

ARTICLE

# SUSTAINABLE FOOD MOVEMENT: REGULATING FOOD LOSS AND WASTE IN INDONESIA

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## Abstract

*Food wastage is an urgent issue affecting significant food deprivation and adverse environmental impacts. However, food loss and waste (FLW) in Indonesia have always been the problem everyone is talking about. As one of the largest contributors to FLW in the world, Indonesia does not have specific regulations regarding this issue. How FLW is handled in Indonesia and what challenges hinder the success of food waste prevention in Indonesia will be analyzed in this article. This article aimed to explore the role of law in preventing the causes of food loss and waste: a structural failure to value food. A qualitative and comparative approach were chosen to analyze the issue. This finds that some obstacles hinder the prevention of FLW in Indonesia. Lack of direct regulation, lack of technology, and socio-cultural barriers.*

*Keywords: Food waste; food loss; regulation; environment..*



## A. Introduction

Food loss and waste (FLW) is a problem in terms of not only food scarcity,<sup>1</sup> but also environmental impact hinders food availability. In parts of the world with limited food supply, food loss causes adverse environmental impacts, including the unnecessary release of greenhouse gases and inefficient use of water and land around the globe. Food that was intended for human consumption was lost and wasted as the result of consumers' purchasing habits and consumption patterns,<sup>2</sup> agricultural processes, lack of technology in packaging and marketing, poor infrastructure and logistics, insufficient skills, knowledge, and lack of management capacity in the supply chain<sup>3</sup> Even though it would be too simplistic to blame it on previous factors,<sup>4</sup> FAO estimates that one-third of all food produced is lost or wasted, which is one-third of all food produced. The estimated number underlines the significance of the problem.<sup>5</sup>

Indonesia, a country known for its significant food loss production, is estimated to generate approximately 300 kg of food loss per capita per year. However, the nation has made a commitment to reduce this amount by half by the year 2030. According to data from the Indonesian Ministry of Environment and Forestry in 2020, food waste accounted for the highest percentage of waste produced by the Indonesian population, making up 39.8% of all waste types. On a daily basis, Indonesia generates a staggering 175 thousand tons of new waste, a substantial portion of which is food waste. Unfortunately, a large portion of this waste ends up in final landfills without undergoing any further processing or utilization. In fact, food waste alone constitutes 60% of the total waste produced, encompassing both leftover food and discarded vegetables and plants.

Moreover, a report published by the National Development Planning Agency (Bappenas) in 2021 shed light on the extent of food loss and waste in

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- 1 Guray Salihoglu et al., "Food Loss and Waste Management in Turkey," *Bioresource Technology* 248 (2018): 88–99.
  - 2 Outi Uusitalo and Tuomo Takala, "From Scarcity to Abundance: Food Waste Themes and Virtues in Agrarian and Mature Consumer Society," *Food Waste Management: Solving the Wicked Problem*, 2020, 257–88.
  - 3 Walter Leal Filho and Marina Kovaleva, *Food Waste and Sustainable Food Waste Management in the Baltic Sea Region* (Springer, 2015).
  - 4 Luciana Delgado, Monica Schuster, and Maximo Torero, "On the Origins of Food Loss," *Applied Economic Perspectives and Policy* 43, no. 2 (2021): 750–80.
  - 5 Ulrich Koester and Ekaterina Galaktionova, "FAO Food Loss Index Methodology and Policy Implications," *Studies in Agricultural Economics* 123, no. 1 (2021): 1–7. Chitin Nanofibrils, "Turning Fishery's Waste into Goods," *Journal of Clinical Review & Case Reports* 3, no. 3 (2018), [https://www.researchgate.net/profile/Pierfrancesco-Is-The-Given-Name-Morganti-Is-The-Family-Name/publication/325693106\\_Chitin\\_Nanofibrils\\_Turning\\_Fishery%27s\\_Waste\\_into\\_Goods/links/5b1e6dcda6fdcca67b69b6b1/Chitin-Nanofibrils-Turning-Fisherys-Waste-into-Goods.pdf](https://www.researchgate.net/profile/Pierfrancesco-Is-The-Given-Name-Morganti-Is-The-Family-Name/publication/325693106_Chitin_Nanofibrils_Turning_Fishery%27s_Waste_into_Goods/links/5b1e6dcda6fdcca67b69b6b1/Chitin-Nanofibrils-Turning-Fisherys-Waste-into-Goods.pdf).



Indonesia. The report revealed that the country experiences a food loss and waste range of 115-184 kilograms per capita per year, with the highest waste occurring during the consumption stage over the past two decades. The energy lost from this food waste alone could have been utilized to provide meals for an astonishing 61 million to 125 million people annually.<sup>6</sup> These findings highlight the urgent need for effective measures to address food loss and waste in Indonesia, not only to reduce environmental impact but also to ensure food security and alleviate hunger in the country. FAO noted that 19.4 to 20 million people in Indonesia are still plagued by hunger and cannot meet their food needs.<sup>7</sup> Meanwhile, vegetables and fruits dominate food loss and waste.<sup>8</sup>

Bappenas conducted a comprehensive research study on food loss and waste (FLW) in Indonesia, focusing on five different food sectors and eleven commodity categories from the Food Balance Sheets (FBS). The analysis revealed some surprising findings. Firstly, when considering the five food sectors, it was found that crops accounted for the highest proportion of FLW generation, representing 46.2% of all sectors or approximately 14-24 million tons per year. Secondly, within the eleven food categories in the FBS, cereals emerged as the largest contributor to FLW generation, making up 44.3% of all sectors or around 12-21 million tons per year. This comparison further highlighted that the horticultural sector had the highest proportion of losses among the five food sectors, with 31.8% of the available domestic supply being lost. Similarly, within the eleven food categories, vegetables accounted for the largest losses, equivalent to 62.8% of the available domestic supply. These findings shed light on the significant challenges and opportunities for reducing FLW in Indonesia's food system.

In addition, according to the FLW calculation conducted by Bappenas, it was found that 53% of the participants reported having leftover food from their cooked or purchased meals in their households. Similarly, 51% of the respondents admitted that there are usually food leftovers on their plates after consuming a meal. Interestingly, when it comes to dining

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6 Josa Lukman, "Choosing and Consuming: Sustainability Key to Indonesia's Food Waste Problem," *The Jakarta Post*, October 25, 2021, Online edition, <https://www.thejakartapost.com/news/2021/10/25/choosing-and-consuming-sustainability-key-to-indonesias-food-waste-problem.html>.

7 FAO, "Eradicating Hunger by Attracting Millennials to Work in the Village," *FAO News*, August 30, 2018, Online edition, <https://www.fao.org/indonesia/news/detail-events/en/c/1151779/>.

8 Yuni Arisandy Sinaga, "Agriculture Ministry, FAO Conduct Food Loss Study in Indonesia," *Antaranews*, September 3, 2022, Online edition, <https://en.antaranews.com/news/247841/agriculture-ministry-fao-conduct-food-loss-study-in-indonesia>.



out, 63% of the participants stated that they usually do not have any left-over food. However, regardless of the consumption setting, both household and non-household, the participants agreed that carbohydrates such as rice, potatoes, and corn are the most commonly wasted food category.

The absence of a universal definition for food waste and food loss poses a significant challenge in addressing the issue effectively. Additionally, more decisive actions are required as there is a notable absence of regulations concerning food waste at both national and regional levels. Up to this point, there has been a lack of a comprehensive national policy that clearly outlines the definition, goals, and procedures for managing food waste. The current waste legislation does not offer specific guidelines for managing food loss and waste.

Currently, the majority of research in this field primarily focuses on defining relevant concepts, developing measurement methods, and collecting data on food waste. However, empirical studies on food loss and waste are limited, with only a small number of scientists conducting such research. Furthermore, there are only a few studies that have undertaken comparative analyses of food waste policies. To bridge this gap in knowledge, this paper aims to provide a detailed examination of food loss and waste regulations through a comparative law approach. By analyzing the implementation of regulations in South Korea and China, these countries serve as models for understanding effective strategies in managing food loss and waste.

This article uses a qualitative research method. The article also examines the potential obstacles in enforcing the law to manage food loss and waste in Indonesia by comparing model in South Korea and China.

## **B. Food Loss and Waste: The Definition**

What is food loss? What is food waste? To date, the debate on the definition of FLW still exists.<sup>9</sup> Therefore, it has been challenging to measure FLW despite various associated research determines to define the exact policy objectives.<sup>10</sup> Previous studies show that there is no a consensus about the term of food loss and food waste nor single definition.<sup>11</sup> Some of them consider food suitable for consumption, while others consider food no longer proper to consume.

9 Fadi Abdelradi, "Food Waste Behaviour at the Household Level: A Conceptual Framework," *Waste Management* 71 (2018): 485–93.

10 Rovshen Ishangulyyev, Sanghyo Kim, and Sang Hyeon Lee, "Understanding Food Loss and Waste—Why Are We Losing and Wasting Food?," *Foods* 8, no. 8 (2019): 297.

11 Isadora do Carmo Stangherlin and Marcia Dutra De Barcellos, "Drivers and Barriers to Food Waste Reduction," *British Food Journal* 120, no. 10 (2018): 2364–87.



FAO defined food loss and waste as edible parts of plants and animals produced or harvested for human consumption but not ultimately consumed by people. It represents a decrease in the mass, caloric, and/or nutritional value of edible food intended for human consumption at any stage in the food value chain.<sup>12</sup> WRI also stated a similar definition in its 2013 report.<sup>13</sup>

Food loss can occur when food unintentionally leaves the supply chain.<sup>14</sup> A food product is discarded because it does not meet market standards. Food loss occurs a lot in developing countries because of the level of food production that is not matched by adequate technology, so some food products will be damaged before they reach consumers or do not match the quality desired by the market. Although not as high as in developing countries, even developed countries have high food loss rates.<sup>15</sup>

Other study defined food waste occurs due to the intentional act of a person or a conscious decision to throw away food.<sup>16</sup> It is more of a human behaviour issue.<sup>17</sup> For example, when a decrease in the quantity or quality of food arises due to the choices and attitudes of retailers, food service providers and consumers. In this point, food loss occurs from the farm up to but not including the retail store, while food waste occurs at the retail store to the household, restaurant, or other consumption points.<sup>18</sup>

Various research studies have primarily distinguished between food loss and food waste. These studies have emphasized that food loss typically occurs during the initial to the middle stages of the supply chain, encompassing losses related to agricultural products, harvesting, transportation, storage, and processing activities. On the other hand, food waste pertains to losses that occur towards the end of the food supply chain, including distribution, retail, and final consumption stages.<sup>19</sup>

12 FAO, "Global Food Losses and Food Waste - Extent, Causes and Prevention," 2011, <https://www.fao.org/3/i2697e/i2697e.pdf>. J Gustafsson et al., "The Methodology of the FAO Study: Global Food Losses and Food Waste-Extent, Causes and Prevention"-FAO, 2011," 2013.

13 Brian Lipinski et al., "Reducing Food Loss and Waste," 2013.

14 Carola Fabi et al., "SDG 12.3. 1: Global Food Loss Index," *FAO, Rome*, 2018. Carola Fabi and Alicia English, "Measuring Food Losses at the National and Subnational Levels: FAO's Methodology for Monitoring Sustainable Development Goals," in *The Economics of Food Loss in the Produce Industry* (Routledge, 2019), 101–15.

15 Ishangulyyev, Kim, and Lee, "Understanding Food Loss and Waste—Why Are We Losing and Wasting Food?"

16 Katie Flanagan, K Robertson, and Craig Hanson, "Reducing Food Loss and Waste," *Setting the Global Action Agenda*, 2019.

17 Flanagan, Robertson, and Hanson.

18 FAO, "Global Food Losses and Food Waste - Extent, Causes and Prevention."

19 Isadora do Carmo Stangherlin, Marcia Dutra de Barcellos, (2018) "Drivers and barriers to food waste reduction", *British Food Journal*, Vol. 120 Issue: 10, pp.2364-2387.



Defining specific terms for food loss and food waste is important. A survey conducted by Coresight asked grocery retailers for their definition of food waste.<sup>20</sup> The results vary. For example, 42% of retailers define food waste as unsold food, 14.4% say that it is unsold food, either thrown away or thrown into a landfill, 67.7% say that it is ready-to-eat food that is thrown away because overproduction or overordering. The lack of common definition of food loss and food waste has an impact on handling the impact of both.

The definition of food waste under Indonesian regulation could not be found in the Law No.18 Year 2008. Yet, the law recognizes that waste management is now different from waste management methods and techniques with environmental insight, causing negative impacts on public health and the environment.

Waste has become a national problem, so its management must be carried out comprehensively. The management and food waste management must be carried out from upstream to downstream. Such management must be carried out in order to provide economic, health and environmental security benefits.

Article 1 of the Presidential Regulation of the Republic of Indonesia No. 97 Year 2017 states that household waste is waste that comes from daily activities in the household, which does not include feces and specific waste. Food waste is included in the category of household waste.

Food waste is generated at the level of distribution and consumption. At the distribution level, food waste can come from markets or supermarkets. Usually, the types of vegetables and fruits with a shape, colour, or quality that do not meet the standard will be discarded. It can still be consumed. At the level of consumption, food waste is produced from leftover cooked ingredients, leftovers from food that has been served, as well as spoiled or expired food due to buying too much food.

Article 4 paragraph (1) of the Regulation of the Minister of Environment and Forestry No. P.75/MENLHK/SETJEN/KUM.1/10/2019 regulating waste reduction. Still, it is limited only to products and packaging that are complex to decompose by nature.

Food packaging cannot be separated because if food packaging, especially those that cannot be decomposed. Producers have responsibil-

<sup>20</sup> Wayne Labs, "Food Loss & Waste: It's Everywhere in the Supply Chain," November 28, 2022, <https://www.foodengineeringmag.com/articles/100704-food-loss-and-waste-its-everywhere-in-the-supply-chain>.



ity for managing their food waste. Currently, plastic materials for food packaging are still prevalent in Indonesia, especially when the Covid-19 pandemic hit, and the amount of plastic waste generated also increased.

### C. **Hunger Games: Indonesia**

Every year Indonesia produces millions of tons of food waste starting from the production, distribution and consumption stages.<sup>21</sup> Quoting data from the United Nations Environment Program (UNEP), food waste production in Indonesia is the highest in Southeast Asia, which produces 20.93 million tons of food waste every year.<sup>22</sup> In fact, the Ministry of Environment and Forestry noted that food waste is the largest composition of waste in Indonesia, namely 28.3% in 2021.<sup>23</sup>

Bappenas in its 2021 report categorized food waste into two types, namely food loss and food waste. Food loss is food that is wasted during the production, post-harvest and storage stages, as well as processing and packaging. Then food waste is food that is wasted during the distribution and marketing stages, as well as remaining consumption. Most of Indonesia's food waste is in the form of food waste from the consumption stage, which can reach 19 million tons per year.

During the Covid-19, food loss and waste become more challenging due to the food security concern.<sup>24</sup> Before the pandemic, food security was a significant issue for Indonesia, but it has amplified the issue more during the pandemic.<sup>25</sup> COVID-19 worsens Indonesia's food security by disrupting food distribution, increasing transaction costs, and lowering rural and urban purchasing power.<sup>26</sup> The agricultural sector has become more vulnerable due to its vital role in supplying food availability with many people still relying on it.<sup>27</sup>

The restrictions on mobility and distancing policy are pushing 1.3

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21 Bappenas, "Executive Summary For Policy Makers: Food Loss & Waste in Indonesia" (Jakarta: Ministry Of National Development Planning, 2021), <https://lodi-indonesia.id/wp-content/uploads/2021/07/Executive-Summary-FLW-ENG.pdf>.

22 Amalia Zuhra and Wildani Angkasari, "Pengaturan Hukum Internasional Terhadap Limbah Makanan Dan Dinamikanya Di Indonesia," *Uti Possidetis: Journal of International Law* 4, no. 3 (2023): 340–74.

23 Vika Azkiya Dihni, "Produksi Sampah Makanan Indonesia Tertinggi di Asia Tenggara," *Databoks*, June 27, 2022, Online edition, <https://databoks.katadata.co.id/datapublish/2022/06/27/produksi-sampah-makanan-indonesia-tertinggi-di-asia-tenggara>.

24 Fabio G Santeramo, "Exploring the Link among Food Loss, Waste and Food Security: What the Research Should Focus On?," *Agriculture & Food Security* 10, no. 1 (2021): 26.

25 Zuhud Rozaki, "Food Security Challenges and Opportunities in Indonesia Post COVID-19," *Advances in Food Security and Sustainability* 6 (2021): 119–68.

26 Uusitalo and Takala, "From Scarcity to Abundance: Food Waste Themes and Virtues in Agrarian and Mature Consumer Society."

27 Rozaki, "Food Security Challenges and Opportunities in Indonesia Post COVID-19."



million more people into poverty.<sup>28</sup> About 20 million people in Indonesia, or 8% of the population, need help to meet their nutritional needs.<sup>29</sup> This has been exacerbated by stunting, which affects one-third of children under five. Unfortunately, 48 million tons of food is lost or in landfill every year, worth between USD\$15-39 billion or 4-5% of Indonesia’s GDP. Ministry of Environment and Forestry (KLHK) in 2021 reported that food waste is the most abundant component of waste, which is 29.1% of total waste.<sup>30</sup> In 2023, the total waste increased to 41.1%. This amount of FLW is sufficient to alleviate Indonesian people from undernourishment.<sup>31</sup>

Based on the food production chain, the biggest points that affect food loss and waste occur at the consumption stage, particularly households and restaurants (see table 1). This is a reference for the government in formulating government policies in dealing with food loss and waste effectively.

**Table 1. Estimated Food Waste from Restaurant and Households in Indonesia**

Reference	Region	Restauran	Household
Sugiyarto (2021)	Yogyakarta	-	8.71% of households’ average rice consumption. Equal to 0.133 kg/day.
Simon Sia Niha, et.al (2022)	National	-	1.38 kg/day - 2.70 kg/day dominated by food waste and plastic waste
Ministry of Environment and Forestry (2019)	National	-	48%
Oktaviasari SA, Vanany I, Maftuhah DI (2021)	Surabaya	61.23 kg/day	-
Syaukat et.al (2021)	Bogor	75,816 kg/day	-

#### D. Regulations on Food Loss and Waste Policy: Are They Exist?

The Indonesian government has ratified several international legal frameworks regarding waste such as the Basel Convention in 1993 and the Kyoto Protocol in June 2004, highlighted that the government have a strong commitment to the potential negative impacts of waste on the environment.<sup>32</sup> Indonesia declared its commitment to implement the 1996 Rome Declaration regarding the concept of food security by legitimizing it based on the Food Law No. 7 of 1996, which was later replaced by

28 Asep Suryahadi, Ridho Al Izzati, and Daniel Suryadarma, “Estimating the Impact of Covid-19 on Poverty in Indonesia,” *Bulletin of Indonesian Economic Studies* 56, no. 2 (2020): 175–92.

29 Bappenas, “Executive Summary For Policy Makers: Food Loss & Waste in Indonesia.”

30 KLHK KLHK, “Sistem Informasi Pengelolaan Sampah Nasional 2021” (Jakarta: Ministry of Environment and Forestry, 2021), <https://sipsn.menlhk.go.id/sipsn/>.

31 Bappenas, “Executive Summary For Policy Makers: Food Loss & Waste in Indonesia.”

32 Christia Meidiana and Thomas Gamse, “Development of Waste Management Practices in Indonesia,”





the Food Law No. 18 of 2012. Law No. 18 of 2012 is now the legal basis for other food policies. This regulation points out that food management in Indonesia is organized based on sovereignty, independence, and food security principles to fulfil basic needs in equitable and persistent ways.

Currently, Indonesia has a national policy and strategic direction for food waste management which consists of 45 strategies grouped into five categories: behavior change, the improvement of food system, appropriate legal substance and funding, food loss and waste usage, the development of research on food loss and waste.<sup>33</sup>

Unfortunately, Indonesia does not have a specific regulation about FLW management. However, the initial steps in the FLW in Indonesia are addressed in the Law Number 32 of 2009 concerning Environmental Protection and Management and related regulations. In this Law, waste is the residue of a business and/or activity. However, there is no definition of food waste. Table 1 lists the regulations related to FLW management.

The law gives the government the authority to formulate national policies and strategies in waste management. In formulating this policy, there needs to be a unified direction to ensure that all related policies are synchronized and focused on the same targets, both at the national and regional levels.

**Table 2. Regulations related to FLW**

Year	Regulation	Regarding	FLW Definition
2020			
2019	1.Regulation of the Minister of Environment and Forestry Number P.75/MENLHK/SETJEN/KUM.1/10/2019 2.Government Regulation No. 86 of 2019	1. Roadmap for Waste Reduction by Producers 2. This regulation contains stages of administrative sanctions ranging from the lightest to the most severe depending on the severity of the food safety violation	Not available
2017	Presidential Regulation No. 97	Indonesian National Strategy Policy on Managing Domestic Waste and Domestic Waste Equivalentents	Not available
2014	Government Regulation No. 101	Hazardous Waste Management	Not available
2013	Ministry of Public Work Regulation No. 3	The Provision of Facilities and Infrastructure to Handle Domestic Waste and Domestic Waste Equivalentents	Not available

*European Journal of Scientific Research* 40, no. 2 (2010): 199–210.

33 Lita Tyesta Addy Listya Wardhani et al., “Examining Policy Aspects of Food Waste in Indonesia,” vol. 1270 (IOP Conference Series: Earth and Environmental Science, IOP Publishing, 2023), 012022.

2012	1.Law No. 18 of 2012 on Food as amended by Law No. 11 of 2020 regarding Job Creation 2. Government Regulation No. 81 of 2012	1. Food regulation (Chapter VII) 2. The Management of Domestic Waste and Domestic Waste Equivalents	Article 3 of Law No. 18 Year 2012 regulates food management to satisfy basic human needs which provides benefits in a fair, equitable and sustainable manner based on food sovereignty, food self-sufficiency and food security.
2008	Law Number 18	Waste Management	Not available
2008	Law No. 8	The Management of Municipal Solid Waste	Not available

Source: various regulations gathered by authors

These various regulations above, none of them explicitly mentions the definition of food waste or in other words, Indonesia does not have food loss and waste laws.<sup>34</sup> Similar situation applies to Government Regulations regarding household waste management. Although Article 13 of Government Regulation No.81/2012 regulates the requirement for producers to have waste recycling procedures, there is no obligation to manage excess food waste such as through donations or other possibility ways.<sup>35</sup> Policies governing incentives such as tax reductions were not found as well.<sup>36</sup>

#### E. South Korea Model: Anti Mukbang Regulations

South Korea has been fighting food waste since 2005 when the government banned throwing food into landfills. In 2010 the South Korean government launched a food waste disposal pilot. This makes residents responsible for their food waste generated in 144 local areas.

The Korean government's steps prioritize reducing food waste by creating the necessary infrastructure to manage it.<sup>37</sup> The South Korean government not only analyzing the obstacles to reducing food waste, but also establishing synergistic relationships with restaurant owners, providing education to the public before regulations are implemented, and finally enforcing the law with

34 Achmad Faishal, "Laws and Regulations Regarding Food Waste Management as a Function of Environmental Protection in a Developing Nation," *International Journal of Criminal Justice Sciences* 17, no. 2 (2022): 223–37.

35 Wardhani et al., "Examining Policy Aspects of Food Waste in Indonesia."

36 Wardhani et al.

37 Sarah Marshall, "South Korea's Food Waste System Is a Model for Developed Nations," July 19, 2022, <https://keia.org/the-peninsula/south-koreas-food-waste-system-is-a-model-for-developed-na>



strict sanctions. Carefully planned implementation stages help the public to take part in the scheme, which in turn increases public confidence as citizens experience how efficiently the food waste management system functions.

So far, the South Korean government has built infrastructure for a national food waste disposal system. This was implemented in 2013, where every resident in South Korea is responsible for properly disposing of their leftover food and paying for it based on its weight. If food waste is not disposed of according to the law, then fines apply for non-compliance.

South Korea has a long journey to regulate food loss and food waste due to cultural barriers. Addressing food waste has never been easy for policymakers in South Korea. South Korean culinary traditions developed based on healthy eating and etiquettes including a variety of side dishes called “banchan”. Banchan consist of popular foods such as kimchi, fish cakes and boiled spinach. Cultural expectations cause restaurants to produce more banchan while wasting it, contributing to an average of 130 kg of food waste per person per year.<sup>38</sup>

Moreover, South Korean faced other challenges such as the growing phenomenon in social media with its mukbang show. Mukbang, also known as an eating show, is an online broadcast where the host consumes food in varying amounts while interacting with the viewers. This genre became popular in South Korea in the early 2010s, and has become a global trend since the mid-2010s.<sup>39</sup>

Mukbang was created from a situation where South Korean people are not used to eating food alone. The reason is that eating alone in South Korea is often considered strange or friendless as the result of socio-economic condition in the country or known as “hell Joseon”.<sup>40</sup> That is why the mukbang culture has emerged to look for friends to eat online.<sup>41</sup> Unfortunately, mukbang or binge-eating in social media result in significant quantities of food being left uneaten or vomited, promoted unhealthy eating habits, and in the end wasted during the show.

To overcome food waste and loss, South Korean govern-

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tions/.

38 Ibid., Marshall.

39 Yeran Kim, “Eating as a Transgression: Multisensorial Performativity in the Carnal Videos of Mukbang (Eating Shows),” *International Journal of Cultural Studies* 24, no. 1 (2021): 107–22.

40 Kagan Kircaburun et al., “The Psychology of Mukbang Watching: A Scoping Review of the Academic and Non-Academic Literature,” *International Journal of Mental Health and Addiction* 19 (2021): 1190–1213.

41 Kim, “Eating as a Transgression: Multisensorial Performativity in the Carnal Videos of Mukbang (Eating Shows).”



ment issued several waste management policies and certain steps have been taken, among others: Volume-based Waste Fee (VBWF), Pay as Your Trash, and Extended Producer Responsibility.<sup>42</sup>

Food waste reduction is regulated by the Waste Control Act of 1986 and the 1992 Act on the Promotion of Resource Saving and Recycling. In 1995, South Korea initiated a waste collection system based on the “polluter pays” principle.<sup>43</sup> This means that waste producers are fully responsible for paying fees determined based on the weight of the food waste they produce.

In 1996, the South Korean government launched a policy called the Food Waste Reduction Master Plan. This masterplan established recycling program in 1998 which was then renewed again in 2004. This program called for the collection of food waste in residential areas and from food waste such as restaurants, cafeterias, and wholesale markets.<sup>44</sup>

In 2005, food waste was officially banned from being thrown into landfills.<sup>45</sup> In 2010, the Ministry of Environment together with the Ministry of Food, Agriculture, Forestry and Fisheries, and the Ministry of Health, Welfare and Family issued food waste reduction project by signing agreements with various sectors. These sectors including restaurants, hotels, schools, highway rest areas, etc. The agreements encouraged restaurants and cafeterias in government institutions to use fewer small plates and adopt eco-friendly menus. The agreement also encouraged “leftover days” program once a week in public institutions.<sup>46</sup>

In a volume-based levy scheme, households are required to pay based on the amount of food waste they produce.<sup>47</sup> Municipalities can choose between three “pay-as-you-throw” solutions. First, there are standard paid plastic bags. Second, put a paid sticker on the food waste bin (which will not be emptied without the sticker). The third solution: operating food waste bins with magnetic card readers that households must use when throwing away their trash. The households obliged to weight of the waste and measured with a scale at the bottom.

42 Legislative Council Secretariat, “South Korea’s Waste Management Policies,” Information Note, March 26, 2013, <https://www.legco.gov.hk/yr12-13/english/sec/library/1213inc04-e.pdf>.

43 Ki-Yeong Yu, “Volume Based Waste Fee (VBMF) System for Municipal Solid Waste,” 2016, <https://seoulsolution.kr/en/content/6326>.

44 Kee-Young Yoo, “Food Waste Management in Korea: Focusing on Seoul,” Policy Brief (UNDP, 2019), [https://www.undp.org/sites/g/files/zskgke326/files/migration/seoul\\_policy\\_center/USPC-Policy-Brief-6-Food-Waste.pdf](https://www.undp.org/sites/g/files/zskgke326/files/migration/seoul_policy_center/USPC-Policy-Brief-6-Food-Waste.pdf).

45 Max S Kim, “South Korea Has Almost Zero Food Waste. Here’s What the US Can Learn,” *The Guardian*, November 20, 2022, <https://www.theguardian.com/environment/2022/nov/20/south-korea-zero-food-waste-composting-system>.

46 Legislative Council Secretariat, “South Korea’s Waste Management Policies.”

47 Kim, “South Korea Has Almost Zero Food Waste. Here’s What the US Can Learn.”



The monthly data obtained is used as a basis for assigning costs to households.

The Ministry of Food and Drug Safety (MFDS) in South Korea implemented a novel labelling approach on August 17, 2021, known as the “use-by date,” in accordance with the Food Labelling Act, which superseded the previous “sell-by date” system. This new method specifies the duration during which food remains safe for consumption if stored correctly based on the label instructions.

The case of Korea serves as a prime example, highlighting the insufficiency of regulations in isolation when it comes to tackling the issue of food waste. To successfully replicate South Korea’s achievements, Indonesia must take into account three crucial factors. These factors encompass the utilization of advanced technology, the implementation of comprehensive public education initiatives, and the strict adherence to regulations. By addressing these key elements, Indonesia can pave the way for a successful reduction in food waste within its borders.

**Table 2. Food Law Regulation and Policy**

Country	Food Safety for Donations	Date Labeling	Food Waste Penalties	Government Incentives	National FLW Law
Indonesia	No	Limited	No	Weak policy	No
South Korea	Yes	Yes	Yes	Yes	Yes

Source: The Global Food Donation Policy Atlas (2021) and various sources gathered by authors

## F. China’s Anti Food Loss and Waste Policy

China, being the largest emerging economy globally, faces significant challenges in ensuring food security due to its vast population and limited arable land. Despite efforts to reduce food waste, there are still issues in the development and execution of policies in China compared to other countries.<sup>48</sup>

China loses more than 35 million tonnes of food each year, which is approximately 6% of the nation’s total food production.<sup>49</sup> This amount of food wastage could potentially feed anywhere from 30 to 50 million people, as

48 Guohui Shen et al., “The Status of the Global Food Waste Mitigation Policies: Experience and Inspiration for China,” *Environment, Development and Sustainability* 26, no. 4 (2024): 8329–57.

49 You Xiaoying, “Where China’s Food Policies and Climate Goals Meet,” accessed May 25, 2024, <https://dialogue.earth/en/food/where-chinas-food-policies-and-climate-goals-meet/#:~:text=In%20China%2C%20more%20than%2035,per%20meal%2C%20the%20newspaper%20reports.>

revealed by a joint investigation carried out by the Institute of Geographic and National Resources Research and the World Wide Fund for Nature.<sup>50</sup>

One of the main issues of food loss is the Chinese dining etiquette often involves hosts ordering more food than necessary to demonstrate their hospitality towards guests.<sup>51</sup> The cultural norm dictates that the more uneaten food left on the table, the more generous and hospitable the host appears to be. A study carried out in 2018 shed light on the concerning issue of food wastage in Chinese urban areas, revealing that an average of 93 grams of food per person per meal goes unconsumed, accounting for approximately 12% of the total food served.<sup>52</sup> The problem of food wastage becomes even more pronounced during large banquets, where over one-third of the food ends up being discarded, highlighting the need for increased awareness and efforts to address this issue in Chinese society.<sup>53</sup>

Food loss in China is primarily attributed to constraints in technology and equipment. At the consumption stage, food wastage is prevalent in three main dining settings: households, restaurants, and canteens, which encompass establishments such as schools, hospitals, and government departments.<sup>54</sup>

The issue of excessive food waste within the food industry of China has been a subject of criticism in recent years, as highlighted by various studies.<sup>55</sup> This has led to discussions surrounding a potential food waste crisis in the country, as evidenced by a plethora of research studies.<sup>56</sup>

Therefore, to overcome the loss and waste, the Chinese President Xi Jinping initiated a program called the “Clean Plate” campaign in August 2020 reflects a commitment to reducing food wastage and emphasizing the critical

50 Chloe Wong, “Food Waste in China and How the Government Is Combating It,” January 28, 2022, <https://earth.org/food-waste-in-china/>.

51 Mandy Zuo, “China’s Tradition of Hospitality May Need Reshaping If Food Waste Is to End,” August 15, 2020, Online edition, <https://www.scmp.com/news/china/society/article/3097380/chinas-tradition-hospitality-may-need-reshaping-if-food-waste>.

52 Wong, “Food Waste in China and How the Government Is Combating It.”

53 Ibid. .

54 Y Feng, C Marek, and J Tosun, “Fighting Food Waste by Law: Making Sense of the Chinese Approach,” *Journal of Consumer Policy* 45, no. 3 (2022): 457–79.

55 Yunyun Li et al., “Rural Household Food Waste Characteristics and Driving Factors in China,” *Resources, Conservation and Recycling* 164 (2021): 105209. Gao Liwei et al., “An Overview of the Resources and Environmental Issues from Wasted Food in Urban Catering across China,” *Journal of Resources and Ecology* 4, no. 4 (2013): 337–43. Ling-en Wang et al., “The Weight of Unfinished Plate: A Survey Based Characterization of Restaurant Food Waste in Chinese Cities,” *Waste Management* 66 (2017): 3–12.

56 Liwei et al., “An Overview of the Resources and Environmental Issues from Wasted Food in Urban Catering across China.” Guobao Song, Henry Musoke Semakula, and Pere Fullana-i-Palmer, “Chinese Household Food Waste and Its’ Climatic Burden Driven by Urbanization: A Bayesian Belief Network Modelling for Reduction Possibilities in the Context of Global Efforts,” *Journal of Cleaner Production* 202 (2018): 916–24. Zhigang Xu et al., “Food-Away-from-Home Plate Waste in China: Preference for Variety and Quantity,” *Food Policy* 97 (2020): 101918.





nature of food security for Chinese residents.<sup>57</sup> This campaign is a response to various disruptions in China's food supply chain in 2020, including natural disasters like mass flash floods, trade tensions with the US impacting food imports, and the constraints imposed by the COVID-19 pandemic on global food trade.<sup>58</sup>

The effectiveness of the "Clean Plate" campaign in curbing food waste remains uncertain, as there is a lack of tangible evidence demonstrating its impact on a national scale. In response to the failure of the campaign, the Chinese government introduced the anti-food waste law as a more stringent measure to regulate and control food consumption patterns.<sup>59</sup> This policy shift indicates a concerted effort to enforce a more structured framework to combat food wastage and promote sustainable practices within the Chinese population.

The enactment of the Anti-food Waste Law by the Chinese government in April 2021 has led to inquiries regarding the strategic employment of a legal framework supported by penalties as a form of policy response. Moreover, the deliberation on the law's introduction at this particular moment in time and its exclusive focus on addressing concerns within the catering industry necessitate a deeper analysis.<sup>60</sup>

The legislation, designed to protect the nation's food security, responds to President Xi's appeals for increased awareness of food security and focuses primarily on restaurants, which are the main culprits of food wastage in China.<sup>61</sup>

This law primarily focuses on restaurants, which are known to contribute significantly to food waste in China. Firstly, the law prohibits excessive leftovers by discouraging hosts from ordering excessive amounts of food to impress their guests. Additionally, restaurants now have the authority to charge an extra fee to customers who leave uneaten food in excessive quantities.<sup>62</sup>

To ensure transparency, restaurants are required to prominently display their charging rates. Secondly, catering service providers are mandated to remind customers of their responsibility towards food fru-

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57 Lingfei Wang, Yuqin Yang, and Guoyan Wang, "The Clean Your Plate Campaign: Resisting Table Food Waste in an Unstable World," *Sustainability* 14, no. 8 (2022): 4699.

58 Wong, "Food Waste in China and How the Government Is Combating It." Wang, Yang, and Wang, "The Clean Your Plate Campaign: Resisting Table Food Waste in an Unstable World."

59 Feng, Marek, and Tosun, "Fighting Food Waste by Law: Making Sense of the Chinese Approach."

60 Feng, Marek, and Tosun.

61 Xinhua Xinhua, "China's Anti-Food Waste Law Vital to Ensure Food Security," *China Daily*, April 30, 2021, <https://www.chinadaily.com.cn/a/202104/30/WS608b45c1a31024ad0babb641.html>.

62 Liu Caiyu, "China Adopts Law against Food Waste; Binge Eating, Excessive Leftovers to Face Fines," *Global Times*, April 29, 2021, <https://www.globaltimes.cn/page/202104/1222490.shtml>.





gality. Any restaurants found guilty of encouraging or misleading behaviours may face fines up to 10,000 yuan (approximately USD\$1,580). Moreover, establishments that consistently waste substantial amounts of food may be subject to fines as high as 50,000 yuan (USD\$7,900).<sup>63</sup>

Lastly, the law prohibits online bloggers from live streaming binge-eating and competitive eating. Those who distribute such content could face fines of up to 100,000 yuan (USD\$15,800), and media outlets may even face closure if their violations are deemed severe.<sup>64</sup>

### G. Food Loss and Waste Reduction: A Challenging Road

Food loss and waste is not an easy thing to deal with. Experiences from other countries in managing food loss and waste can be seen from various research. Kosseva has indicated that reducing food waste in developed countries is challenging because it relates to individuals feeding behavior and attitudes.<sup>65</sup> In Sub-Saharan Africa, food is wasted, with 39% at the production level and 37% at the handling and storage levels, representing 76% upstream of the supply chain.<sup>66</sup>

Affognon et al. conducted a meta-analysis of postharvest loss studies in Sub-Saharan Africa and profiled these studies based on criteria including the chain level, the losses assessment methodologies, and the type of study.<sup>67</sup> Concerning the chain level, most studies focused on the storage stage in the supply chain. While the most common loss assessment methodology used was count and weight. Finally, most studies conducted were household surveys.<sup>68</sup>

Some studies found that religion and culture encourage food waste in many ways.<sup>69</sup> Elmenofi et al. conducted research by using an exploratory analysis of food waste in Egypt from 181 respondents.<sup>70</sup> Their research showed that food waste increased significantly during Ramadan. The most wasted foods are fruits, vegetables, cereals, and bakery prod-

63 Marissa Sheldon, "China Passes Law to Prevent Food Waste, Increase Food Security" (New York: Hunter College New York City Food Policy Center, May 11, 2021), <https://www.nycfoodpolicy.org/food-policy-snapshot-china-food-waste-law/>.

64 Caiyu, "China Adopts Law against Food Waste; Binge Eating, Excessive Leftovers to Face Fines."

65 Maria R Kosseva and Colin Webb, *Food Industry Wastes: Assessment and Recuperation of Commodities* (Academic Press, 2020).

66 Abdelradi, "Food Waste Behaviour at the Household Level: A Conceptual Framework."

67 Hippolyte Affognon et al., "Unpacking Postharvest Losses in Sub-Saharan Africa: A Meta-Analysis," *World Development* 66 (2015): 49–68.

68 Affognon et al.

69 Efrat Elimelech et al., "Between Perceptions and Practices: The Religious and Cultural Aspects of Food Wastage in Households," *Appetite* 180 (2023): 106374.

70 AGG Elmenofi et al., "An Exploratory Survey on Household Food Waste in Egypt," vol. 15, 2015.



ucts. Moreover, the World Bank report in 2010 showed that the subsidy program in Egypt that covers bread and using ration cards for sugar, cooking oil, rice and tea directed to households suffers from leakages.<sup>71</sup>

These leakages represent a large part of the food subsidies that are not directed to their intended use. For example, subsidized *baladi* bread is used as animal and fish feed or selling subsidized food in the black market.<sup>72</sup> Investigating food waste at the household level in Egypt is essential because, as indicated by Lipinski et al., around 34% of food is wasted at the consumption level in North Africa and West and Central Asia.<sup>73</sup> Additionally, Egypt joins the highest contributing countries to food waste with 73 kilograms/year/per capita according to the BCFN report in 2016; Egypt's rank is sixteenth after Saudi Arabia, which produces waste with the amount of 427 kilograms/year/per capita, the United Arab Emirates that produces 196 kilograms/year/capita.

Indonesia has been critiqued for generating exorbitant food waste and for the lack of regulations.<sup>74</sup> If there is no policy intervention, food waste generation is estimated to reach 112 million tonnes per year in 2020-2045. With intervention, food waste generation can be reduced to 49 million tons per year by 2045.

A study is carried out by Diponegoro University and Yayasan Bintari, taking in Semarang showed an interesting result concluded that the construction of 3R (Reduce, Reuse, and Recycle) waste management sites or TPS-3R and waste banks are the two mainstay programs of regional governments to reduce food loss and waste.<sup>75</sup> TPS-3R and waste banks are two government programs that are expected to encourage people to carry out waste sorting activities, included recycling inorganic waste (plastic and cardboard) and processing organic waste (food waste into compost).<sup>76</sup>

Meanwhile, waste banks are a solution that seems ideal and practical for reducing household waste while providing economic benefits for

71 S Akhtar et al., "Egypt's Food Subsidies: Benefit Incidence and Leakages" (The World Bank, September 6, 2010), <https://documents1.worldbank.org/curated/en/126581468026382278/pdf/574460ESW0P-12210disclosed0101211101.pdf>.

72 Akhtar et al.

73 Lipinski et al., "Reducing Food Loss and Waste."

74 Tammara Soma, "Gifting, Ridding and the 'Everyday Mundane': The Role of Class and Privilege in Food Waste Generation in Indonesia," *Local Environment* 22, no. 12 (2017): 1444–60. Waluyo and Dona Budi Kharisma, "Circular Economy and Food Waste Problems in Indonesia: Lessons from the Policies of Leading Countries," *Cogent Social Sciences* 9, no. 1 (2023): 2202938.

75 Rukuh Setiadi, "Tiga Kendala Ini Sebabkan Rendahnya Upaya Pemilahan Sampah Di Indonesia," *The Conversation*, April 13, 2020, Opinion edition, <https://theconversation.com/tiga-kendala-ini-sebabkan-rendahnya-upaya-pemilahan-sampah-di-indonesia-132682>.

76 Setiadi.

the community and managers. No different to the banking system, people saving is not in the form of money but with waste, such as plastic, paper, cardboard, etc. They will get a savings book and can borrow money. The return of the loan is in the form of waste worth the money borrowed.

However, these two programs have not been able to achieve its main object by the community due to the substantial reasons:<sup>77</sup> First, people are skeptical about waste sorting activities because they see that the waste that has been separated will eventually be mixed up in the waste trucks.

Second, limited facilities at TPS-3R and waste banks are also a problem. In Semarang, for example, seem overwhelmed by providing assistance with supporting facilities and infrastructure for waste banks, such as warehouses, shredding machines, transport fleets, as well as assistance regarding the management of TPS-3R facilities.

Third, professional management system. Waste management in the area is not running optimally because it is not handled by people who are professionals and experts in the field of waste. Likewise with waste bank management. Waste banks are usually held by individuals voluntarily, especially by groups of housewives. Another problem is that waste banks experience problems with funds to cover expenses, such as assets, facilities and operations because they depend on active customer participation.

The 2021's the Global Food Banking Network and the Harvard Law School reports alerted about increased rate of food losses and waste. The reduction of food loss and waste, Indonesia can feed people experiencing hunger and help arrest climate change. The report identifies four key challenges and obstacles in reducing food loss and waste: First,

no specific regulation or draft new regulations to include a food safety for donations. The government has no guidance on food safety requirements relevant to donation. Second,

Indonesia could amend the law to establish a dual date labelling system that clearly distinguishes between safety-based and quality-based date labels. The government could also amend the law to permit food donation after the quality-based date. Third,

Indonesia do not have national legislation that establishes clear and

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77 Setiadi.



comprehensive liability protection for food donors and food recovery organizations when they donate food that meets all safety rules. And fourth,

Indonesia could update its income tax deductions to provide a tax incentive for in-kind donations of food; to eliminate a current financial barrier to donation, it could also amend its VAT scheme to exempt donated foods from VAT.

Not only regulation barriers, BAPPENAS study shows that there are five leading causes and drivers of FLW in Indonesia: lack of Good Handling Practice (GHP) implementation; suboptimal storage space quality; market quality standards and consumer preferences; lack of information/education for food workers and consumers; and excess portions and consumer behavior.

## H. CONCLUSION

Regulation is an important support for all actions aimed at reducing FLW but accompanied by adequate participation and collaboration from all relevant stakeholders. Indonesia, apart from not having coordination or collaboration between the relevant parties dealing with food loss and waste, also does not have specific policies and regulations for handling food loss and waste. There is very limited initiative and efforts spread across many fragmented rules. Passing specific laws and policies regarding handling FLW will not only be able to overcome food loss and waste. Hence, this article argues to emphasize of what Indonesia could be learnt from South Korea and China experiences to deal with FLW. It is clear message that both countries not only have developed legal frameworks and measurable policies on food waste management, but also have overcome the cultural barriers to prevent more environmental damages from food loss and waste. Integrated and comprehensive regulations and strict law enforcement are necessary to strengthened as a solid basis and based on current conditions and through the effective and meaningful participation of all actors and factors. At the end, public awareness and its transformative education are also fundamental factors in preventing FLW and even they can be the key to the sustainable future food system in Indonesia.

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