

Ensuring Food Security in Indonesia: The Urgent Need for Food Loss and Waste Regulation

Sheila Noor Baity*

*Faculty of Law, Universitas Islam Indonesia, Yogyakarta, Indonesia,
sheilabaity@uii.ac.id, ORCID ID 0009-0007-5369-4463*

Muhamad Agil Aufa Afinnas

*Faculty of Law, Universitas Islam Indonesia, Yogyakarta, Indonesia,
234100107@uii.ac.id, ORCID ID 0009-0002-9148-089X*

Abstract. The phenomenon of Food Loss and Waste (FLW) is a problem with serious impacts on environmental, economic, and social aspects. This research aims to analyze the normative issues surrounding FLW in Indonesia in accordance with the mandate of Article 27 and 28H(1) of the 1945 Constitution, while also offering prescriptions on how Indonesian law should address the FLW issue. This research is a normative legal research, using a conceptual and comparative approach. The comparative approach involves analyzing legal systems in three jurisdictions: Europe, America, and Asia. Furthermore, the concept of smart regulation is used as a perspective to prescribe effective FLW regulations in Indonesia. The findings of this research show that Indonesia has demonstrated awareness of FLW through the National Food waste Agency (NFA), the legal draft on FLW and the revision of Food law in progress. However, the absence of specific regulations on FLW proves to be counterproductive to the current government priorities. Secondly, to address the FLW issue, a combination of Command and Control (CaC) instruments, economic instruments, and educational and informational strategies is highly recommended. Integrating these three instruments is expected to encourage all stakeholders—including the government, business actors, and the community—to contribute to solving the FLW problem. This recommendation is also supported by an analysis of FLW regulations in Europe, America, and Asia, which reveals that a combination of Command and Control (CaC) mechanisms, economic instruments, and education can effectively reduce FLW in these regions.

Keywords: Food waste regulation, Food security, Sustainable development.

Abstrak. Fenomena Mubazir Pangan merupakan masalah yang membawa dampak serius terhadap aspek lingkungan, ekonomi, dan sosial. Penelitian ini bertujuan untuk menganalisis isu-isu normatif seputar Mubazir Pangan di Indonesia sesuai dengan amanat UUD 1945 Pasal 27 dan 28H(1), sekaligus memberikan preskripsi tentang bagaimana hukum Indonesia seharusnya menangani isu Mubazir Pangan. Penelitian ini merupakan penelitian hukum normatif dengan pendekatan konseptual dan komparatif. Pendekatan komparatif ini menganalisis sistem hukum di tiga yurisdiksi: Eropa, Amerika, dan Asia. Lebih lanjut, konsep regulasi cerdas digunakan sebagai perspektif untuk merumuskan regulasi Mubazir Pangan yang efektif di Indonesia. Temuan penelitian ini menunjukkan bahwa Indonesia telah menunjukkan kesadaran terhadap Mubazir Pangan melalui NFA, rancangan undang-undang Mubazir Pangan, dan revisi undang-undang pangan yang sedang berjalan. Namun, ketiadaan regulasi khusus tentang Mubazir Pangan terbukti kontraproduktif terhadap prioritas pemerintah saat ini. Kedua, untuk mengatasi isu Mubazir Pangan, kombinasi instrumen Komando dan Pengendalian, instrumen ekonomi, serta strategi edukasi dan informasi sangat direkomendasikan. Integrasi ketiga instrumen ini diharapkan dapat mendorong seluruh pemangku kepentingan—termasuk pemerintah, pelaku usaha, dan masyarakat—untuk berkontribusi dalam menyelesaikan masalah Mubazir Pangan. Rekomendasi ini juga didukung oleh analisis regulasi Mubazir Pangan di Eropa, Amerika, dan Asia, yang menunjukkan bahwa kombinasi mekanisme Komando dan Kendali, instrumen ekonomi, dan pendidikan dapat secara efektif mengurangi Mubazir Pangan di wilayah-wilayah tersebut.

Kata Kunci: Regulasi sisa pangan, Ketahanan pangan, Pembangunan berkelanjutan.

Submitted: 14 January 2025 | Reviewed: 5 February 2025 | Revised: 17 June 2025 | Accepted: 15 July 2025

INTRODUCTION

Food Loss and Waste (FLW) has become a pressing global issue due to its extensive environmental, economic, and social impacts.¹ Food loss and waste (FLW) are responsible for 1.702.9 million tons of CO₂ equivalent or 7.29% of Indonesia's average greenhouse gas (GHG) emissions.² It is estimated that there are 48 million tons of food wasted annually in Indonesia, or equivalent to 115-184kg per capita per year.³ This wastage exacerbates food insecurity, as Indonesia ranks second in hunger rates among ASEAN countries⁴ with more than one-third of its children experiencing stunting.⁵ This highlights the urgent need to address food loss and waste, especially as the world faces the climate crisis.⁶ These interconnected challenges exacerbate environmental degradation and threaten global sustainability, underscoring the critical importance of reducing food loss and waste. In fact, incorporating food loss and waste into updated climate plans could enhance mitigation and adaptation efforts within food systems by up to 25%.⁷

Study report from the National Development Planning of the Republic of Indonesia in 2021⁸ identified that there are ten direct causes and eight indirect drivers of FLW where the lack of food waste regulation becomes one of them. The absence of a legal framework addressing FLW in Indonesia has become a critical factor driving the

¹ Mohamad G. Abiad and Lokman I. Meho, "Food Loss and Food Waste Research in the Arab World: A Systematic Review," *Food Security* 10, no. 2 (2018): 311–22.

² Ministry of National Development Planning of the Republic of Indonesia, "Study Report : Food Loss And Waste In Indonesia. Supporting the Implementation of Circular Economy and Low Carbon Development," 2021, <https://lcdi-indonesia.id/wp-content/uploads/2021/07/Report-Kajian-FLW-ENG.pdf>.

³ "Indonesia Green Growth Program," accessed January 13, 2025, <https://greengrowth.bappenas.go.id/en/sustainable-food-waste-management-contributes-to-low-carbon-development-in-indonesia/>.

⁴ "Tingkat Kelaparan Indonesia Tergolong Tinggi Di ASEAN," accessed January 13, 2025, <https://databoks.katadata.co.id/infografik/2024/01/22/tingkat-kelaparan-indonesia-tergolong-tinggi-di-asean>.

⁵ Helen Andriani et al., "A Multilevel Analysis of the Triple Burden of Malnutrition in Indonesia: Trends and Determinants from Repeated Cross-Sectional Surveys," *BMC Public Health* 23, no. 1 (September 21, 2023): 1–15, <https://doi.org/10.1186/s12889-023-16728-y>.

⁶ Raymond Pierrehumbert, "There Is No Plan B for Dealing with the Climate Crisis," *Bulletin of the Atomic Scientists* 75, no. 5 (September 3, 2019): 215–21, <https://doi.org/10.1080/00963402.2019.1654255>.

⁷ UNEP, "Food Loss and Waste Must Be Reduced for Greater Food Security and Environmental Sustainability," 2020, <https://www.unep.org/news-and-stories/press-release/food-loss-and-waste-must-be-reduced-greater-food-security-and>.

⁸ Ministry of National Development Planning of the Republic of Indonesia, "Study Report : Food Loss And Waste In Indonesia. Supporting the Implementation of Circular Economy and Low Carbon Development."

issue⁹, demanding immediate action to formulate comprehensive regulations. Without legal intervention, efforts to mitigate FLW and establish sustainable food systems will remain inadequate and ineffective.

Previous studies have provided valuable insights into FLW management in Indonesia, but they have yet to explore the smart regulation¹⁰ approach and did a comprehensive comparison of global regulation on FLW. For instance, Achmad Faishal and Suprpto¹¹ emphasize amending existing laws on environmental production and packaging of food items, while H. P. Saliem *et al.*¹² advocate for a national policy on FLW reduction and the establishment of comprehensive national FLW data. Waluyo and Dona Budi K¹³ propose the creation of a Circular Economy Act, while Satyawati, Ni Gusti Ayu Dyah *et al.*¹⁴ suggest an omnibus law approach to regulate the Sustainable Food System. Lita Tyesta A.L.W *et al.*¹⁵ indeed conducted similar research by reviewing existing policies in Indonesia and comparing them with those from other countries. However, the analysis methods and findings of those studies differ from this study, which categorizes the legal materials based on continent, regulatory schemes, and types of legal measure to offer more extensive and systematic reference for developing FLW regulations in Indonesia.

This study adopts the comparative-legal transplantation¹⁶ approach as done previously by several research to provide a foundation for legal formulation of FLW

⁹ Molly Cohen *et al.*, “Indonesia Legal Guide Food Donation Law and Policy,” 2022, https://www.foodbanking.org/wp-content/uploads/2023/01/The-Global-Food-Donation-Policy-Atlas_Indonesia_Legal-Guide.pdf.

¹⁰ Neil Gunningham, Peter N. Grabosky, and Darren Sinclair, *Smart Regulation: Designing Environmental Policy*, Oxford Socio-Legal Studies (Oxford : New York: Clarendon Press ; Oxford University Press, 1998).

¹¹ Achmad Faishal and Suprpto, “Laws and Regulations Regarding Food Waste Management as a Function of Environmental Protection in a Developing Nation,” *International Journal of Criminal Justice Science* 17, no. 2 (2022).

¹² H P Saliem *et al.*, “Policies and Strategies for Reducing Food Loss and Waste in Indonesia,” *IOP Conference Series: Earth and Environmental Science* 892, no. 1 (November 1, 2021): 012091, <https://doi.org/10.1088/1755-1315/892/1/012091>.

¹³ 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 (December 31, 2023): 2202938, <https://doi.org/10.1080/23311886.2023.2202938>.

¹⁴ Ni Gusti Ayu *et al.*, “REGULATING FOOD WASTE MANAGEMENT IN INDONESIA: DO WE NEED AN OMNIBUS LAW (AGAIN)?,” *Indonesia Law Review* 14, no. 1 (2024), <https://doi.org/10.15742/ilrev.v13n3.1>.

¹⁵ Lita Tyesta Addy Listya Wardhani *et al.*, “Examining Policy Aspects of Food Waste in Indonesia,” *IOP Conference Series: Earth and Environmental Science* 1270, no. 1 (2023), <https://doi.org/10.1088/1755-1315/1270/1/012022>.

¹⁶ Syahriza Alkohir Anggoro, “TRANSPLANTASI HUKUM DI NEGARANEGARA ASIA: SUATU PERBANDINGAN,” *Indonesia Law Reform Journal*, 2021, <https://download.garuda.kemdikbud.go.id/article.php?article=3186262&val=28019&title=TRANSPLANTASI%20HUKUM%20DI%20NEGARA-NEGARA%20ASIA%20SUATU%20PERBANDINGAN>; Hari Purwadi, Adi

problem. Ngac Boc Thi¹⁷ highlighted that food waste challenges are more pronounced in developing countries compared to developed ones. Kwok Pei Lin¹⁸ analyzed food waste regulations in Japan and South Korea to find the best approach to tackle FLW issue in Singapore while Parry, A., P. Bleazard, and K. Okawa¹⁹ examined food waste policies through case studies in Japan and the United Kingdom, laying a foundation for further research in this area. Nonetheless, this study provides a critical foundation by identifying global best practices and aligning them with Indonesia's commitment to the Sustainable Development Goals (SDGs), particularly SDG 12.3, which aims to halve food loss and waste by 2030. It explores a regulatory model to combat FLW in Indonesia that can address not only for reducing waste but also for ensuring food security, fostering economic justice and promoting environmental sustainability for future generations.

This research article is structured into four parts. The first part establishes the philosophical and theoretical foundation for regulating food loss and waste (FLW) in Indonesia, drawing upon the right to food, food security, the role of law as a tool for social engineering, smart regulation principles, and legal transplantation theory. The second part evaluates Indonesia's existing legal framework related to FLW, including the Food Law, Environmental Management and Protection Law, Waste Management Law, and the Omnibus Law on Job Creation, identifying their strengths and limitations in addressing FLW. The third part provides a comparative analysis of global legal approaches to FLW reduction, highlighting how various countries either adopt a standalone law or incorporate FLW provisions into broader regulatory

Sulistiyono, and Adriana Grahani Firdausy, "KONSEKUENSI TRANSPLANTASI HUKUM TERHADAP PANCASILA SEBAGAI NORMA DASAR DAN HUKUM LOKAL," *Yustisia* 4, no. 1 (April 1, 2015): 73–88, <https://doi.org/10.20961/YUSTISIA.V4I1.8622>; Tim Lindsey, "Law Reform in Developing and Transitional States," *Law Reform in Developing and Transitional States*, December 6, 2006, 1–420, <https://doi.org/10.4324/9780203962305/LAW-REFORM-DEVELOPING-TRANSITIONAL-STATES-TIM-LINDSEY/RIGHTS-AND-PERMISSIONS>.

¹⁷ Ngoc Bao Dung Thi, Gopalakrishnan Kumar, and Chiu-Yue Lin, "An Overview of Food Waste Management in Developing Countries: Current Status and Future Perspective," *Journal of Environmental Management* 157 (July 2015): 220–29, <https://doi.org/10.1016/j.jenvman.2015.04.022>.

¹⁸ Kwok Pei Lin, "Waste Management Law & Policy in Japan and South Korea, with Particular Focus on Food Wastes: Lessons for Singapore," accessed January 14, 2025, <https://scholarbank.nus.edu.sg/entities/publication/1415bfd2-a944-44a5-b679-418fcee2bf9d>.

¹⁹ Andrew Parry, Paul Bleazard, and Koki Okawa, "Preventing Food Waste: Case Studies of Japan and the United Kingdom," OECD Food, Agriculture and Fisheries Papers, vol. 76, OECD Food, Agriculture and Fisheries Papers, March 5, 2015, <https://doi.org/10.1787/5js4w29cf0f7-en>.

frameworks. Building on this, the fourth part examines the prospects and potential pathways for developing an effective and context-specific legal regime for FLW in Indonesia. Finally, the article concludes by synthesizing key findings and proposing strategic directions for future regulatory reform.

METHODOLOGY

This research is a normative legal research. The types of questions asked in this study have a descriptive-instrumental character.²⁰ The main goal of this research is to develop a philosophical and theoretical argument for why the state needs to regulate the issue of FLW with a smart regulation model. Therefore, this research proposes two research questions: how the existing laws in Indonesia address the issue of FLW; and how the regulations established in Indonesia should address the issue of FLW. This research was carried out with comparative-legal transplantation and smart regulation as the conceptual approach. Comparative approach was taken to compare the legal substance of several countries in three legal jurisdictions: Europe, America, and Asia to find the best and suitable legal practice for Indonesia by mentioning the example and categorizing the type of measures such as incentive, disincentive, or neither incentivizing nor disincentivizing in character.

Furthermore, the concept of smart regulation is used as a theory or standpoint to construct effective FLW regulation in Indonesia. This concept holds substantial theoretical and practical relevance, as it encapsulates a pluralistic and integrative regulatory framework that combines command-and-control mechanisms, market-based instruments, and informational strategies. This multidimensional approach is particularly pertinent to addressing complex environmental issues such as food loss and waste, rather than relying on one-size-fits-all regulatory models, which often fail to achieve sustainable and adaptive outcomes.

This study used secondary sources as the main legal materials. The collection of the materials was conducted by literature studies pertaining to the evaluation of FLW-

²⁰ Kees Waaldijk, *The Character of Scholarly Legal Research: Paradigms, Problem, Questions, Hypotheses, Sources, Methods* (Leiden: Universiteit Leiden, 2009), 2.

related regulations in Indonesia and existing global FLW regulations. These legal materials were then analyzed using a systematic-qualitative approach by listing the relevant regulation and policies in Indonesia to critically assess their limitations in addressing FLW; and then developing categories of the legal measures from the developed world such as American, European, and Asian countries.

RESULT AND DISCUSSION

Philosophical and Theoretical Basis to Regulate Food Loss and Waste in Indonesia

Indonesia recognized food as a basic human need where the State is obliged to ensure its availability, accessibility, and fulfillment through the Law Number 18 of 2012 on Food (Food Law 18/2012). The right to food is guaranteed by the 1945 Constitution, particularly Article 27 and Article 28H(1), which uphold the right to a decent life and the right to a good and healthy environment. Thus, ensuring that no food is lost or wasted is important to enhance overall food security ²¹ which enables the fulfillment of the right to food.

The current Indonesian President, Prabowo Subianto, has chosen food security as his top priority for the next two to three years of his term, with the spirit to achieve food self-sufficiency (*swasembada pangan*) and farmers' prosperity.²² However, without thoughtful and well-regulated policies, inefficiencies such as poor storage facilities and improper post-harvest handling will cause FLW which could exacerbate food insecurity in Indonesia.²³ With the momentum of revising the Food Law 18/2012, this

²¹ Giovanni Ottomano Palmisano et al., "Food Losses and Waste in the Context of Sustainable Food and Nutrition Security," *Food Security and Nutrition*, January 1, 2020, 235–55, <https://doi.org/10.1016/B978-0-12-820521-1.00010-1>; Saman Siddiqui, Hullash Chauhan, and Ashish Kumar, "Waste Management and Its Impact on Food Security," *Advanced Computational Methods for Agri-Business Sustainability*, July 10, 2024, 287–304, <https://doi.org/10.4018/979-8-3693-3583-3.CH016>; Fabio G. Santeramo, "Exploring the Link among Food Loss, Waste and Food Security: What the Research Should Focus On?," *Agriculture and Food Security* 10, no. 1 (December 1, 2021), <https://doi.org/10.1186/S40066-021-00302-Z>; Esila Bayar and Zeynep Begüm Kalyoncu Atasoy, "A Narrative Review Aligning Food Security with Food Loss and Waste Reduction," *Ergincan Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, no. SUIC (December 31, 2024): 1–14, <https://doi.org/10.18185/ERZIFBED.1534572>; Kenneth Popik, "A Comprehensive Review of Safety, Security, and Food Waste in the Food Supply Chain Logistics," *International Journal of Agricultural and Life Sciences*, September 30, 2024, 444–49, <https://doi.org/10.22573/SPG.IJALS.024.S122000122>.

²² "Food Security to Remain Priority for Two--Three Years: Prabowo - ANTARA News," accessed June 15, 2025, <https://en.antaranews.com/news/359101/food-security-to-remain-priority-for-two-three-years-prabowo>.

²³ Raiza Andini, "Titiek Soeharto: Food Waste Perlu Diatur Dalam UU Pangan," May 7, 2025, <https://rmol.id/politik/read/2025/05/07/665563/titiek-soeharto-food-waste-perlu-diatur-dalam-uu-pangan>.

presents a timely opportunity to embed FLW reduction and management strategy into the framework as many suggest.²⁴ Without regulatory action to reduce and manage FLW suitable for human consumption, it will undermine food security and hinder the fulfillment of the right to food.²⁵

Roscoe Pound views law as a tool of social engineering which can be designed through state-enforced mechanisms to encourage or discourage certain action with the aim to influence societal behavior and norms towards desired outcomes.²⁶ However, Pound emphasized that law alone is insufficient and must be supported by institutions like family, education, morality, and religion.²⁷ In the context of FLW, it is important to understand that FLW is caused by many factors and has affected many aspects such as social, environmental and economic aspects.

Therefore, the concept of smart regulation is used to ensure that the formulation of FLW regulation is effective. This concept emerged in the discourse of environmental compliance. Smart regulation is the realization of regulatory pluralism that serves as an innovative and flexible form of social control. Parties involved in compliance with norms are no longer limited to two parties: the government (as the regulator) and business actors (as the regulated parties). The wider community can also participate in the implementation of environmental compliance instruments.²⁸

In the literature related to environmental compliance instruments, there are several instruments, such as Command and Control regulation (CaC), Economic Instruments,

²⁴ Liputan6, “Komisi IV DPR Temui 8 Profesor IPB Bahas 5 Isu Penting Pangan, Termasuk MBG - News Liputan6.Com,” May 13, 2025, <https://www.liputan6.com/news/read/6019156/komisi-iv-dpr-temui-8-profesor-ipb-bahas-5-isu-penting-pangan-termasuk-mbg?page=3>; Arnidhya Nur Zhafira, “Kemenko Pangan Soroti Sinergi Dan Tolok Ukur Dalam RUU Pangan - ANTARA News,” June 11, 2025, <https://www.antaranews.com/berita/4891253/kemenko-pangan-soroti-sinergi-dan-tolok-ukur-dalam-ruu-pangan>; Nandito Putra, “Empat Usulan Yayasan Kehati Dalam RUU Pangan | Tempo.Co,” June 2025, <https://www.tempo.co/ekonomi/empat-usulan-yayasan-kehati-dalam-ruu-pangan-1674565>.

²⁵ Valeria Pasarín and Teemu Viinikainen, “LEGAL BRIEF Enabling a Legal Environment for the Prevention and Reduction of Food Loss and Waste Enabling a Legal Environment for the Prevention and Reduction of Food Loss and Waste,” 2022.

²⁶ Nafiatul Munawaroh, “Arti Law as a Tool of Social Engineering | Klinik Hukumonline,” 2023, <https://www.hukumonline.com/klinik/a/arti-law-as-a-tool-of-social-engineering-lt646f063a5c77a/>.

²⁷ Nazaruddin Lathif, “TEORI HUKUM SEBAGAI SARANA ALAT UNTUK MEMPERBAHARUI ATAU MEREKAYASA MASYARAKAT,” *PALAR | PAKUAN LAW REVIEW* 3, no. 1 (January 1, 2017), <https://doi.org/10.33751/PALAR.V3I1.402>.

²⁸ Andri G. Wibisana, “Instrumen Ekonomi, Command and Control, Dan Instrumen Lainnya: Kawan Atau Lawan? Suatu Tinjauan Berdasarkan Smart Regulation,” *Bina Hukum Lingkungan* 4, no. 1 (October 25, 2019): 174, <https://doi.org/10.24970/bhl.v4i1.104>

self-regulation, voluntarism, Education and information instrument, and Free Market Environmentalism.²⁹ CaC is an instrument of environmental compliance that puts the government in a very central position. The nature of this instrument is top-down, because the government sets rules related to how people must act, and there are sanctions if there is a violation of the regulations that have been made.³⁰ The effectiveness of CaC depends on several factors: the ability to detect violations, a quick and appropriate response to violations, and the existence of adequate sanctions.³¹ However, this approach is criticized to be too rigid and will hinder innovative efforts in dealing with complex environmental problems.³²

In such a case, the smart regulation model can offer a solution to this problem as it emphasizes the combination of environmental compliance instruments. The main argument is that synergy is needed between several available compliance instruments to ensure effectiveness in their application. In addition, the existing instruments of environmental compliance do not have to be viewed dichotomously and negate each other.³³ This research confirms the argument of the concept and will use it in formulating FLW regulations in Indonesia. This study recommends the use of CaC instruments³⁴, Economics instruments³⁵, and Education and information instruments,³⁶ as a combination to handle FLW problems.

This research used the legal transplantation theory which derived from the comparative law approach in order to find the best practice to address the FLW issue in developed countries in America, Europe, and Asia. This theory refers to the process

²⁹ Gunningham, Grabosky, and Sinclair, *Smart Regulation*, 51.

³⁰ Andri G. Wibisana, "Instrumen Ekonomi": 173.

³¹ Mas Achmad Santosa, *Good Governance dan Hukum Lingkungan*, (Jakarta: ICEL, 2001): 235.

³² Michael D. Zagata, "'Command and Control versus Economic Incentives in Environmental Protection,'" *Albany Law Environmental Outlook* 2, no. 3 (1996): 10.

³³ Neil Gunningham and Darren Sinclair, "Regulatory Pluralism: Designing Policy Mixes for Environmental Protection," *Law & Policy* 21, no. 1 (January 1999): 50.

³⁴ The most common definition of command and control is the action of the government by making laws and imposing their enforceability on both individuals and corporate entities. See: Derrin Davis and Donald F. Gartside, "Challenges for Economic Policy in Sustainable Management of Marine Natural Resources," *Ecological Economics* 36, no. 2 (February 2001): 223–36.

³⁵ Economic instruments can be defined as policies that are enacted with the aim of compensating for externalities (either negative or positive) using pricing or financial incentives. See: Markus Johansson et al., "A Risk Framework for Optimising Policies for Deep Decarbonisation Technologies," *Energy Research & Social Science* 82 (December 2021): 3.

³⁶ In this article, education and information instruments will focus on education and training. See: Gunningham, Grabosky, and Sinclair, *Smart Regulation*, 70.

of adopting legal concepts, institutions, or systems from one country into another, which must be critically adapted to local social, cultural, and political contexts to ensure effectiveness and legitimacy.³⁷ To implement legal transplantation in Indonesia, it must adhere to Pancasila as the philosophical and ideological foundation for every regulation to ensure that the idea, concept, and solution did not come from western values.³⁸ Therefore, this research suggests legal measures not just by looking at smart regulation and legal transplantation theory, but also by evaluating the existing regulation related to FLW, so the prescription is matched with the current legal regime.

Evaluating the Relevant Regulations in Indonesia

Defining FLW is critical for formulating an effective legal measure, as interpretations may vary across sectors and countries. Currently, there is no clear consensus on the concept of FLW³⁹, as the definition of "edible" food varies due to the uniqueness of each country's business practices, private standards, legal frameworks, and food safety regulations, each influencing the generation of food waste to varying degrees.⁴⁰ Two key references for defining FLW have been developed by internationally recognized bodies, such as the Food and Agriculture Organization (FAO) and the United Nations Environment Program (UNEP). According to FAO:

"Food Loss refers to food that during its process in the food supply chain gets spilled, spoiled or otherwise lost, or incurs reduction of quality and value, before it reaches its final product stage. Food loss typically takes place at production, postharvest, processing and distribution stages in the food supply chain."

While food waste refers to:

³⁷ Anggoro, "TRANSPLANTASI HUKUM DI NEGARANEGARA ASIA: SUATU PERBANDINGAN"; Purwadi, Sulistiyono, and Firdausy, "KONSEKUENSI TRANSPLANTASI HUKUM TERHADAP PANCASILA SEBAGAI NORMA DASAR DAN HUKUM LOKAL"; Lindsey, "Law Reform in Developing and Transitional States."

³⁸ Purwadi, Sulistiyono, and Firdausy, "KONSEKUENSI TRANSPLANTASI HUKUM TERHADAP PANCASILA SEBAGAI NORMA DASAR DAN HUKUM LOKAL."

³⁹ Jocelyn M. Boiteau and Prabhu Pingali, "Can We Agree on a Food Loss and Waste Definition? An Assessment of Definitional Elements for a Globally Applicable Framework," *Global Food Security* 37 (June 2023): 110677, <https://doi.org/10.1016/j.gfs.2023.100677>.

⁴⁰ Morvarid Bagherzadeh, Mitsuhiro Inamura, and Hyunchul Jeong, "Food Waste Along the Food Chain," OECD Food, Agriculture and Fisheries Papers, vol. 71, OECD Food, Agriculture and Fisheries Papers, December 22, 2014, <https://doi.org/10.1787/5jxrcmftzj36-en>.

“food of good quality and fit for consumption, but still does not get consumed because it is discarded, whether or not after it is left to spoil. Food waste typically (but not exclusively) takes place at retail and consumption stages in the food supply chain.”⁴¹

Both definitions clarify when food is classified as lost or wasted: food loss occurs before it reaches the consumer, while food waste arises at the consumption stage.

Legal definitions serve as foundational elements in law, describing concepts or establishing new meanings.⁴² Without clear definitions, the formulation of effective and enforceable FLW regulations may become significantly difficult. Unfortunately, while several existing regulations in Indonesia have the potential to address the FLW issues (see Table 1), none of them has mentioned or even defined FLW.⁴³

Table 1. List of Regulation related to FLW in Indonesia

Regulation Number/Year	Relevancy to FLW
Law Number 18 of 2012 on Food	Acknowledge the right to food as basic human rights; oblige the State to ensure the availability, accessibility, and fulfillment of food consumption; aiming to be food sovereign and self-sufficient. The term “ <i>pangan</i> ” or “food” is defined as anything derived from biological sources – whether processed or unprocessed – intended as food or drink for human consumption.
Law Number 18 of 2012 on Food Waste Management	Regulate waste in the scope of household waste; waste similar to household waste; and specific waste. Article 12-16 obliged different actors to reduce, separate, and manage their waste according to the local regulations (for households) or government regulations (for facilities management and producers). Chapter VI regulates how waste management should be operated by the government, local government, business actors, and the public. Incentives and disincentives are implemented under Article 21.

⁴¹ FAO, “Global Initiative on Food Loss and Waste Reduction” (Rome: Food and Agriculture Organization of the United Nations, 2015), <https://openknowledge.fao.org/server/api/core/bitstreams/57f76ed9-6f19-4872-98b4-6e1c3e796213/content>.

⁴² Fabrizio Macagno, “Definitions in Law,” *Bulletin Suisse de Linguistique Appliquée* 2 (2010).

⁴³ Lita Tyesta et al., “Examining Policy Aspects of Food Waste in Indonesia Examining Policy Aspects of Food Waste in Indonesia” 1270 (n.d.): 12022, accessed June 14, 2025, <https://doi.org/10.1088/1755-1315/1270/1/012022>; Ayu et al., “REGULATING FOOD WASTE MANAGEMENT IN INDONESIA: DO WE NEED AN OMNIBUS LAW (AGAIN)?”; Wardhani et al., “Examining Policy Aspects of Food Waste in Indonesia”; H. P. Saliem et al., “Policies and Strategies for Reducing Food Loss and Waste in Indonesia,” *IOP Conference Series: Earth and Environmental Science* 892, no. 1 (November 23, 2021), <https://doi.org/10.1088/1755-1315/892/1/012091>.

Law Number 32 of 2009 on Environmental Protection and Management Law	This regulation focuses on the environmental planning; utilization; Control of environmental pollution and/or degradation.; maintenance; supervision; and law enforcement. Uses environmental compliance instruments in the forms of criminal, civil, and administrative law.
Omnibus Law Number 6 of 2023 on Job Creation	Although this law recognized the global challenges of rising energy and food prices, climate change, and disrupted supply chains; but it only focused on the ease of investment related to food and agriculture which may further exacerbate FLW if not being addressed properly.

Besides these regulations, Indonesia has established the National Food Agency (NFA) and the National Nutrition Agency (NNA) under the President which has acknowledged the importance of reducing FLW.⁴⁴ For example, in 2022 the NFA implement "*Gerakan Selamatkan Pangan*" (Save Food Movement) in 38 provinces by working in synergy with relevant Ministries/Agencies, cross-sectoral Regional Government Organizations (OPD), and state-owned and regional-owned enterprises (BUMN and BUMD), the Food Task Force, the private sector, associations, academia, and experts.⁴⁵ In 2025, the NNA has anticipated the potential food waste generated during *Makan Bergizi Gratis* (Free Nutritious Meal) program, by collecting leftover food from trays returned by beneficiaries to be recorded by the local environmental agency (DLH) under the Ministry of Environment and Forestry (KLHK).⁴⁶

⁴⁴ Atalya Puspa, "Pemerintah Fasilitas Pengelolaan Food Waste Pada Program Makan Bergizi Gratis," 2025, <https://www.metrotvnews.com/read/kM6CRLXI-pemerintah-fasilitas-pengelolaan-food-waste-pada-program-makan-bergizi-gratis>; NFA, "Badan Pangan Nasional - NFA Dorong Proses Penyusunan Regulasi Turunkan Food Waste - Blog," 2024, <https://badanpangan.go.id/blog/post/nfa-dorong-proses-penyusunan-regulasi-turunkan-food-waste>; Antara, "Pemerintah Bakal Bikin Undang-Undang Yang Mengatur Tentang 'Food Loss and Waste' - Jawa Pos," November 10, 2023, https://www.jawapos.com/ekonomi/013266843/pemerintah-bakal-bikin-undang-undang-yang-mengatur-tentang-food-loss-and-waste#google_vignette; "Program MBG Berpotensi Timbulkan 1,4 Juta Ton Sampah Makanan per Tahun | Republika Online," accessed June 10, 2025, <https://esgnow.republika.co.id/berita/swwphd416/program-mbg-berpotensi-timbulkan-14-juta-ton-sampah-makanan-per-tahun>; "Begini Skema Sederhana Pengolahan Food Waste Program Makan Bergizi Gratis | Tempo.Co," accessed June 10, 2025, <https://www.tempo.co/politik/begini-skema-sederhana-pengolahan-food-waste-program-makan-bergizi-gratis-1192493>.

⁴⁵ BPN, "Badan Pangan Nasional - Cegah Food Waste, NFA Gencarkan Gerakan Selamatkan Pangan Untuk Ketahanan Pangan Dan Gizi - Blog," 2023, <https://badanpangan.go.id/blog/post/cegah-food-waste-nfa-gencarkan-gerakan-selamatkan-pangan-untuk-ketahanan-pangan-dan-gizi>; Antara, "Sarinah First Mall to Go Food Waste-Free, Earns BPN Praise - ANTARA News," 2022, <https://en.antaranews.com/news/244657/sarinah-first-mall-to-go-food-waste-free-earns-bpn-praise>.

⁴⁶ Tempo.co, "Begini Skema Sederhana Pengolahan Food Waste Program Makan Bergizi Gratis | Tempo.Co," 2025, <https://www.tempo.co/politik/begini-skema-sederhana-pengolahan-food-waste-program-makan-bergizi-gratis-1192493>.

Although there is an initiative to regulate FLW within the revision of the Food Law 18/2012, this study argues that Indonesia should enact a standalone law specifically aimed at addressing the multifactorial nature of FLW. A holistic and integrated legal framework needs to be effectively addressed the various interrelated causes of FLW across the food supply chain including inefficiencies in production, post-harvest handling, storage, distribution, consumption patterns, and regulatory gaps⁴⁷ in food donations and food labelling, for example. FAO also recommends the adoption of a framework legislation specifically targeting FLW which clearly assigns responsibilities to government authorities and private actors, sets binding reduction targets, and mandates the development of supporting policies to prevent and reduce FLW.⁴⁸

Exploring Food Loss and Waste Reduction Law around the Globe

Various governmental, regional and local authorities around the globe have introduced regulatory and economic measures to advocate and even impose food waste reduction strategies⁴⁹ to different actors along the food supply chain. Countries have implemented FLW regulations using two approaches: either by enacting a specific, standalone law or by integrating FLW provisions into existing laws, such as those related to waste management or climate action. Below is the list of regulations used in the analysis for this study:

Table 2. The Global FLW Regulations

Country & Type of Regulation	Regulation	Main Content	Schemes & Legal Measure
Europe			
Ireland (Incorporates FLW into its waste law)	Waste Management (Food Waste) Regulations 2009 ¹	Obligation to segregate and treat food waste	Scheme 1. Disincentives (appear at the District Court and pay penalties

⁴⁷ FAO, "MOVING FORWARD ON FOOD LOSS AND WASTE REDUCTION FOOD AND AGRICULTURE," 2019, www.fao.org/publications.

⁴⁸ Pasarín and Viinikainen, "LEGAL BRIEF Enabling a Legal Environment for the Prevention and Reduction of Food Loss and Waste Enabling a Legal Environment for the Prevention and Reduction of Food Loss and Waste."

⁴⁹ Ali Chalak et al., "The Global Economic and Regulatory Determinants of Household Food Waste Generation: A Cross-Country Analysis," *Waste Management* 48 (February 2016): 418–22, <https://doi.org/10.1016/j.wasman.2015.11.040>.

			or imprisonment or both)
France (Stand-alone law)	Law Number 138/2016 on the fight against food waste	Obligation to donate food for certain retailers; Prohibition of food disposal	Scheme 2. Disincentives (penalties)
Italy (Stand-alone law, but also include pharmaceutical and other goods)	Law Number 166/2016, "Provisions concerning the donation and distribution of food and [...]"	Ease food donation by removing barriers such as donation cost, labeling requirement, donation procedures, and liability requirement	Scheme 2. Incentives (waste tax reduction, liability protection)
Spain/Catalonia (Stand-alone law)	Law Number 3/2020 on food loss and wastage prevention	Obligation to reduce food waste for all stakeholders throughout the whole food supply chain	Scheme 1. Disincentives (penalties and fine)
Poland (Stand-alone law)	Act 2019/1680, on counteracting food waste	Obligation to conclude a contract for the free donation of food between a food seller/retailers and an NGO.	Scheme 2. Disincentives (penalties and fine)
American Continent			
USA (Stand-alone law)	Bill Emerson Good Samaritan Food Donation Act 1996; Federal Food Donation Act 2008.	Exempts food donors from liability; Exempts the federal government and its contractors of cost of donation and liability, unless there is gross negligence or intentional misconduct. Note: different states passed laws regarding tax incentives, food labeling and landfill ban. ⁵⁰	Scheme 2. Incentive (liability protection)
Canada	Alberta law on	Exempts food donor from	Scheme 2.

⁵⁰ Breanna Workman, "12 States with Food Waste Legislation | RTS," accessed January 14, 2025, <https://www.rts.com/blog/12-states-with-food-waste-legislation/>.

(Stand-alone law)	charitable donation of food 2000.	liability, unless the food is unfit for human consumption, have the intention to injure or to cause death or acted recklessly	Incentive (liability protection)
Argentina (Stand alone law)	Decree Number 246/2019 on National plan for food loss and waste reduction	Exempts food donors from liability, unless there is “willful misconduct” (<i>dolo</i>) or “negligence” (<i>culpa</i>)	Scheme 2. Incentive (liability protection)
Colombia (Stand-alone law)	Law Number 1990/2019 on National Policy Against Food Loss and Waste	Promotes food donation and introduced measures to reduce FLW	Scheme 2. No Incentive or Disincentives
Asian Continent			
Japan (Stand-alone law)	Law Number 19/2019 concerning Promotion of Reduction of Food Loss	Promote the reduction of food loss; Establish a basic policy to cut back on food waste; Educate businesses and consumers; Food donations; Commemorating Food loss reduction month & day	Scheme 2 & 3. No Incentive or Disincentives
South Korea (Incorporates FLW into its waste law)	Wastes Control Act Number 15103/2017	Obligation to recycle food waste using paid-biodegradable bags; Pay-as-you-throw system for food waste.	Scheme 1. Disincentive
China (Stand-alone law)	Anti-food Waste Law of the People’s Republic of China (Number 78 of 2021)	Obligation to remind consumers to prevent food waste; Not mislead consumers to order excessive food; Formulate and implement measures	Scheme 3. Disincentive (corrective action or fine)

		to prevent food waste; Prohibition to advocating excessive food consumption and gluttony	
Malaysia (Stand-alone law)	Food Donors Protection Act 2020 (Act 826)	Exempts food donors from civil liability, unless it is caused by negligence, not complied with food safety and hygiene, bad faith.	Scheme 2. Incentive (liability protection)

Source: Author's analysis based on desk research of the relevant national regulations.

Based on Table 2, it can be seen that Italy, Spain, Japan and China are some of the countries that use a specific law approach to address FLW by explicitly define food waste as “all food in the food supply chain [...] remains edible and could potentially be used to feed people or animals [...]”.⁵¹ Japan⁵² and Spain⁵³ have the same approach on covering edible food to be regulated while China covers both edible (“food that is safe to eat or drink”) and inedible FLW (“waste and reduced quality and quantity of food”).⁵⁴

In contrast, Ireland, France, and Korea regulate FLW by integrating it into existing legislative frameworks rather than adopting standalone laws. Consequently, food waste is not distinctly defined but is subsumed under broader waste classifications. For instance, the Korean Wastes Control Act categorizes food waste as “garbage” or food considered “no longer useful for human life or business activity.”⁵⁵ Ireland’s Waste Management Act also does not explicitly define food waste but rather regulate the waste in commercial activities or public establishments where food is supplied.⁵⁶

⁵¹ FAO, “Law No. 166 on the Donation and Distribution of Food and Pharmaceutical Products for Purposes of Social Solidarity and Food Waste Prevention,” accessed January 14, 2025, <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC160906/>.

⁵² Shoji Kobayashi, “Food Recycling Law in Japan” (Tokyo Environmental Public Service Corporation, n.d.), <https://www.seisakukikaku.metro.tokyo.lg.jp/documents/d/seisakukikaku/1501-08-shigen-e>.

⁵³ La Moncloa, “Government of Spain Approves Pioneering Law against Food Waste,” 2022, https://www.lamoncloa.gob.es/lang/en/gobierno/councilministers/paginas/2022/20220607_council.aspx.

⁵⁴ FAO, “Anti-Food Waste Law of the People’s Republic of China,” accessed January 14, 2025, <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC203240>.

⁵⁵ “Wastes Control Act,” accessed January 14, 2025, https://elaw.klri.re.kr/eng_service/lawView.do?hseq=22157&lang=ENG.

⁵⁶ eISB, “S.I. No. 508/2009 - Waste Management (Food Waste) Regulations 2009” (Office of the Attorney General), accessed January 14, 2025, <https://www.irishstatutebook.ie/eli/2009/si/508/made/en/print>.

It is interesting to note that both laws regulate heavily on food waste segregation effort but define food waste differently. Thus, defining food waste and its scope is important to formulate the laws and measures in reducing FLW.

To better understand how different countries uphold these laws, this study uses three categories of FLW regulation schemes: 1.) Waste management (either by segregation requirement or disposal ban or PAYT system); 2.) Food donation; and 3.) Educational Campaign.

The **First** scheme is by regulating the management of waste. South Korea, in 1995, introduced a volume-based user fee system in the Wastes Control Act where citizens were successfully being encouraged to separate food waste and recyclable waste like plastic bottles and cartons. Following this success, from 2005 onward, the government prohibits food waste burial in landfills or cities with a population of 100,000. In 2013, the government introduced compulsory food waste recycling using paid-biodegradable bags and mandated a PAYT system where food waste will be charged in an amount calculated according to the discharged quantity.

Furthermore, the current Wastes Control Act Number 15103, on November 28, 2017, established an obligation for the government officials at provincial, city and local level to create plans to restrain the generation of FLW. Not only the government who need to create such plans, persons who discharge large quantities of food wastes are also obliged to report food waste reduction plans and must treat such wastes to the competent local authority. Any persons who violate the law may be punished by imprisonment with labor or by administrative fines.

The **Second** scheme that is seen in many countries, including the United States of America (USA), Canada, Argentina, Colombia, France, Italy, Poland and Malaysia, are Food Donation Act. Various aspects of food donation were regulated. For example, regarding the obligations, liabilities and responsibilities of food donors and receivers, incentives or disincentives, and principles governing food donation.

In France, the law laid out the conditions for food donations which includes a general ban on food disposal by business in all food supply chains and a ban on donating food unfit for consumption. Failure to comply with the obligation is punishable by fine. For

example, when a food distributor deliberately renders unsold food that is still edible, he/she can be punished with a fine of €3,750.⁵⁷ With this law, France has become the first country in the world to ban (disincentivize) supermarkets from throwing away or destroying unsold food, forcing them instead to donate it to charities and food banks.⁵⁸ It also established the obligation to conclude a contract (partnership) with charities for food donation and oblige specific actors to display their commitment on food waste.⁵⁹

To encourage food donation, legal protection from civil and/or criminal liability is applied if the donated food causes illnesses as long as the donors act in good faith.⁶⁰ The USA, Canada, Argentina, and Malaysia create a specific, stand-alone law on this matter. While the main content of the law is the same (liability exemption), these countries have terms and conditions to nullify this protection. The USA uses “gross negligence or intentional misconduct” while Canada uses “intention to injure or to cause death or acted recklessly.” Argentina exempts food donors from liability unless there is “willful misconduct” (*dolo*) or “negligence” (*culpa*), and Malaysia exempts food donors from civil liability unless it is caused by “negligence, noncompliance with food safety and hygiene, or bad faith.”

Additionally, encouragement in the forms of fiscal instruments like tax reduction and incentive is available in Italy. The Italian Law Number 166 of 2016 promotes the recovery and donation for social welfare purposes, where the conditions for donating food to the donor organizations, standards and conservations of surplus food are regulated. It simplifies donations for food businesses as many were concerned about violating health and safety laws by donating food marginally past its sell-by date.⁶¹ They will not face sanctions for giving away food and will pay less waste tax the more

⁵⁷ Art. L. 541-15-6.-I.- of French Law N138/2016

⁵⁸ Angelique Chrisafis, “French Law Forbids Food Waste by Supermarkets,” *The Guardian*, February 4, 2016, sec. World news, <https://www.theguardian.com/world/2016/feb/04/french-law-forbids-food-waste-by-supermarkets>.

⁵⁹ Pierre Condamine, “France’s Law for Fighting Food Waste,” 2020, https://zerowasteurope.eu/wp-content/uploads/2020/11/zwe_11_2020_factsheet_france_en.pdf.

⁶⁰ See Figure 6 on USA, Canada, Argentina, and Malaysia.

⁶¹ BBC, “Italy Adopts New Law to Slash Food Waste,” *BBC News*, August 3, 2016, sec. Europe, <https://www.bbc.com/news/world-europe-36965671>.

they donate. Farmers are also encouraged to give away unsold produce to charities by removing the incurring costs (economic/fiscal instrument).

The Third schemes that are evident in the examined regulations are educational efforts to raise or improve the awareness on FLW issues. The Japanese Law Number 19/2019 concerning Promotion of Reduction of Food Loss clarifies the responsibilities of the national and local governments to educate businesses and consumers to reduce FLW.⁶² The law in question also urges businesses and consumers to be proactive about reducing food loss,⁶³ such as sticking posters or other propaganda materials to take leftovers from a restaurant since it's uncommon in Japanese culture.⁶⁴ Interestingly, this law designates October 30 as Food Loss Reduction Day and October as Food Loss Reduction Month.⁶⁵

In China's Anti-food Waste Law of April 2021, government organs, people's organizations, state-owned enterprises, and public institutions are required to take the lead in saving food and opposing waste during official events.⁶⁶ Catering services are obliged to actively remind consumers to prevent food waste and to not mislead consumers to order excessive food and cause substantial waste.⁶⁷ Violation to this mandate will be subject to corrective action or fine between 1.000 and 10.000 Yuan. News media advocating excessive food consumption and gluttony are also prohibited under this law. If the violator refuses to take corrective action or the circumstances are serious, they will be fined between 10.000 and 100.000 Yuan.

In addition to these three measures, procedural matters such as who is the target or actor of the law and what or which FLW stages are regulated are also important to note as these countries vary in addressing such questions. For instance, China targets top-down actors from government organs to the media. While Japan and Korea obligate the

⁶² Article 14 of Japanese Law N19/2019

⁶³ Article 5 & 6 of Japanese Law N19/2019

⁶⁴ Library of Congress, "Japan: Diet Passes New Act Aimed at Reducing Food Loss," 2019, <https://www.loc.gov/item/global-legal-monitor/2019-10-09/japan-diet-passes-new-act-aimed-at-reducing-food-loss/>.

⁶⁵ Article 9 of Japanese Law N19/2019

⁶⁶ Article 3 Law of the People's Republic of China on Food Waste No 78, April 29, 2021 (hereinafter Chinese Law N78/2021) <http://www.npc.gov.cn/englishnpc/c23934/202112/f4b687aa91b0432baa4b6bdee8aa1418.shtml#:~:text=The%20Law%20of%20the%20People's,of%20the%20date%20of%20promulgation.>

⁶⁷ Feng Y., Marek C., and Tosun J., "Fighting Food Waste by Law: Making Sense of the Chinese Approach," *Journal of Consumer Policy* 45 (2022): 457–79.

national and local government to establish a policy or plan to reduce food waste. In Ireland, the scope of application is provided in detail such as food waste arising at, or collected from the commercial or retail activity that serves hot food, public house where food is supplied, employees, guest house, shop or supermarket, a restaurant or cafe and similar establishments, hospitals, schools, government office, etc.

It is evident from this analysis that legal measures can help reduce food waste⁶⁸ by addressing legal uncertainties, such as liability risks from food donations, and by implementing positive incentives and disincentive approaches like penalties to encourage responsible practices among all stakeholders.⁶⁹ Just like the carrot and stick metaphor, countries like Italy use “carrot” by offering generous tax incentives to food donors while France uses the “stick” approach by entailing fines for stores that failed to donate food.⁷⁰ Moreover, regulation can also serve as a command and control mechanism to achieve the desired goals of reducing FLW which later contribute to a better and fairer agrifood system.

The Prospects of Regulating Food Loss and Waste in Indonesia

Despite the current development and variety of the global FLW regulations, Indonesia is still lagging as its current legal framework is insufficient to tackle the issue.⁷¹ Indonesia lacks a cohesive and comprehensive framework that specified liability protections for food donors and food recovery organizations, lacks detailed food safety standards, standardized date labels, and tax benefits to encourage FLW reduction.⁷²

The lack of rules in Indonesia on how the public, hotels, restaurants, and catering (HORECA) manage their FLW makes prevention and control of FLW in its

⁶⁸ Gersen Jacob E. and Posner Eric A., “Soft Law: Lessons from Congressional Practice,” *Stanford Law Review* 61, no. 3 (2008): 573–627.

⁶⁹ Dennis W. K. Khong and Josephine H. L. Goh, “Anti-Food Waste Laws: A Comparative Analysis,” in *Proceedings of the International Conference on Law and Digitalization (ICLD 2022)*, ed. Yang Chik Adam and Azwina Wati Binti Abdull Manaf (Paris: Atlantis Press, 2022), 18, https://doi.org/10.2991/978-2-494069-59-6_3.

⁷⁰ Ibid p28

⁷¹ Food Banking Regional Network, *The Global Food Donation Policy Atlas: Indonesia Legal Guide* (2023), https://www.foodbanking.org/wp-content/uploads/2023/01/The-Global-Food-Donation-Policy-Atlas_Indonesia_Legal-Guide.pdf.

⁷² Food Banking Regional Network, *The Global Food Donation Policy Atlas: Indonesia Executive Summary* (2023), https://www.foodbanking.org/wp-content/uploads/2023/01/The-Global-Food-Donation-Policy-Atlas_Indonesia_Executive-Summary.pdf.

implementation far from ideal.⁷³ The majority of food waste, particularly from the business sector, will end up in landfills if there are no regulations governing how to distribute food as well as how to avoid and treat food waste.⁷⁴ It should be underlined first that this FLW problem has various dimensions.

Before entering the analysis of effective regulatory construction, an overview of FLW problems in Indonesia will be presented. According to existing studies, in general, from 2000-2019 it is estimated that FLW stockpiles reached 115-184 kg per capita/year. From that number, the largest stockpile comes from the consumption stage when viewed from the supply chain stage. Based on the type of food, the largest generation comes from food plants, namely rice. Meanwhile, vegetables are the least efficient sector when viewed based on the food sector.⁷⁵

Given that the first problem related to FLW in Indonesia revolves around the absence of specific regulations, a law-level regulations (*undang-undang*) are urgently needed to complement the already existing law on waste, environment, and any other relevant legislation. Furthermore, the law must specifically regulate FLW and at least contain an unequivocal definition of FLW, a mechanism to deal with FLW problems, a separated chapter regulating food donations, legal protection for food donors, sanctions that can have a deterrent effect, and regulate several economic instruments in the form of taxes, incentives/disincentives, and subsidies.

In Indonesia, food waste management has not yet garnered enough attention, as reflected in Wardhani, L.T.A.L., *et al.* (2023) which analyzed that the Waste Management Act and Government Regulation on household waste management does not explicitly address food waste. Although the Government Regulation required producers to implement waste recycling there is no mandate to recover food surplus through donations. Furthermore, policies offering incentives, such as tax reductions or tax relief, are absent which could motivate producers, retailers, and distributors to donate surplus food and reduce waste.

⁷³ BAPPENAS, "Study Report on Food Loss and Waste in Indonesia," 2021, <https://lcdi-indonesia.id/wp-content/uploads/2021/07/Report-Kajian-FLW-ENG.pdf>.

⁷⁴ *ibid*

⁷⁵ *ibid*

The regulatory model in the United States, Italy, Spain, and Malaysia, which is the stand-alone law model, can be emulated to be applied in Indonesia. This is because Indonesia does not have a specific regulation to address FLW. Even if it is only generally addressed, it is feared that the norms to regulate FLW cannot be implemented properly as it has the risk of inconsistency with other rules, thus it is important to explicitly mention and define FLW in a stand-alone law rather than incorporating it into the existing rules. Therefore, up to this point, a combination of CaC is needed, in the form of legislation and its implementing regulations, as well as economic instruments.

In regards to economic instruments, tax incentives can be used. Simply put, the scheme that can be applied is to provide incentives in the form of tax exemptions for food donors so that they are encouraged to donate food if there are leftovers. Italy can be used as an example in implementing this scheme. In addition, there must also be disincentives for food producers who dispose food waste in a landfill and use equipment below the established standards to reduce the creation of food waste, especially at the production level. For example, poor storage systems, packaging and transportation may cause food loss during the distribution stage.

The application of this disincentive instrument can be combined with the CaC instrument in the form of obligations, which is set by the government through legal regulations governing the standard of equipment⁷⁶ used by business actors in the food production sector. Finally, subsidies can also be provided by the government in the form of adequate facilities and infrastructure to support food production efficiency.

Furthermore, taking an example from Japan, education related to FLW problems must continue to be provided by the government both to business actors and consumers. Additionally, the FLW campaign in order to raise awareness on the problem and the strategy to reduce it must also be provided by the government. If this instrument is

⁷⁶ This is very important, because FLW in developing countries often results from poor harvesting techniques, lack of storage, packing, and transportation infrastructure. Therefore, making policies that contain minimum equipment standards is very important. Chetna Chauhan et al., "Food Loss and Waste in Food Supply Chains. A Systematic Literature Review and Framework Development Approach," *Journal of Cleaner Production* 295 (May 2021): 2 and 6.

applied, a combination of CaC instruments, economics instruments, and education and information instruments is needed.

In Indonesia, education and information instruments can also be focused on education and training, which can enhance the capacity of business actors and the community in facing environmental issues. With such education and training, it is hoped that there will be improvement in compliance with environmental policies. The government can provide educational and training facilities to complement the regulatory instruments that have been established.⁷⁷

The reason for choosing a combination of CaC instruments and economic instruments is that the effectiveness of CaC depends heavily on the active role of the government. In addition to that, the nature of legal regulations, that tend to be static, often make legal development slower, especially when it comes to technological developments. The government will also find it very difficult to detect and identify pollutants as well as environmental pollution conditions that exist at many points and are difficult to trace⁷⁸ (FLW problems have this characteristic).

Implementing CaC without combining it with economic instruments also creates no incentive for FLW producers to exceed the standard limits required by the government. For example, in the use of food production facilities. Therefore, CaC needs to be combined with economic instruments because they can encourage FLW producers to change their behavior (in this case through incentives/disincentives, and subsidies). In other words, governments do not have to be rigid in complying with the prevailing regulations or scare business actors with sanctions. Instead, they can be more flexible pursuant to market mechanisms. However, the advantages of CaC are still significant because regulatory instruments will create legal certainty, and with legal certainty, business actors and consumers can gain a better understanding of what FLW is, and the government will have clearer legal basis in identifying violations and in enforcing the law.

⁷⁷ Gunningham, Grabosky, and Sinclair, *Smart Regulation*, 70.

⁷⁸ Neil Gunningham et al, *Smart regulation... op.cit*, 56.

Given that the solutions to FLW problems must also involve the community, education and information instruments should also be considered worthy of attention. Providing education to the community will prove useful in resolving this problem. The government can create official information related to the source or cause of FLW, the amount and the strategy to reduce FLW for different actors. Business actors also are needed to provide annual reports regarding their FLW reduction progress so that the government can evaluate and measure all the efforts to achieve Target 12.3 of the Sustainable Development Goals. Such information will ease the government in evaluating the programs that have been carried out, and prove useful for the community and environmentalists who are also engaged in fixing the FLW problem. Based on the previous argument, utilizing a combination of CaC instruments, economic instruments, and education and information instruments is recommended to resolve the FLW problem in Indonesia. Coordination among relevant ministries, national and local government bodies such as the NFA, NNA and DLH, as well as private sectors and the general public, is the key to implement these instruments effectively. With the increased awareness of the FLW issue and its consequences, it is imperative that Indonesia t adopt a stand-alone law to address the issue effectively.

CONCLUSION

Indonesia acknowledges food as a fundamental human right which the current Indonesian President has prioritized in achieving food security and self-sufficiency. There is an urgent need to properly regulate and rectify the existing inefficiencies along the food supply chain that contribute to the FLW generation – from production to consumption and disposal – which needs to be addressed specifically in a stand-alone law. However, none of the existing regulations has mentioned or defined the term “food waste”, “food lost” or both.

Through the comparative law-legal transplantation approach and the smart regulation concept, this study recommends Indonesia to take lessons from the United States, Spain, and Italy which have applied a combination of CaC instruments and economic instruments appropriately in the food donation and food waste disposal

sectors. In addition to these two instruments, the education and information instruments as applied in Japan and China can also be adopted to strengthen the commitment of stakeholders, such as the government, media, and restaurants. With these three instruments, it is hoped that the strategies to resolve the FLW problem can be implemented not just by the government, but also by the business actors and communities along the supply chain to ensure the effective reduction of FLW with the aim to achieve food security and sustainable development.

ACKNOWLEDGMENTS

The authors acknowledge the support provided by the Faculty of Law, Universitas Islam Indonesia, particularly through the 2023 Coaching Clinic program. The guidance and constructive feedback received from the advisors during this program were very helpful in the development of this paper.

COMPETING INTEREST

there is no conflict of interest in the publication of this article

REFERENCES

- Abiad, Mohamad G., and Lokman I. Meho. "Food Loss and Food Waste Research in the Arab World: A Systematic Review." *Food Security* 10, no. 2 (2018).
- Andriani, Helen, Erlin Friska, Miftahul Arsyi, Alphyyanto Eko Sutrisno, Alexander Waits, and Nurul Dina Rahmawati. "A Multilevel Analysis of the Triple Burden of Malnutrition in Indonesia: Trends and Determinants from Repeated Cross-Sectional Surveys." *BMC Public Health* 23, no. 1 (September 21, 2023): 1836. <https://doi.org/10.1186/s12889-023-16728-y>.
- Andini, Raiza. "Titiek Soeharto: Food Waste Perlu Diatur Dalam UU Pangan," May 7, 2025. <https://rmol.id/politik/read/2025/05/07/665563/titiek-soeharto-food-waste-perlu-diatur-dalam-uu-pangan>.
- Anggoro, Syahriza Alkohir. "TRANSPLANTASI HUKUM DI NEGARANEGARA ASIA: SUATU PERBANDINGAN." *Indonesia Law Reform Journal*, 2021. <https://download.garuda.kemdikbud.go.id/article.php?article=3186262&val=28019&title=TRANSPLANTASI%20HUKUM%20DI%20NEGARA-NEGARA%20ASIA%20SUATU%20PERBANDINGAN>.

- Antara. "Pemerintah Bakal Bikin Undang-Undang Yang Mengatur Tentang 'Food Loss and Waste' - Jawa Pos," November 10, 2023. https://www.jawapos.com/ekonomi/013266843/pemerintah-bakal-bikin-undang-undang-yang-mengatur-tentang-food-loss-and-waste#google_vignette.
- — —. "Sarinah First Mall to Go Food Waste-Free, Earns BPN Praise - ANTARA News," 2022. <https://en.antaranews.com/news/244657/sarinah-first-mall-to-go-food-waste-free-earns-bpn-praise>.
- Ayu, Ni Gusti, Dyah Satyawati, Nyoman Suyatna, Putu Gede, Arya Sumerta Yasa, I Dewa, Gede Palguna, and Nadeeka Rajaratnam. "REGULATING FOOD WASTE MANAGEMENT IN INDONESIA: DO WE NEED AN OMNIBUS LAW (AGAIN)?" *Indonesia Law Review* 14, no. 1 (2024). <https://doi.org/10.15742/ilrev.v13n3.1>.
- Bayar, Esila, and Zeynep Begüm Kalyoncu Atasoy. "A Narrative Review Aligning Food Security with Food Loss and Waste Reduction." *Erzincan Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, no. SUIC (December 31, 2024): 1-14. <https://doi.org/10.18185/ERZIFBED.1534572>.
- Bagherzadeh, Morvarid, Mitsuhiro Inamura, and Hyunchul Jeong. "Food Waste Along the Food Chain." *OECD Food, Agriculture and Fisheries Papers*. Vol. 71. OECD Food, Agriculture and Fisheries Papers, December 22, 2014. <https://doi.org/10.1787/5jxrcmftzj36-en>.
- BAPPENAS. "Study Report on Food Loss and Waste in Indonesia," 2021. <https://lcdi-indonesia.id/wp-content/uploads/2021/07/Report-Kajian-FLW-ENG.pdf>.
- BBC. "Italy Adopts New Law to Slash Food Waste." *BBC News*, August 3, 2016, sec. Europe. <https://www.bbc.com/news/world-europe-36965671>.
- Boiteau, Jocelyn M., and Prabhu Pingali. "Can We Agree on a Food Loss and Waste Definition? An Assessment of Definitional Elements for a Globally Applicable Framework." *Global Food Security* 37 (June 2023): 100677. <https://doi.org/10.1016/j.gfs.2023.100677>.
- "Begini Skema Sederhana Pengolahan Food Waste Program Makan Bergizi Gratis | Tempo.Co." Accessed June 10, 2025. <https://www.tempo.co/politik/begini-skema-sederhana-pengolahan-food-waste-program-makan-bergizi-gratis-1192493>.
- BPN. "Badan Pangan Nasional - Cegah Food Waste, NFA Gencarkan Gerakan Selamatkan Pangan Untuk Ketahanan Pangan Dan Gizi - Blog," 2023. <https://badanpangan.go.id/blog/post/cegah-food-waste-nfa-gencarkan-gerakan-selamatkan-pangan-untuk-ketahanan-pangan-dan-gizi>.
- Chalak, Ali, Chaza Abou-Daher, Jad Chaaban, and Mohamad G. Abiad. "The Global Economic and Regulatory Determinants of Household Food Waste Generation: A Cross-Country Analysis." *Waste Management* 48 (February 2016): 418-22. <https://doi.org/10.1016/j.wasman.2015.11.040>.
- Chauhan, Chetna, Amandeep Dhir, Manzoor Ul Akram, and Jari Salo. "Food Loss and

- Waste in Food Supply Chains. A Systematic Literature Review and Framework Development Approach." *Journal of Cleaner Production* 295 (May 2021): 126438.
- Chrisafis, Angelique. "French Law Forbids Food Waste by Supermarkets." *The Guardian*, February 4, 2016, sec. World news. <https://www.theguardian.com/world/2016/feb/04/french-law-forbids-food-waste-by-supermarkets>.
- Cohen, Molly, Emily M. Broad Leib, Regan Plekenpol, Oscar Heanue, and Owen Hosseinzadeh. "Indonesia Legal Guide Food Donation Law and Policy," 2022. <https://www.foodbanking.org/wp-content/uploads/2023/01/The-Global-Food-Donation-Policy-Atlas-Indonesia-Legal-Guide.pdf>.
- Condamine, Pierre. "France's Law for Fighting Food Waste," 2020. https://zerowasteeurope.eu/wp-content/uploads/2020/11/zwe_11_2020_factsheet_france_en.pdf.
- Davis, Derrin, and Donald F. Gartside. "Challenges for Economic Policy in Sustainable Management of Marine Natural Resources." *Ecological Economics* 36, no. 2 (February 2001): 223-36.
- eISB. "S.I. No. 508/2009 - Waste Management (Food Waste) Regulations 2009." Office of the Attorney General. Accessed January 14, 2025. <https://www.irishstatutebook.ie/eli/2009/si/508/made/en/print>.
- Faishal, Achmad, and Suprpto. "Laws and Regulations Regarding Food Waste Management as a Function of Environmental Protection in a Developing Nation." *International Journal of Criminal Justice Science* 17, no. 2 (2022).
- FAO. "Anti-Food Waste Law of the People's Republic of China." Accessed January 14, 2025. <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC203240>.
- — —. "Global Initiative on Food Loss and Waste Reduction." Rome: Food and Agriculture Organization of the United Nations, 2015. <https://openknowledge.fao.org/server/api/core/bitstreams/57f76ed9-6f19-4872-98b4-6e1c3e796213/content>
- — —. "Law No. 166 on the Donation and Distribution of Food and Pharmaceutical Products for Purposes of Social Solidarity and Food Waste Prevention." Accessed January 14, 2025. <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC160906/>.
- — —. "MOVING FORWARD ON FOOD LOSS AND WASTE REDUCTION FOOD AND AGRICULTURE," 2019. www.fao.org/publications.
- "Food Security to Remain Priority for Two--Three Years: Prabowo - ANTARA News." Accessed June 15, 2025. <https://en.antaranews.com/news/359101/food-security-to-remain-priority-for-two-three-years-prabowo>.
- Lathif, Nazaruddin. "TEORI HUKUM SEBAGAI SARANA ALAT UNTUK MEMPERBAHARUI ATAU MEREKAYASA MASYARAKAT." PALAR |

- PAKUAN LAW REVIEW 3, no. 1 (January 1, 2017). <https://doi.org/10.33751/PALAR.V3I1.402>.
- Lindsey, Tim. "Law Reform in Developing and Transitional States." *Law Reform in Developing and Transitional States*, December 6, 2006, 1-420. <https://doi.org/10.4324/9780203962305/LAW-REFORM-DEVELOPING-TRANSITIONAL-STATES-TIM-LINDSEY/RIGHTS-AND-PERMISSIONS>.
- Liputan6. "Komisi IV DPR Temui 8 Profesor IPB Bahas 5 Isu Penting Pangan, Termasuk MBG - News Liputan6.Com," May 13, 2025. <https://www.liputan6.com/news/read/6019156/komisi-iv-dpr-temui-8-profesor-ipb-bahas-5-isu-penting-pangan-termasuk-mbg?page=3>.
- Gunningham, Neil, Peter N. Grabosky, and Darren Sinclair. *Smart Regulation: Designing Environmental Policy*. Oxford Socio-Legal Studies. Oxford : New York: Clarendon Press ; Oxford University Press, 1998.
- Gunningham, Neil, and Darren Sinclair. "Regulatory Pluralism: Designing Policy Mixes for Environmental Protection." *Law & Policy* 21, no. 1 (January 1999): 49-76.
- "Indonesia Green Growth Program." Accessed January 13, 2025. <https://greengrowth.bappenas.go.id/en/sustainable-food-waste-management-contributes-to-low-carbon-development-in-indonesia/>.
- Jacob E., Gersen, and Posner Eric A. "Soft Law: Lessons from Congressional Practice." *Stanford Law Review* 61, no. 3 (2008).
- Johansson, Markus, David Langlet, Olof Larsson, Åsa Löfgren, Niklas Harring, and Sverker Jagers. "A Risk Framework for Optimising Policies for Deep Decarbonisation Technologies." *Energy Research & Social Science* 82 (December 2021): 102297.
- Khong, Dennis W. K., and Josephine H. L. Goh. "Anti-Food Waste Laws: A Comparative Analysis." In *Proceedings of the International Conference on Law and Digitalization (ICLD 2022)*, edited by Yang Chik Adam and Azwina Wati Binti Abdull Manaf, 15-34. Paris: Atlantis Press, 2022. https://doi.org/10.2991/978-2-494069-59-6_3.
- Kobayashi, Shoji. "Food Recycling Law in Japan." Tokyo Environmental Public Service Corporation, n.d. <https://www.seisakukikaku.metro.tokyo.lg.jp/documents/d/seisakukikaku/1501-08-shigen-e>.
- La Moncloa. "Government of Spain Approves Pioneering Law against Food Waste," 2022. https://www.lamoncloa.gob.es/lang/en/gobierno/councilministers/paginas/2022/20220607_council.aspx.
- Library of Congress. "Japan: Diet Passes New Act Aimed at Reducing Food Loss," 2019. <https://www.loc.gov/item/global-legal-monitor/2019-10-09/japan-diet-passes-new-act-aimed-at-reducing-food-loss/>.

- Lin, Kwok Pei. "Waste Management Law & Policy in Japan and South Korea, with Particular Focus on Food Wastes: Lessons for Singapore." Accessed January 14, 2025. <https://scholarbank.nus.edu.sg/entities/publication/1415bfd2-a944-44a5-b679-418fcee2bf9d>.
- Macagno, Fabrizio. "Definitions in Law." *Bulletin Suisse de Linguistique Appliquée* 2 (2010).
- Ministry of National Development Planning of the Republic of Indonesia. "Study Report : Food Loss And Waste In Indonesia. Supporting the Implementation of Circular Economy and Low Carbon Development," 2021. <https://lcdi-indonesia.id/wp-content/uploads/2021/07/Report-Kajian-FLW-ENG.pdf>.
- Munawaroh, Nafiatul. "Arti Law as a Tool of Social Engineering | Klinik Hukumonline," 2023. <https://www.hukumonline.com/klinik/a/arti-law-as-a-tool-of-social-engineering-lt646f063a5c77a/>.
- NFA. "Badan Pangan Nasional - NFA Dorong Proses Penyusunan Regulasi Turunkan Food Waste - Blog," 2024. <https://badanpangan.go.id/blog/post/nfa-dorong-proses-penyusunan-regulasi-turunkan-food-waste>.
- Parry, Andrew, Paul Bleazard, and Koki Okawa. "Preventing Food Waste: Case Studies of Japan and the United Kingdom." *OECD Food, Agriculture and Fisheries Papers*. Vol. 76. OECD Food, Agriculture and Fisheries Papers, March 5, 2015. <https://doi.org/10.1787/5js4w29cf0f7-en>.
- Pierrehumbert, Raymond. "There Is No Plan B for Dealing with the Climate Crisis." *Bulletin of the Atomic Scientists* 75, no. 5 (September 3, 2019): 215–21. <https://doi.org/10.1080/00963402.2019.1654255>.
- Palmisano, Giovanni Ottomano, Francesco Bottalico, Hamid El Bilali, Gianluigi Cardone, and Roberto Capone. "Food Losses and Waste in the Context of Sustainable Food and Nutrition Security." *Food Security and Nutrition*, January 1, 2020, 235–55. <https://doi.org/10.1016/B978-0-12-820521-1.00010-1>.
- Pasarín, Valeria, and Teemu Viinikainen. "LEGAL BRIEF Enabling a Legal Environment for the Prevention and Reduction of Food Loss and Waste Enabling a Legal Environment for the Prevention and Reduction of Food Loss and Waste," 2022.
- Popik, Kenneth. "A Comprehensive Review of Safety, Security, and Food Waste in the Food Supply Chain Logistics." *International Journal of Agricultural and Life Sciences*, September 30, 2024, 444–49. <https://doi.org/10.22573/SPG.IJALS.024.S122000122>.
- "Program MBG Berpotensi Timbulkan 1,4 Juta Ton Sampah Makanan per Tahun | Republika Online." Accessed June 10, 2025. <https://esgnow.republika.co.id/berita/swwphd416/program-mbg-berpotensi-timbulkan-14-juta-ton-sampah-makanan-per-tahun>.
- Purwadi, Hari, Adi Sulistiyono, and Adriana Grahani Firdausy. "KONSEKUENSI TRANSPLANTASI HUKUM TERHADAP PANCASILA SEBAGAI NORMA DASAR DAN HUKUM LOKAL." *Yustisia* 4, no. 1 (April 1, 2015):

- 73–88. <https://doi.org/10.20961/YUSTISIA.V4I1.8622>.
- Puspa, Atalya. “Pemerintah Fasilitas Pengelolaan Food Waste Pada Program Makan Bergizi Gratis,” 2025. <https://www.metrotvnews.com/read/kM6CRLXl-pemerintah-fasilitas-pengelolaan-food-waste-pada-program-makan-bergizi-gratis>.
- Putra, Nandito. “Empat Usulan Yayasan Kehati Dalam RUU Pangan | Tempo.Co,” June 2025. <https://www.tempo.co/ekonomi/empat-usulan-yayasan-kehati-dalam-ruu-pangan-1674565>.
- Saliem, H. P., S. Mardianto, Sumedi, E. Suryani, and S. M. Widayanti. “Policies and Strategies for Reducing Food Loss and Waste in Indonesia.” IOP Conference Series: Earth and Environmental Science 892, no. 1 (November 23, 2021). <https://doi.org/10.1088/1755-1315/892/1/012091>.
- Santeramo, Fabio G. “Exploring the Link among Food Loss, Waste and Food Security: What the Research Should Focus On?” Agriculture and Food Security 10, no. 1 (December 1, 2021). <https://doi.org/10.1186/S40066-021-00302-Z>.
- Siddiqui, Saman, Hullash Chauhan, and Ashish Kumar. “Waste Management and Its Impact on Food Security.” Advanced Computational Methods for Agri-Business Sustainability, July 10, 2024, 287–304. <https://doi.org/10.4018/979-8-3693-3583-3.CH016>.
- Thi, Ngoc Bao Dung, Gopalakrishnan Kumar, and Chiu-Yue Lin. “An Overview of Food Waste Management in Developing Countries: Current Status and Future Perspective.” Journal of Environmental Management 157 (July 2015): 220–29. <https://doi.org/10.1016/j.jenvman.2015.04.022>.
- “Tingkat Kelaparan Indonesia Tergolong Tinggi Di ASEAN.” Accessed January 13, 2025. <https://databoks.katadata.co.id/infografik/2024/01/22/tingkat-kelaparan-indonesia-tergolong-tinggi-di-asean>.
- Tempo.co. “Begini Skema Sederhana Pengolahan Food Waste Program Makan Bergizi Gratis | Tempo.Co,” 2025. <https://www.tempo.co/politik/begini-skema-sederhana-pengolahan-food-waste-program-makan-bergizi-gratis-1192493>.
- Tyesta, Lita, Addy Listya Wardhani, Wahyu S Minarto, Virda Maharani, and Abby Zharfan. “Examining Policy Aspects of Food Waste in Indonesia Examining Policy Aspects of Food Waste in Indonesia” 1270 (n.d.): 12022. Accessed June 14, 2025. <https://doi.org/10.1088/1755-1315/1270/1/012022>.
- UNEP. “Food Loss and Waste Must Be Reduced for Greater Food Security and Environmental Sustainability,” 2020. <https://www.unep.org/news-and-stories/press-release/food-loss-and-waste-must-be-reduced-greater-food-security-and>.
- Wardhani, Lita Tyesta Addy Listya, Wahyu S. Minarto, Virda Maharani, and Abby Zharfan. “Examining Policy Aspects of Food Waste in Indonesia.” IOP Conference Series: Earth and Environmental Science 1270, no. 1 (2023). <https://doi.org/10.1088/1755-1315/1270/1/012022>.

- Waalwijk, Kees. *The Character of Scholarly Legal Research: Paradigms, Problem, Questions, Hypotheses, Sources, Methods*. Leiden: Universiteit Leiden, 2009.
- 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 (December 31, 2023): 2202938. <https://doi.org/10.1080/23311886.2023.2202938>.
- "Wastes Control Act." Accessed January 14, 2025. https://elaw.klri.re.kr/eng_service/lawView.do?hseq=22157&lang=ENG.
- Wibisana, Andri G. "Instrumen Ekonomi, Command and Control, Dan Instrumen Lainnya: Kawan Atau Lawan? Suatu Tinjauan Berdasarkan Smart Regulation." *Bina Hukum Lingkungan* 4, no. 1 (October 25, 2019): 172. <https://doi.org/10.24970/bhl.v4i1.104>.
- Workman, Breanna. "12 States with Food Waste Legislation | RTS." Accessed January 14, 2025. <https://www.rts.com/blog/12-states-with-food-waste-legislation/>.
- Y., Feng, Marek C., and Tosun J. "Fighting Food Waste by Law: Making Sense of the Chinese Approach." *Journal of Consumer Policy* 45 (2022)
- Zagata, Michael D. "'Command and Control versus Economic Incentives in Environmental Protection.'" *Albany Law Environmental Outlook* 2, no. 3 (1996).
- Zhafira, Arnidhya Nur. "Kemenko Pangan Soroti Sinergi Dan Tolok Ukur Dalam RUU Pangan - ANTARA News," June 11, 2025. <https://www.antaranews.com/berita/4891253/kemenko-pangan-soroti-sinergi-dan-tolok-ukur-dalam-ruu-pangan>.