forums with industries in food service, hospitality, and other sectors to foster innovative changes in their approaches to waste management. The forum would create an open dialogue with the private sector to raise awareness of the issue of food waste and to encourage innovation into the issue of waste management. Possible initiatives for MPP include:

4.1 Introducing economic incentives for businesses and communities to develop solutions to their food waste:

The government can consider adopting positive and negative economic incentives to encourage businesses to prevent and reduce food waste. Positive incentives encourage certain actions by promising a reward, while negative incentives seek to motivate actions by threatening a punishment (Aramyan et al., 2016). For instance, positive incentives are grants or subsidies for food waste reduction technologies, or tax incentives for food waste donations. An example of a negative incentive would be placing a tax on wasted food.

Introducing negative incentives such as taxes on food waste would be difficult for a developing country like Cambodia. Therefore, the government should explore the possibility of adopting positive incentives. The government collaborate with international organizations, especially aid agencies, to provide subsidies in the form of technological and financial support to businesses whose operations try to reduce, reuse, or recycle food waste. The subsidies should also target communities and residents whose livelihood includes sustainable practices such as composting and recycling. In addition, the government can introduce tax incentives such as VAT exemption for restaurants that offer food donations. These incentives will stimulate voluntary actions from businesses and communities to work toward reducing food waste.

4.2 Promoting start-up competitions and businesses with a focus on food waste reduction

Many food-related start-ups are created on the basic principle that what is considered waste for one may become a resource for another (Perey et al., 2018). Start-ups and business competitions can be initiated by the government, private corporations, or a collaboration between the two. The government can take the initiative by providing incentives to private corporations (see section 4.1) who organize and support start-up competitions. These competitions will function as creative platforms and give a financial boost to new business start-ups who provide solutions to the issue of food waste in the city.

There are many examples of great innovations established through start-ups. For instance, Flashfood is a Canadian startup that developed the Flashfood smartphone application to connect customers with surplus food at grocery stores. The Flashfood app allows buyers to recover costs and significantly reduce their carbon footprint by selling products that have reached their best before dates. The consumers are also able to buy food items such as produce, meat, and prepared meals at discounted prices. This startup diverts potential food waste by redistributing it to customers looking for more sustainable options (Startus Insights, 2021). The “Good For Food” device, built by a Singaporean startup, helps reduce food waste by equipping dustbins with camera technology using artificial intelligence (AI) to identify each dish going into the bin while measuring its weight through a weighing scale. Through this dustbin technology, restaurants will know what food they are throwing out, so they can modify the portions of each of their dishes for their next serving. The device has helped restaurants reduce food waste by 30-40% (CAN Insider, 2019).

In addition to start-up competitions, the government should also promote existing businesses who are already implementing practices that limit their food or plastic waste through their business transactions. Currently, in Cambodia, there are companies offering food delivery services with waste-reduction features. For example, mobile applications for food services such as Food Panda and Nham24 have included an opt-out option at the checkout for “no utensils” to cut down on plastic waste. Businesses with such features should be rewarded with financial incentives, to motivate other business owners to incorporate similar practices in their enterprises.

4.3 Establishing food banks and centers for poor communities

Food banks have been referred as a “green solution to hunger” as they are able to simultaneously address the issues of global hunger and food loss and waste (The Global Foodbanking Network (GFN), 2019, p.3). Food banks are mainly community-based or nonprofit organizations that collect food surplus that would otherwise be lost or wasted in the food system and redirect these surpluses to feed hungry communities through networks of local charities and grassroots organizations (GFN, 2019, p.3). According to the 2019 report by GFN, food banks operating in 57 countries around the world serve about 62.5 million people and prevent around 2.68 million metric tons of safe, edible surplus food from being wasted as well as mitigate around 10.54 billion kg of CO₂ annually (GFN, 2019).

If MPP and relevant authorities can establish food banks while promoting these startups with food-reduction features, this will help foster virtual and non-virtual connections between sellers

(restaurants, groceries stores, markets) and consumers to reduce excess or leftover food. While creating business opportunities, successful implementation of these initiatives can foster a vibrant, clean, and environmentally-friendly ecosystem of food management between business operations and consumers.

5. Promoting public awareness and engagement on the issue of food waste

The whole action plan for food waste management would not be possible without public buy-in and engagement. Public awareness campaigns must be carried out along with the implementation of other actions. For instance, without support from the public the new law on mandatory waste separation, recycling and composting is unlikely to be well-received. Awareness raising can also serve to promote behavior change toward the issue of waste. Therefore, to ensure the success of the action plan, MPP should collaborate with service providers and relevant authorities to administer the following initiatives:

- Introducing the issue of food waste into mainstream media (TV, newspaper, social media, etc.)
- Organizing social campaigns and public outreach in public settings
- Establishing a dedicated phone number as an information center on the issue

MPP must cooperate with the Ministry of Education, Ministry of Information, and local and international development partners to ensure the creation and broadcasting of appropriate content. This is a necessary step to improve understanding among the public and to limit confusion. Key topics should include: the negative effects of food waste, the benefits of composting and recycling, steps for compliance and possible fines regarding the mandatory waste separation law and other topics relevant to food waste management.

Mainstreaming the issue of food waste into a feasible policy action plan is not an overnight task. It requires tremendous effort and constant collaboration between key stakeholders to turn this idea into a reality. However, without an idea in the first place, there will be no action. Hence, this chapter aims to act as a catalyst to open a discussion on the issue of food waste among policy makers.

Conclusion

The issue of food waste and food loss is just one example of the world's problems in inefficiency, inequality, climate change, and many other severe social and environmental issues. This global issue is also deeply important in the Cambodian context with food being the major source of solid waste in the country's capital. While the majority of existing publications and policy recommendations include the issue of food waste within solid waste management, this paper aims to highlight food waste as its own issue for the city of Phnom Penh to consider. For policy recommendations, the paper suggests five key actions that directly address the limitations of the current situation in the capital. The five policies include: 1) enhancing the quality of waste collection service through reforming the Public Private Partnership between the Municipality of Phnom Penh and the service provider, 2) imposing mandatory waste separation duties for all residents and businesses, 3) commercializing recycling and composting, 4) promoting

technological and innovative ideas in dealing with food waste, and 5) promoting public awareness and engagement on the issue of food waste. Implementing innovative solutions to Phnom Penh's food waste challenges will help to enhance the city's sustainability in managing its food resources and waste, hence improving the quality of life for all the city's residents.

References

- Aramyan, L., Valeeva, N., Vittuari, M., Gaiani, S., Politano, A., Gheoldus, M., Mahon, P., Scherhauser, S., Paschali, D., Cseh, B., Ujhelyi, K., Hanssen, O. J. (2016). *Market-based instruments and other socio-economic incentives enhancing food waste prevention and reduction*. Wageningen: Fusions.
- Bryne, R. (2009). Cambodian Garbage Scavengers Face Deadly Health Risks. VOA. <https://www.voanews.com/archive/cambodian-garbage-scavengers-face-deadly-health-risks>
- CAN Insider. (2019). Young Singaporeans' Smart Answer to the World's Food Waste Problem. *Channel News Asia Insider*. <https://www.youtube.com/watch?v=zd2GOpLfaU>
- Chea, V. (2021). New Firms Commence Garbage Collection in Phnom Penh. *Khmer Times*. <https://www.khmertimeskh.com/50884779/new-firms-commence-garbage-collection-in-phnom-penh/>
- EPA, (2020). *Zero Waste Case Study: San Francisco*. United States Environmental Protection Agency. Retrieved from: <https://www.epa.gov/transforming-waste-tool/zero-waste-case-study-san-francisco>
- EPA (2021). *Basic Information about Landfill Gas*. United States Environmental Protection Agency. Retrieved from: <https://www.epa.gov/lmop/basic-information-about-landfill-gas>
- EuroCham Cambodia, (2019). Partnership Ready Cambodia: Waste Management. Global Business Network (GBN) Program. GIZ. Retrieved from: https://www.giz.de/en/downloads/GBN_Sector%20Brief_Kambodscha_Waste_E_WEB.pdf
- FAO, (2019). *Key Facts on Food Loss and Waste You Should Know!*. Retrieved from: https://twosides.info/includes/files/upload/files/UK/Myths_and_Facts_2016_Sources/18-19/Key_facts_on_food_loss_and_waste_you_should_know-FAO_2016.pdf
- Filimonau, V. & De Coteau, D. A. (2019). Food waste management in hospitality operations: A critical review. *Tourism Management*, 71, 234–245. doi: 10.1016/j.tour-man.2018.10.009.
- Fox, T., & Fimeche, C. (2013). *Global food: Waste not, want not*. London: Institution of Mechanical Engineers.
- GFN, (2019). Waste Not Want Not Toward Zero Hunger. Food Banks as Green Solution to Hunger. The Global FoodBanking Network. http://www.foodbanking.org/wp-content/uploads/2019/03/GFN_WasteNot.pdf.
- Ghani, W. A., Rusli, I. F., Biak, D. R., & Idris, A. (2013). An application of the theory of planned behaviour to study the influencing factors of participation in source separation of food

waste. *Waste Management*, 33(5), pp. 1276–1281.
<https://doi.org/10.1016/j.wasman.2012.09.019>

Gould, L. H. Rosenblum. I., Nicholas, D., Phan, Q. & Jones, T. F. (2013). Contributing factors in restaurant-associated foodborne disease outbreaks. *Journal of Food Protection*, 76, 1824–1828. doi: 10.4315/0362-028X.JFP-13-037

Gustavsson, J., Cederberg, C., Sonesson, U., Van Otterdijk, R., & Meybeck, A. (2011). *Global food losses and food waste*. Rome: Food and Agriculture Organization of the United Nations (FAO).

Hutt, D. (2019). Confronting Cambodia's Waste Management Challenge. *The Diplomat*.
<https://thediplomat.com/2019/10/confronting-cambodias-waste-management-challenge/>

IPCC, (1995). *Climate Change 1995: The Science of Climate Change*. Cambridge: Cambridge University Press.

JICA. (2005). Study on Solid Waste Management in the Municipality of Phnom Penh in the Kingdom of Cambodia. Retrieved from:
http://open_jicareport.jica.go.jp/pdf/11784451_01.pdf

Kilibarda, N., Djokovic, F., & Suzić, R. (2019). Food Waste Management — Reducing and Managing Food Waste in Hospitality. *Meat Technology*. 60. 134-142.

Manaf, A.L., Samah, A.A.M., Zukki, M.L.N., (2009). *Municipal solid waste management in Malaysia: practices and challenges*. *Waste Management*. 29.

Mongtoeun, Y., Fujiwara, T., & Sethy, S. (2014). A Study of Commercial Solid Waste Generation and Composition in Phnom Penh City, CAMBODIA. *Journal of Natural Sciences Research*, 4, pp. 49-54.

Nhim, S. (2019). Trash Collector Cintri to Lose Monopoly in Phnom Penh. *VOD*.
<https://vodenglish.news/trash-collector-cintri-to-lose-monopoly-in-phnom-penh/>

Pap, N., & Pongrácz, E., & Myllykoski, L., & Keiski, R., (2004). *Waste minimization and utilization in the food industry: Processing of arctic berries, and extraction of valuable compounds from juice- processing by- products*. Proceedings of the Waste Minimization and Resources Use Optimization Conference.

Perey, R., Benn, S., Agarwal, R., & Edwards, M. (2018). The place of waste: Changing business value for the circular economy. *Business Strategy and the Environment*, 27(5), 631–642.

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987-992.

- PPCA, IGES, Nexus, UN Environment, CCCA. (2018). *Phnom Penh Waste Management Strategy and Action Plan 2018-2035*. Phnom Penh, Cambodia.
https://www.researchgate.net/publication/329771406_Phnom_Penh_Waste_management_strategy_and_action_plan_2018-2035_web
- Seng, B., Kaneko, H., Hirayama, K., & Katayama-Hirayama, K. (2011). Municipal solid waste management in Phnom Penh, capital city of Cambodia. *Waste management & Research: Journal of the International Solid Wastes and Public Cleansing Association, ISWA*, 29(5), 491–500. <https://doi.org/10.1177/0734242X1038099>
- Seng, B., Hirayama, K., Katayama-Hirayama, K., Ochiai, S., Kaneko, H., (2013). Scenario analysis of the benefit of municipal organic-waste composting over landfill, Cambodia. *Journal of Environmental Management* 114, 216–224.
<https://www.sciencedirect.com/science/article/pii/S0301479712005063>
- Seng, K. (2015). Analysis of solid waste composition and waste forecasting in Phnom Penh with the production of methane from Dangkor landfill, Cambodia. Institute of Technology of Cambodia.
- Singh, R., Dickella, P., Yagasa, R., & Onogawa, K. (2020). *State of Waste Management in Phnom Penh, Cambodia (Version 2, 2020)*. IGES Centre Collaborating with UNEP on Environmental Technologies (CCET) of Institute for Global Environmental Strategies (IGES).
- Spiess, R. (2017). Cintri chided by former exec. *The Phnom Penh Post*.
<https://www.phnompenhpost.com/business/cintri-chided-former-exec>
- Startus Insights (2021). Discover 5 Top Startups developing Food Waste Management Solutions.
<https://www.startus-insights.com/innovators-guide/discover-5-top-startups-developing-food-waste-management-solutions/>
- STT, (2019). *Waste Management in Phnom Penh. A review of waste management from the streets*. Urban Governance. https://teangtnaut.org/wp-content/uploads/2019/01/20190129_STT_Final_Annual_Report_English_version-compressed.pdf
- Talyan, V., Dahiya, R.P., Sreekrishnan, T.R., (2008). *State of municipal solid waste management in Delhi, the capital of India*. *Waste Management*. 28.
- Tran, T. & Vuth, C. (2020). Trash Piles Up as Workers Fear Cintri Restructuring, Go on Strike. *VOD*. <https://vodenglish.news/trash-piles-up-as-workers-fear-cintri-restructuring-go-on-strike/>
- USDA, (2013). USDA and EPA Launch U.S. Food Waste Challenge.
<https://www.usda.gov/media/press-releases/2013/06/04/usda-and-epa-launch-us-food->

waste-challenge" <https://www.usda.gov/media/press-releases/2013/06/04/usda-and-epa-launch-us-food-waste-challenge>

World Bank, (2004). *Solid Waste, Vietnam Environment Monitor*.

<http://siteresources.worldbank.org/INTVIETNAM/Data%20and%20Reference/20533187/VEMeng.pdf> (accessed 10.11.09.).

Zhen-shan, L., Lei, Y., Xiao-Yan, Q., Yu-mei, S., (2009). Municipal solid waste management in Beijing city. *Waste Management*, 29.



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