Best Practices of Circular Food Production and Consumption in Japan and Korea

A Handbook for Local Governments

ICLEI
Local Governments for Sustainability
EAST ASIA

KONRAD ADENAUER STIFTUNG

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ABOUT ICLEI

ICLEI – Local Governments for Sustainability is a global network of more than 2,500 local and regional governments committed to sustainable urban development. Active in 125 countries, we influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development. Our Members and team of experts work together through peer exchange, partnerships and capacity building to create systemic change for urban sustainability.

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CONTENTS

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INTRODUCTION

Urbanization has profoundly changed food consumption patterns. Globally, urban dwellers consume up to 70% of the food supply. In the Asian and Pacific region, with more than 2.3 billion population living in cities[1] and the ongoing expansion of urbanization, the demand for food and nutrition is increasing.

On the other hand, nearly one-third of the food produced for human consumption is wasted and lost. In highly urbanized Asian countries such as Korea, 5.81 million tons of food was discarded in 2017[2]. Another statics shows that in 2018, 15,680 tons of food was thrown away per day[3]. In Japan, the society generates 15 million tons of food loss and waste every year. This includes 6 million tons of food which can be eaten but eventually ends up being discarded[4].

Food accounts for 26% of global greenhouse gas (GHG) emissions, including emissions related to land-use change, supply chain operation, fossil fuels used in logistics and embodied carbon dioxide of food packaging[5 6]. In Japan, approximately 16.9 million tons of GHG emissions are related to food imports, which is twice the emissions generated from local food delivery. With urbanization and the growth of the middle class in Asia, people are consuming more animal-source and processed food[7]. The most popular Korean food—ox bone soup (*Seolleongtang*)—has a high carbon footprint: A single-serve broth emits 10 kg GHG emissions.

The current food system also leads to biodiversity loss, environmental degradation, and water pollution[8]. Most of the nitrogen components of artificial fertilizers flow into rivers and oceans. Crops absorb less than 50% of the components. The abundant nitrogen and phosphorus provide a nutrient-rich environment for algae, but excessive nutrients cause eutrophication and oxygen-deficient water[9]. The repeated use of machinery on soil leads to productivity decline and low crop yields[10].

Food systems require a transformation for sustainability. It is necessary to have a comprehensive and holistic view. The circular economy provides a new lens through which stakeholders can explore how food system connects people and ecology.

Overview

In East Asia, transformation can be dated back to 1960-1970s, and it continues till today. Japan and Korea experienced rapid urbanization and industrialization in the 1970s. When the urban and rural areas face profound changes of production and consumption patterns, the food system becomes one of the crucial domains where many social and environmental movements focus on.

Japan

In the late 1960-1970s, Japan adopted agriculture modernization and industrialization due to rapid economic growth[11]. Chemical additives were over-utilized and people experienced negative impacts[12,13]. The obsession of massive production widened the distance between consumers and producers, and it destroyed the balance between human and nature.

Minamata disease and other industrial pollution amplified Japanese consumers' awareness of the relationship between food safety, human health, and environment. Concerned consumers sought chemical-free food from trusted farmers and refused to massive-produced food grown with chemicals. Producers responded to the demand through direct delivery for milk and organic products. The partnership between producers and consumers were formed and driven by concerns about food safety.

The "One Village One Product movement" was first initiated in the late 1970s in Japan. Each local government promotes one agricultural product, including indigenous, original and rare agriculture plants. The movement aimed to enable products which did not meet large market standards to become cash crops. Later, with the rising awareness of sustainable development in the agriculture sector and rural development and the *Basic Law on Food, Agriculture and Rural Areas*, the "*Chisan-chisho* movement" (local production and local consumption) was active in the 1990s and 2000s. The movement argued that local food production would restore the trust and safety of food, revitalize the local economy, reduce the ecological footprint, as well as rebuild Japanese tradition and culture. Food was given a significant role in environmental and socio-economic development for the first time.

With the surging awareness of sustainable development and resource efficiency, since the 2000s, the word "*Mottainai*" has been embraced again in the Japanese society. It is a word used to express disappointment and regrets for the wastefulness. The government utilized the phrase in a national campaign for food loss reduction, advocating "bring back mottainai to food" and "the spirit of '*Mottainai*' is Japanese culture that we are proud of"[14]. Since then, more citizens connected their daily food consumption behaviors with the concept. In a recent study published in 2019, it states that "when asking the participants about their overall thoughts about food waste, some of them answered concisely: '*Mottainai*'"[15].

As sustainability gradually went mainstream, the Japanese society became more aware of the ecological implication of food. Biodiversity-based agricultural practices protecting endangered species were promoted by local governments and Japan Agricultural Cooperatives for the mutually beneficial human-nature relationships[16,17]. The revival and protection of indigenous crops and vegetables were brought back to the food sector again. This time it was not for profit but more about sustainable regional development and local environment[18].

Korea

In Korea, the agricultural industrialization was started in the 1970s. Korean farmers excluded indigenous species of rice and heavily relied on chemicals and synthetic fertilizers for increasing productivity. The free-trade policy led to the domination of imported grains and products[19]. The agriculture sector experienced a dramatic decrease of profit and the ecological landscapes.

The "Hansalim movement" emerged in the late 1980s as a response to change the food and agriculture system. The word '*Hansalim*' means "living in unity" and "save all living things"[20]. The movement advocated the philosophy of co-existence of human and nature[21]. Consumers and producers were encouraged to build direct connection. Consumers would understand and treasure the producers' efforts, and producers would cultivate grains and vegetables with the respect of nature.

The 1980s was the time when farmers were hit severely by the free-trade policy and consumers were disappointed in finding chemical additives from imported products. The "Hansalim movement" provided an alternative to set up a new consumption-production relationship. The ideology of ecology and the harmonious human-nature relationship later on had a significant impact on Korea's environmental campaigns and opens up a new era of the New Environment Movement[22, 23]. The "living in unity" philosophy also enriched the Hansalim movement with a social perspective. The "local community of solidarity" and the co-responsibility of producers and consumers for each other are still embedded in the Korean culture till today.

The rich history of the food movement in Japan and Korea continues driving transformation. Cities in Japan and Korea have taken even more innovative and ambitious actions to pursue sustainability of food. While cities' practices in the food sector are often recognized for urban GHG emission mitigation and biodiversity impacts, the implication on resource efficiency cannot be neglected.

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This publication of ICLEI East Asia provides very inspiring insights to the successful policy interventions in three Japanese and Korean cities that have supported resource efficient food production and consumption actions. It explains in a very detailed and concrete manner how city governments used a combination of financial, cooperation, informational and research instruments to build urban agriculture systems and to avoid food loss in line with the SDG 12.3. It comes in perfect complementarity to the 'City Practitioners Handbook of Circular Food Systems' of ICLEI Circulars. I believe this is a very timely resource, especially for those local governments that are eager to #BuildBackBetter.

Burcu Tuncer, Head of Circular Development of the ICLEI World Secretariat

Scope and Target

As the integrated concept— circular economy— has been highlighted on the policy agenda globally, ICLEI East Asia prepares this report through a "circular lens" to review cities' practices in Korea and Japan. This report thoroughly reviews the strategies that local governments and stakeholders take, in consultation with policymakers, businesses and key stakeholders in the urban food system. Developing and developed cities in the Asia and Pacific region can adopt these strategies to make the urban food system more sustainable.

This report mainly focuses on practices on the production-side and the consumption-side of the urban food system. It demonstrates strategies taken by policy-makers (e.g. establishing regulations), think tanks (e.g. conducting research and analysis) and other multi-stakeholder collaboration.

On the production-side, this report reviews the urban agriculture practice in Seoul City, and it identifies key challenges and potential opportunities. On the consumption-side, this report reviews the food loss reduction practice in Hiroshima City and Sapporo City.

It is worth noting that the three cities have more circular practices being taken place along the cities' food value chain. Due to limited space, this report does not include them all. One of the well known examples is food waste recovery. While this report does not include recovery for now, ICLEI East Asia asserts that all efforts — no matter whether they are at the production, consumption, or waste management stage — are equally important for a sustainable and circular food system.

Objectives

This report aims to review good examples that contribute to the urban food system's circular economy. The main audience for this report includes decision-makers and practitioners from local governments that are pursuing a sustainable food system in cities in the Asia region. At the same time, businesses, civil society organizations, non-governmental organizations, academics and think tanks can also get inspiration from this report.

This report analyzes activities taken by local stakeholders. Activities and interventions are categorized into five types:

1. regulations and planning;
2. economic and financial instruments;
3. cooperation and collaboration;
4. information and communication tools;
5. research and education

Examples show how urban actors take these actions in line with local conditions and contexts, and who are the relevant stakeholders. This report thus provides a practical reference for government officials and practitioners who intend to embrace the circular economy approach in the urban food system.

"

Cities have become the centers of global food consumption and thus the key to the successful transformation of the food system. The concept of circular economy provides a new approach for us to re-examine the role and impacts of the food system in connecting people and nature. Local governments in East Asia have been pioneers in sustainable development and transformation of urban food system. This research will inspire more cities to take innovative actions in transforming urban food system for our sustainable future.

Shu Zhu, Regional Director of the ICLEI East Asia Secretariat

Methodology

This report is conducted through desk-based review and semi-structured interviews with a variety of local stakeholders.

A desk-based review of cities' regulatory frameworks, policy documents, research reports, flyers, and media reporting was carried out through local e-libraries and websites, including city governments' official websites and other local organizations' webpages. These documents contain a variety of activities and interventions taken by one or several organizations. As most documents are written in local languages, this report is mainly completed by native researchers, in order not to miss any important information.

Semi-structured interviews were conducted as a supplement to the desk-based review. Interviewees cover local government officials who are in charge of policy implementation, representatives from companies, experts from civil society organizations and non-governmental organizations, and researchers.

For the case of Seoul City, interviewees were firstly invited to complete a short email survey. The survey questionnaire has three main sections: (a) their organizations' role and activities in the field; (b) expectation of policies and supports; (c) practical difficulties and challenges. The survey was sent out to five stakeholders, and all of them provided responses. As some interviewees provided a rather short answer, in order to comprehensively understand their insights, semi-structured interviews were conducted. Interviewees were asked open-ended questions about their past experiences in the field.

For the case of Hiroshima City and Sapporo City, city government officials were interviewed. The interviews were conducted via phones and emails, focusing on understanding local solutions and hurdles.

The report includes the following five chapters:

- **Chapter 1** includes the introduction, background and methodologies.
- **Chapter 2** contains the concept of the circular economy, the local approaches and priorities of the realization of the concept, and ICLEI's circular development framework.
- **Chapter 3** includes Seoul City's good practice in urban agriculture. The chapter is divided into five parts:
    1. why urban agriculture is circular
    2. urban agriculture in the Korean context
    3. local activities and interventions
    4. best examples and cases
    5. challenges and opportunities
- **Chapter 4** contains good examples from Hiroshima City and Sapporo City about food loss reduction. This chapter is divided into six parts:
    1. why food loss reduction is circular
    2. food loss reduction in Japan
    3. Hiroshima City's interventions
    4. Sapporo City's interventions
    5. best examples and cases
    6. challenges and opportunities
- **Chapter 5** contains a summary of practical takeaways.

CIRCULAR ECONOMY IN FOOD SYSTEMS

Why the Food System Needs Circular Economy?

"Circular economy" is a phrase that has been gaining traction among governments and businesses over the last few years. Despite a lack of commonly agreed-upon definition, the essence of "circularity" is seen as a systematic approach aiming at decreasing resource extraction and waste generation through initiatives that keep products and resources—water, land, oil, and so on— in use for as long as possible. Circularity finds synergies between production entities so that one unit´s outputs become the other unit´s inputs or support efficiency gains in resource use. "Circular economy" can be roughly seen as a sustainable production and consumption system functioning with circularity.

The circular economy is inspired by natural ecosystems. In nature, one creature or its output can be utilized by others. Energy and nutrients are fully and efficiently used. There is no "waste" in the system. The "closed loops" concept and "resource efficiency" are adopted in the circular economy.

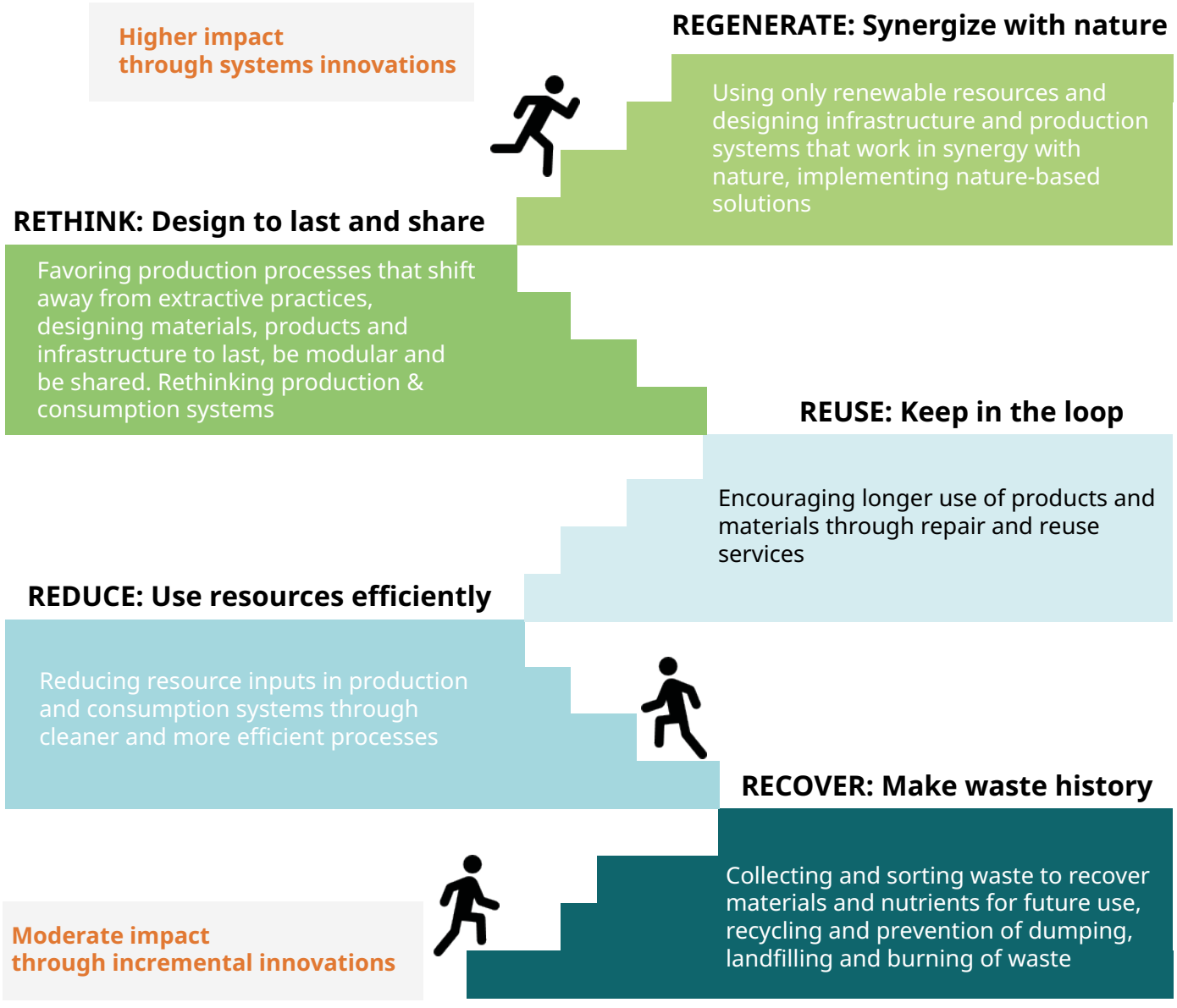
Food is the sector that builds in nature, and food systems connect humans and nature. Food continuously supports human development, but the way we produce and consume food damages the mutual-support balance. A new model is needed to bring the balance back before it is too late. Adopting the circular economy approach can be the solution. By practicing circular economy, we have the chance to restore and regenerate ecosystems and biodiversity. Carbon dioxide and other GHG emissions can be reduced. We can minimize food loss and waste, and soil productivity will be improved thanks to organic fertilizers.

> ***A circular economy approach for the food system is of essence to address Sustainable Development Goals related to climate change and sustainable production and consumption in particular for the fast growing region – Asia-Pacific. Local authorities are well positioned to create the momentum for the transition to a circular economy at the bottom level. This study by ICLEI maps best practices of circular food system of metropolitan cities in Asia-Pacific and will facilitate policy learning among municipal governments in different countries.***
>
> The Konrad Adenauer Foundation

ICLEI's Circular Development Framework

ICLEI supports the localization of the circular economy through its circular development pathway which aims at decoupling urban and economic development and well-being from resource consumption and waste production. Circular development encourages equitable access to resources and supports new local economies that are productive and not extractive, where resources are exchanged and not wasted. Under this pathway, local and regional governments prioritize sustainable waste management and work with the business sector from early-market engagement to the delivery of solutions that support circularity.

In practice, measures and innovations to transition to circular urban systems can be framed across ICLEI´s 5Rs framework.



URBAN AGRICULTURE IN SEOUL CITY

Photo from Neo Brand on Unsplash

Seoul, the capital city of the Republic of Korea, is located in the western part of the central region of the Korean Peninsula with 10 million population living in the city center[24]. Declaring that 2012 is the "Year Zero" for urban agriculture, the city sowed its first seed of urban agriculture. Seoul City has set an ambitious goal: every household in Seoul be able to enjoy the joy of farming, to build strongly connected urban communities, and to actively contribute to adding greenery in the urban area. Seoul City aims to be the world's capital of urban agriculture.

Since then, the Seoul Metropolitan Government (SMG) has been undertaking a series of initiatives and projects. The government has laid down its plans, implemented ordinances on development and support of urban agriculture, and collaborated with many stakeholders. Even though the intention does not explicitly build on the circular economy concept, urban agriculture becomes a means to regenerate the city. Urban agriculture mitigates symptoms resulting from urbanization— the lack of green space, the disconnection between nature and humans, and fragmented and fragile urban food systems.

Stakeholders and the Metropolitan Government reached a successful result. The eight-year efforts contribute to increasing seven folds of the urban farming areas, bringing the total area to 202 hectares. In 2019, it is approximately the size of 300 football fields. The number of participants has also dramatically increased from 4,500 to 640,000.

Urban Agriculture as A Circualr Economy Apopraoch

Urban agriculture is a circular economy approach that efficiently utilizes local resources to reinvigorate local economies, restore environmental quality, and regenerate the ecosystem. It also has the potential to support social justice and equity.

Urban agriculture provides consumers with access to local food. Consumers can connect with producers in the city center. People see and experience food production, which encourages them to appreciate food and show respect for nature. The increasing farming space in cities would restore the damaged urban ecosystem, as plants and crops bring insects and birds and bees back to the metropolitan area. Community farms, rooftop gardens and vertical farms offer novel spaces to redirect unwanted organic scraps back to the urban agri-food system and regenerate the microhabitats. Citizens work on urban farms for joint and collective objectives (e.g. consistent and sustainable yields and re-build the ecosystem). Farms also provide urbanites with new recreational and educational opportunities.

Urban agriculture triggers stakeholders to rethink and redesign a city's hardware infrastructure (e.g. roads and land-use) and the institution (e.g. planning process). Cities are constructed mainly because of commercial activities and trading. Lands are used to accommodate the growing population. As more apartment complexes, roads, and commercial buildings are built, the basic need of humans—the agri-food system—is often absent in the land-use planning and is sacrificed for conventional urban infrastructure[25, 26]. Introducing urban agriculture in the city center is a new change for city planners and practitioners to reshape the human-environment interactions.

Urban agriculture is also an approach to enhance social justice and build communities. Initiating a collaborative farming area with participation from all neighboring communities creates an opportunity to incorporate marginalized groups. Through growing food and exchanging crops on the land, people can raise self-esteem and boost self-confidence. Urban agriculture and local food festivals can be a platform for producers to meet consumers. This brings actors to feel they are part of the group, and it creates an occasion to enhance social interactions.

Urban agriculture can drive resource efficiency in cities and regions by embracing the closed-loop principle and regenerative measures.

Hydroponics enables plants growing in a closed-loop water system without soil. Compared to the conventional farming method, hydroponics requires less water demand because of the circularity of water and nutrients. Similarly, aquaponics mimics the ecosystem enabling the nutrients from fish's discharge and waste to be directed back to plants. Recovering nutrients from food scraps and converting waste into fertilizers close the nutrients loop. In urban agriculture, the boundary between producers and consumers is blurred. Anyone (including urban agriculture businesses and individuals) can grow vegetables in rich and healthy soil with compost from kitchen waste, and anyone can utilize their farming areas to keep resources staying in the system as long as possible.

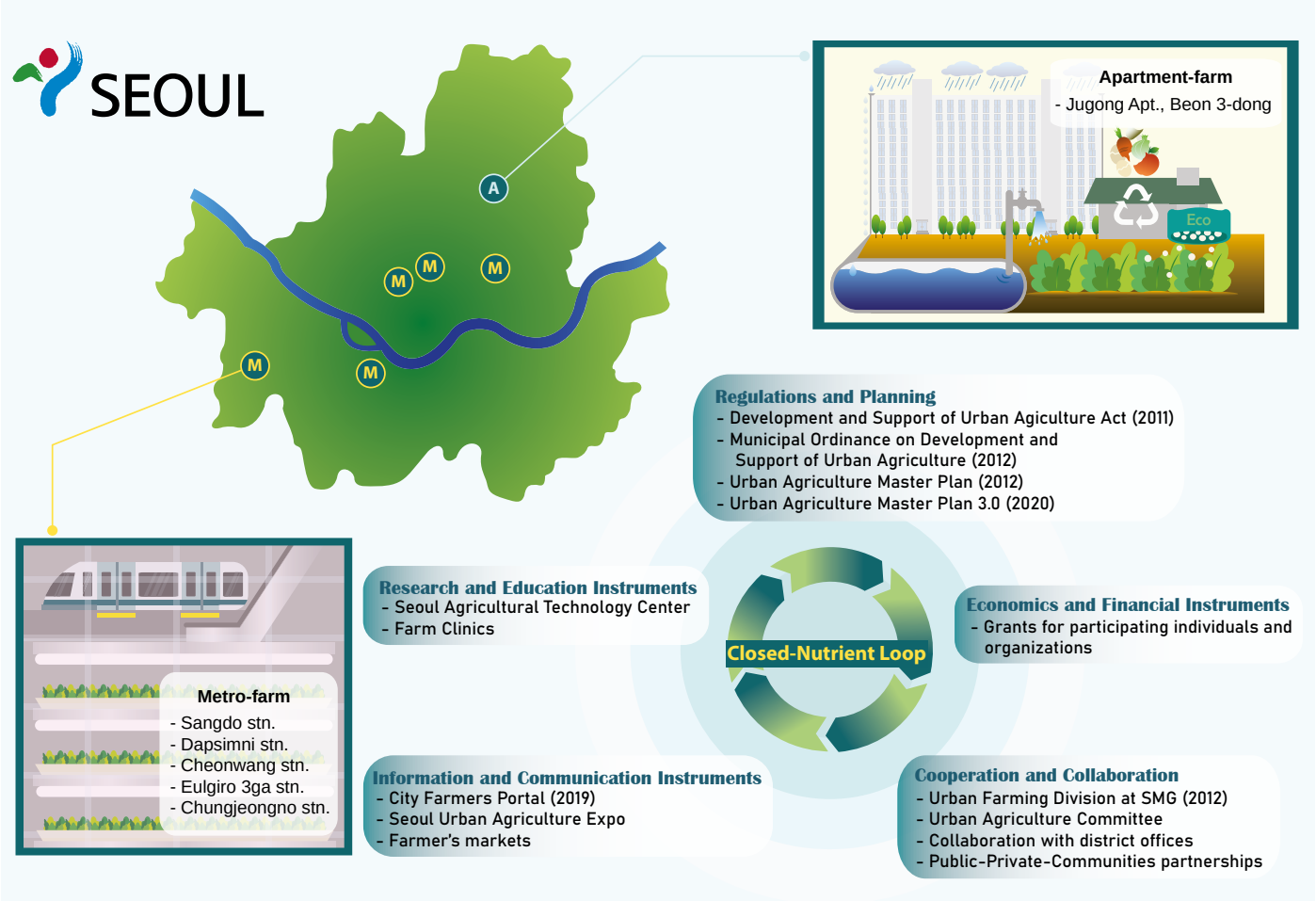
Background

In 2011, the Ministry of Agriculture, Food and Rural Affairs of the Republic of Korea enacted the *Development and Support of Urban Agriculture Act* (hereafter: the Act). It laid the solid foundation for urban agriculture development. To develop a nature-friendly urban environment, the Act highlights the harmonious development of cities and rural communities as well as the awareness-raising of urban agriculture.

Under the Act, the term "urban agriculture" has a specific definition. Urban agriculture refers to an act of (a) growing or cultivating crops; (b) cultivating trees or flowers; (c) raising insects and bees by using land, buildings, or various living spaces in an urban area. Regarding the definition, animal husbandry is not included even if it is very rare to happen in the urban area. "Urban farmers" is also specifically defined. Participants in urban agriculture are not allowed to sell their products in general market places. Only registered professional farmers can do so. This restriction is believed to protect the agriculture industry.

The Act further categorizes the types of urban farming, including:

- Farming in places of residential buildings such as the interior and exterior of a house and apartment building including indoor, balcony and rooftops (e.g. roof-top garden farming, parking lots farming, backyard and balcony gardening)
- Farming in neighborhood areas by utilizing the adjacent area around a house or apartment building (e.g. weekend-farming, community farming)
- Farming in the city center by utilizing the interior, exterior, or rooftop of a commercial building or utilizing land adjacent to a high-rise building
- Public urban farms and parks
- Farming in education facilities (including kindergartens, schools and kids care centers) for learning and practice purposes.



Implementation Strategies

Regulation and Planning

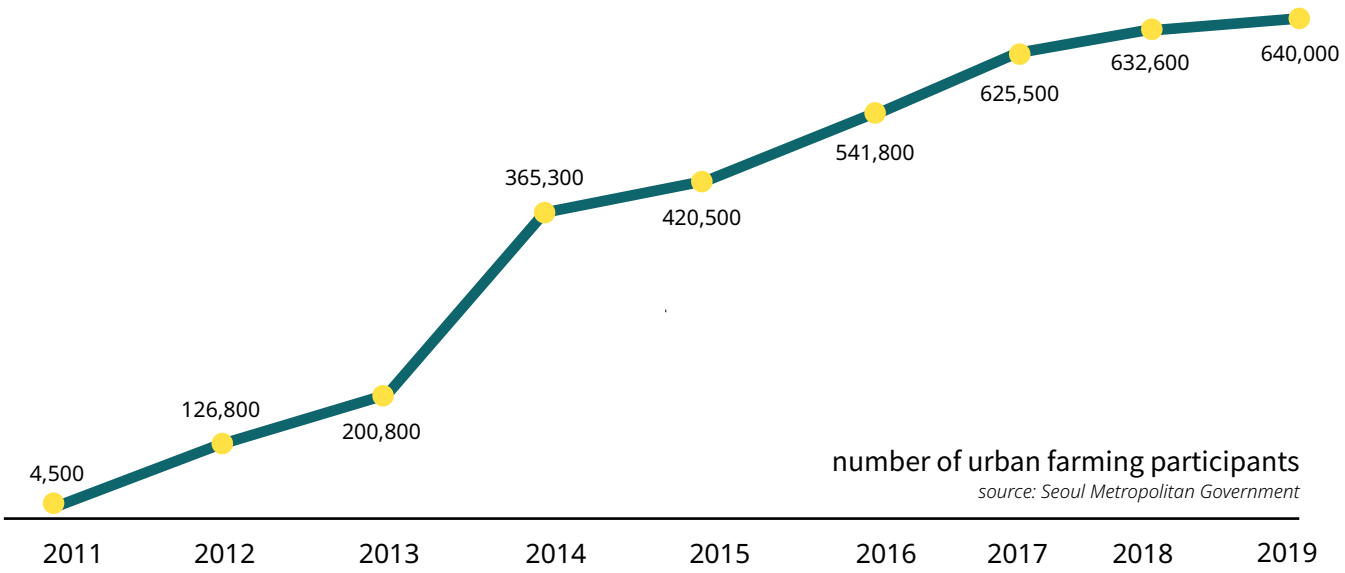
Delegated by the national *Development and Support of Urban Agriculture Act*, in 2012, the SMG enacted the *Municipal Ordinance on Development and Support of Urban Agriculture* (hereafter: the Ordinance). The Ordinance provided a local-level regulatory basis to turn the vision and concept of urban agriculture into actions. It called for executive departments to develop a comprehensive implementation plan, establish a committee, and introduce a certification scheme for urban agriculture practitioners.

A comprehensive implementation plan provides a blueprint for local governments and stakeholders to take actions and set up strategies. To achieve Seoul's urban agriculture goal for the next 20 years (till 2030), the SMG unveiled its first Urban Agriculture Master Plan in 2012. This Master Plan was treated as an overarching guideline when other planning activities (e.g. land-use planning and construction planning) have implications on urban agriculture. The Master Plan was deemed to be updated and reviewed by the Mayor of Seoul every five years in order to regularly check the progress and improvement.

To be more specific, the Master Plan included the following elements:

- Current status and prospects of urban agriculture;
- Direction-setting for objectives of advancement and support of urban agriculture;
- Plans for education on urban agriculture and training of professionals;
- Plans for research, development and diffusion of technology for urban agriculture;
- Plans for promoting urban agriculture.

In 2020, the SMG announced the "Master Plan 3.0" as the third updated version of the Master Plan. In this version, the city raises the ambition: increasing the total urban farming area to 240 hectares and the number of urban agriculture participants to 1 million before 2024. According to the government estimation, urban agriculture expansion will create additional 500 jobs and relevant investment will reach 251 billion KRW (approximately 200 million USD). The SMG intends to incubate more "Certified Urban Agriculture Managers", who are professional instructors providing citizens with guidance, training, consultancy and technology transferring to support the dissemination of urban agriculture knowledge and expertise.



number of urban farming participants

source: Seoul Metropolitan Government

Photo from the Creative Exchange on Unsplash

Economic and Financial Instruments

Turning urban spaces into farms requests upfront investment and operational expenses. The lack of cash will be one of the hindrances for new participants. To eliminate the barrier, the SMG and its district-level offices jointly set up a financial scheme providing citizens with grants up to 80-100% of the upfront cost of urban agriculture projects. Citizens who intend to experiment with agriculture practices in their rooftops and self-owned spaces can apply for it.

In addition to grants for individual citizens, the SMG frequently calls for proposals from communities, non-profit organizations, and social enterprises. Short-listed organizations would receive grants as seed money to operate innovative projects. In 2020, the government selected 12 projects, and each one got approximately 10,000,000 to 25,000,000 KRW (equal to 8,800 to 22,000 USD) . Though it is not a substantial amount, the funding triggers several interesting projects regarding closing nutrients loops. For instance, one of the projects implemented a participatory approach to convert food waste into resources in apartment farms. Another project intended to restore the river ecosystem and save fireflies by taking urban agriculture practices[27].

By definition in the Korean context, the term “urban farmers” refers to those who do farming for non-profit purposes. Therefore, the main economic and financial instrument offered by the local authority is a grant. Soft loans and other financial instruments are mainly provided to full-time professional farmers who do farming in the outskirts of Seoul or to certificated agriculture managers for specific purposes. For example, certificated agriculture managers can access to a soft loan at an annual interest rate 1.5% for three years for piloting new farming techniques[28].

Cooperation and Collaboration

G&P Government - Private

The government works closely with businesses, especially enterprises utilizing advanced vertical farming technologies. To better deploy the unused space in metro stations, in 2019, the SMG initiated a metro-farm project through partnering with an agricultural company. The project establishes underground hydroponic farms growing sprouts and lettuce. In the cafe operated by the farm, commuters can buy salads made from the vegetables grown at the metro farm. The station-farm also provides tours and interactive demonstrations to families and students interested in learning more about Seoul's food system[29].

G&G Government - Government

The SMG also closely collaborates with district offices. Even though the Ordinance and the Urban Agriculture Master Plan are published, it is not legally binding for district officials to adopt and implement. To successfully enforce policies and projects, the SMG gains district offices' buy-in and forms collaboration. As of September 2020, three-fourths of district offices (19 out of 25 offices) have adopted the Ordinance and localized it into district-level ordinances.

Photo from Elaine Casap on Unsplash

G&C Government & Communities

As of 2020, approximately two hundred urban farming community-based organizations have been established and well-functioned, including Urban Farmers Association and its affiliates and co-ops across the city. These organizations are valuable partners in facilitating and upscaling urban agriculture policies. They started as grass-roots organizations in districts with a group of like-minded urban agriculture practitioners. Encouraged by the city's Urban Agriculture Master Plan published in 2012, these community-based organizations jointly established a nation-wide network— Korea Urban Agriculture Citizens Association— to extend its influence and advocacy. Located in Seoul, the Association hosts annual public-private dialogues to facilitate opinion exchanges.

Government - Private - Community

Seoul City's journey towards urban agriculture and the circular food system significantly relies on collaboration and the solid partnership among various stakeholders. The SMG in 2012 established a special division— Urban Farming Division— within the Municipality's Economic Policy Office. This division is responsible for urban agriculture development, and it has maintained strategic partnerships with community organizations, non-governmental organizations (NGOs), and district offices. Stakeholders provide feedback to this division for improving decision-making and policies.

One of the important institutional mechanisms to bolster multi-stakeholder cooperation is the urban agriculture committee, which is established under the framework of the Ordinance. The committee comprises fifteen representatives recommended by the Seoul City Council and universities, urban agriculture community-based organizations, environmental NGOs and businesses. The committee has mandates to:

- formulate and amend the Urban Agriculture Master Plan
- develop mid and long-term strategies
- evaluate the implementation outcomes
- research and develop urban agriculture technology
- promote urban agriculture

The dialogues and discussions happening in the committee meetings are collaboratively contributed by representatives and NGOs, and the Director of the SMG's Economic Policy Office serves as the chairperson.

Public-private-communities partnerships have been piloted in Seoul for testing innovative resource efficiency measures. The SMG initiated a collaboration with 25 district offices and the Korea Land and House Corporation for "apartment farms" in residential areas. The project utilized recycled rainwater to water vegetables and lettuce grown in urban farms. To wisely use resources as close to the sourc as possible (e.g. food scraps generated from households can be used and composted in apartment farms), the SMG co-financed composting facilities installment. This pilot project provided a unique opportunity for households to form collaboration and networking with each other[30] and easily access farming to shorten food mileage and resource cycle[31, 32].

Photo from Macau Photo Agency on Unsplash

Information and Communication Instruments

Information dissemination and good communication with stakeholders is crucial for urban agriculture development. In 2019, the SMG launched a website—City Farmers Portal—to provide community farmers and practitioners with technical assistance. The website demonstrates success stories about urban farmers and how they prepare for urban agriculture. It is also a one-stop center where practitioners can find information about organic fertilizers and soil quality improvement. Urban farmers also use the online discussion board and courses to exchange experiences and knowledge.

To promote urban agriculture, the Seoul Urban Agriculture Expo is annually organized by the government and relevant stakeholders. This international event gathers urban farmers from all over the world. Seoul urban farmers learn from international experiences and exchange ideas. The Expo aims to deliver a message: urban agriculture is inclusive, and every citizen can access it. It is an approach to change the unsustainable and quick-and-liner urban food system. Citizens jointly share and create multi-benefits, such as securing food production, improving mental health, and enhancing community solidarity.

Farmers' markets are a method to demonstrate fresh agricultural products. The SMG collaborates with associations and urban farmers and regularly organizes farmers' markets around the city. The city government designates several areas for operating these markets. On the weekend in autumn, urban farmers and small-scale self-employed farmers bring their products to sell and have face-to-face dialogues with consumers. Producers promote and explain how they grow crops, and consumers gain first-hand information about the food they buy and eat.

Research and Education Instruments

The city-affiliated Seoul Agricultural Technology Center plays a vital role to provide technical and knowledge support on urban farming development. The center offers knowledge about plant species, the best environment for growth and useful advice on plant disease treatment. The center sets up "communities of experts" and gives lectures to citizens who are interested in agriculture. Participants will be awarded certificates after completion of the curriculum. Certificated trainees will be recognized as experts and continue contributing to the center for upscaling urban agriculture.

In 2020, the center launched two special editions of lectures: (1) circular resource aquaponics and (2) therapeutic farms. In the circular resource aquaponics program, an aquaponics pilot was established. Participants had access to the aquaponics and understood resource circularity. The therapeutic farming program offered training to psychiatrists and practitioners working in hospitals and nursing facilities. The training included practical information about turning vacant space into farms and gardens, guidance for engagement with minorities and vulnerable groups, and other useful information[33].

The SMG welcomes proposals from citizens and communities to pilot innovative approaches, and the Seoul Agricultural Technology Center then helps with training and technical support. Since 2013, the SMG has endeavoured to test waste-to-resource in the urban food system. Some proposals were submitted by practitioners working on community-based farms, roof-top farms, and farms on the campus to close local nutrients loops. Through attending training courses offered by the Seoul Agricultural Technology Center, practitioners became more familiar with the waste-to-resource process and composting[34].

Since 2017, the city government has financially supported the "Farm Clinics" project. The project sets up "helping clinics" in each district for communities. The helping clinics offer consulting services and solutions to help farmers overcome difficulties when growing plants and vegetables.

Best Practices

Seoul City has put efforts on urban agriculture for a decade. Urban agriculture becomes a tool to connect society with ecosystems. Urban farming areas stably and gradually increase. As the movement enters into a plateau period in the past few years, in order to speed up the expansion of urban agriculture, more innovative practices are springing up.

The Circular Eco-Farm of the Jugong Apartment Complex

The Jugong Complex is a social housing constructed and operated by the Korea Land and House Corporation (LH). The first tenant moved into the apartment complex in the 1990s, and most tenants have lived there for more than 30 years[35]. Residents know each other well and are closely bonded.

The third apartment block of the complex was selected by the SMG to be a circular eco-farm pilot in 2018 because of the high availability of land, the composition of residents, and the feasibility for closing resource loops[36]. The LH and occupants soon had consultation meetings. Representatives from LH had dialogues with residents about the potential implication of construction work on the residential areas and the project's benefits. Residents showed high interest in the new experiment.

To avoid any adverse implications on the building's structure, the LH and residents reached an agreement to convert the unused land (approximately 330 square meters) next to the apartment into a farm, instead of turning rooftop for farming purposes. Pipelines adhered to the building for rainwater collection from the rooftop. Rainwater flows through the pipes into a new-constructed underground storage tank with 20-tons capacity. The collected water is used for fruits and vegetables grown on the farm.

The LH installed equipment to convert households' food waste into fertilizer. The composting equipment has a function to separate the liquid (including oil and water) from solid food waste. Approximately 80% of solid food waste can be composted in the machine, while the effluent is discharged into a wastewater treatment plant. The food waste loses its original form in one month and becomes fertilizer ready to be applied to the community farms[37].

The circular eco-farm was kicked-off in June 2018, and its first harvest came in November. Participating households had positive feedback towards this trial, particularly about the benefit to community development and the improvement of elders' mental health. This circular model provides an alternative solution to utilize the most valuable resources in the urban environment — rainwater and nutrients. This pilot project's success gives the LH and the city government more confidence in upscaling to other apartment complexes.

photo from cityfarmer.seoul.go.kr

The Smart Metro Farm at Sangdo Metro Station

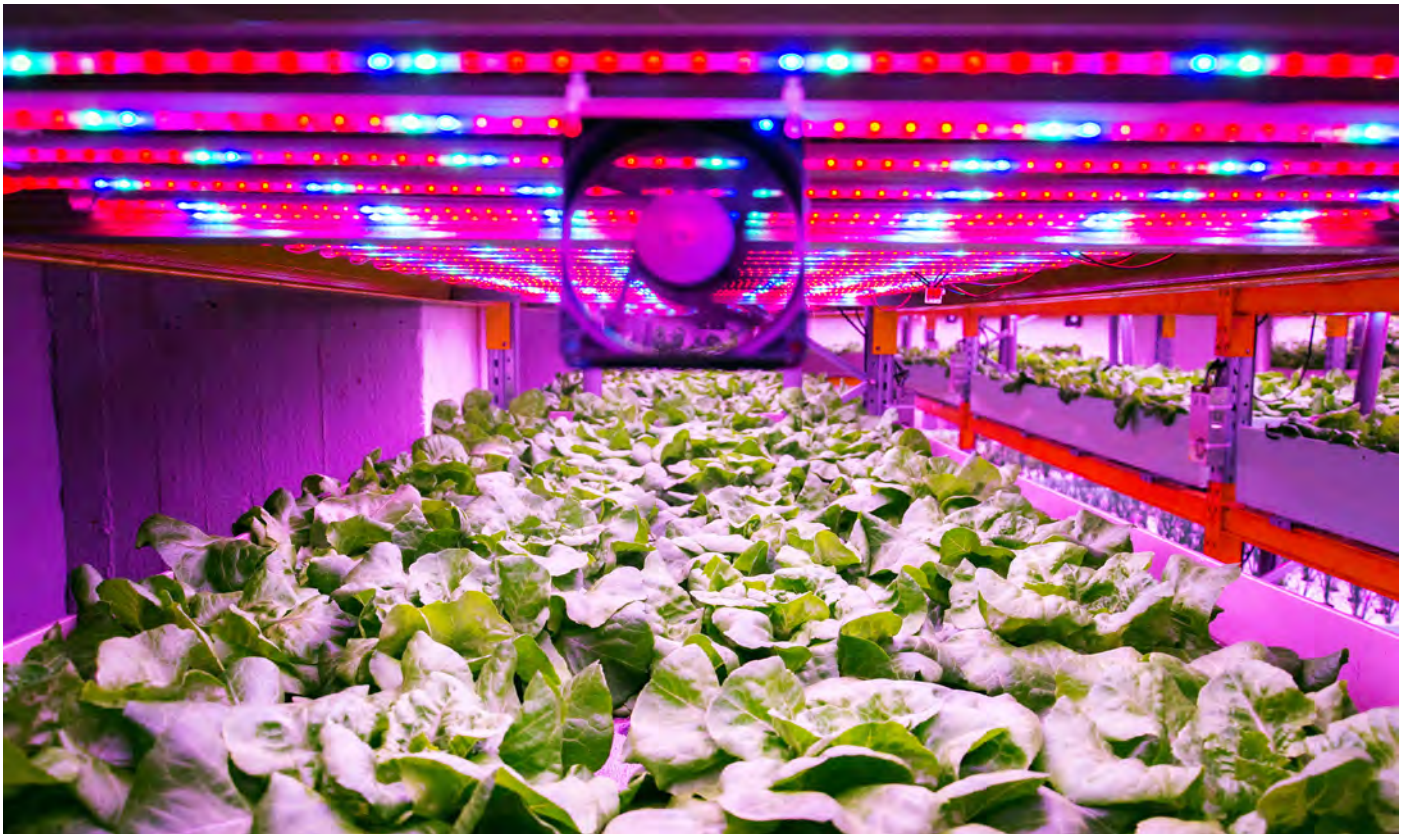
In Seoul City, spaces in metro stations are leased to small and medium businesses. Some areas are often idled, and the potential has not yet been unlocked. The public-private smart metro farm at Sangdo Metro Station is an experimental approach to introduce urban farming in these spaces at the city center.

Aiming to explore different forms of urban agriculture, the SMG initiated a project to turn unused space in the Songdo Metro Station into a demonstrative underground hydroponic vertical farm. The Smart Metro Farm is a public-private partnership between the SMG and a high-tech agricultural business—Farm8. Farm8 operates the Metro Farm and pays monthly rent to Seoul Metro Company to cover space lease costs[38].

The Smart Metro Farm is installed with special LED lighting, hydroponic growing trays and the smart control equipment monitoring temperature, humidity, CO2 levels and lighting time. It is experimental cross-industry cooperation between telecom companies and agriculture businesses. Telecom companies utilize the Metro Farm to test remote sensing software and blockchain innovation[39]. The high-tech hydroponics is seen as a solution for Korea's shrinking agricultural sector that encounters crisis of aging population, soil fertility declining and climate change. The Sangdo Metro Farm produces around 27.9 kilograms of greens per day. The growing time is less in this hydroponic system, taking about 38 days to grow lettuce from seed to harvesting. Compared to 50-days growth on soil, hydroponics is a new option for urban farming in Seoul City.

Hydroponics is relatively new for society. It is necessary to raise awareness and gain buy-in. For not causing local farmers' anxiety about the competition between hydroponics and traditional farming methods, the Metro Farm plants European vegetables to differentiate from local production. Vegetables grown in the Metro Farm are utilized for salad and sandwiches sold in the cafe. The Farm offers commuters an option to purchase greens grown in the center on the way heading home. Refrigerated transport shipping vegetables from rural areas to the city can be saved as well as the energy used. The Farm absorbs CO2 from the metro station and pumps oxygen. Theoretically, it can enhance the ventilation and indoor air quality, though more numerical data is needed to assess the result.

Aiming to explore innovative urban farming models, the SMG has planned to facilitate similar indoor hydroponics for at least 4 metro stations in 2020-2021. More smart farms and different business models will flourish around the city, and more resources can be further captured and utilized within the urban area.



Challenges and Opportunities

Challenge 1. Unlock More Spaces in City Center

The potential of idle rooftops and fractional land located in the city center has not yet been fully unlocked, even though the local government and stakeholders have noticed it. These spaces offer an opportunity to close the nutrient loop through the shortest path. Households' food scraps can be composted and contribute to soil and plants. The food mileage would maximally reduce. Farms on the unused rooftops and land provide opportunities for a close and harmonious human-nature relationship. Converting idle rooftops into urban farms would bring co-benefits to climate change and air pollution mitigation. Data supports that buildings with green roofs use less electricity in the summer.

The SMG has planned to convert multi-use facilities' unused rooftops into urban gardens — such as roofs of performance halls, sports facilities, and religious facilities. Yet the rooftops of private and commercial buildings should not be overlooked.

Building owners are aware that it is wasteful to keep rooftops idle, but the retrofitting expenses for urban farming may be too high. The structure of buildings may need to be reinforced for safety reasons. It may be even more complicated and expensive if the rooftop farm is equipped with facilities to close the resource loop.

Photo from nrd on Unsplash

Challenge 2. Incorporate Market Economy in Urban Agriculture

The definition of urban agriculture under the Urban Agriculture Act framework states that urban agriculture is limited to leisure purposes and educational activities. This definition defines urban agriculture activities based on profitability in addition to geographical location. The differentiation intends to ease professional peasant's anxiety of competition— if more urban farmers practice farming in the city and sell their products as the government supports, traditional farmers fear the profit loss. This restriction on urban agriculture activities may cast a shadow over the future of urban farming in Seoul City.

Urban farmers are not allowed to sell the harvest for profit, according to the current legislation. This rules out all possibilities to develop urban farming business models in Seoul. If practitioners intend to financially self-sustain for a rooftop farming project by selling crop production, the only way to achieve it is to register as professional farmers. That is a complicated process, as people need to meet specific criteria to be identified as peasants. The complexities and barriers discourage new practitioners and amateurs from experimenting with innovative ideas.

Opportunity 1. Set up Innovative Incentives

In order to leverage more urban farming spaces, tax credits and local tax deduction may be an attractive incentive. Local government has full authority to identify items which can be exempted from taxation. The current exemption covers cultural facilities, parks, and other activities that have benefits to the public[40]. Considering the environmental and social multi-benefits of urban agriculture, real estate owners who change idle spaces to farms can be included in the tax deduction.

Establishing a soft loan mechanism focusing on supporting new urban farming activities in the city center would be another enabler, especially targeting upscaling farms on and around commercial buildings. With a low-interest loan to cover the retrofit of the structure and relevant material and labor cost, building owners may reconsider the investment and become incentivized. In Seoul, the local government has the authority to initiate soft loan products— one example is the Building Energy Retrofit Program. The SMG offers 8-year loans that cover all building retrofit expenses with a 0.9% interest rate. This similar model could be duplicated for urban agriculture and circular food systems.

Opportunity 2. Introduce the Land Bank Program

The government could consider setting up the land bank program operated by (semi-)governmental entities or nonprofit corporations to free abandoned, unclaimed, and tax-foreclosed properties and spaces for urban farming use. These spaces would often be abandoned railways, underground areas, or unused fragmented lots rejected by the private market. The program would focus on acquiring problematic properties and then transfer them back to use for sustainable development. The entity operating the land bank program would be empowered with special authorities to obtain properties at low or no cost through a particular process. The entity could lease or sell the land with favorable terms for urban agriculture projects.

The critical success factors include (1) the tight linkage between the land bank program and tax foreclosure process, (2) the close alignment with local land use plans, and (3) the engagement with residents and stakeholders. The program would need stable funding and strong political support from the government for the first step — investigating problematic properties and establishing a database for information transparency.

Opportunity 3. Provide Practical Toolkits

Incorporating the circular concept into urban agriculture could be knowledge-intensive. It is complicated to successfully convert organic waste into fertilizer. Temperature and microbes have to be carefully controlled if no advanced technology supports. Applying the right amount of fertilizer on the soil at the correct time is a delicate and subtle process. Urban agriculture and circular farming is a journey requiring practitioners' patience and expertise.

The current knowledge hub— City Farmers Portal— already provides a good foundation for information dissemination. If more practical guides and toolkits about urban circular economy farming can be developed, it would be even more helpful for practitioners. Toolkits can include the common operational elements that urban farmers need to consider when kicking off urban and circular farming. Guides can provide detailed information about technical and financial resources for beginners as well as offer a step-by-step introduction to waste-to-resource in urban farms.

Opportunity 4. More Engagement with Professional Farmers

The above-mentioned strict definition of urban agriculture builds a wall between urban farmers and professional farmers. Professional agriculture is described as a "profit-driven, production-driven" sector, and its value depends on tangible products. Urban farming is framed as an activity taking human beings and environment into account, and its value is intangible[41]. This taxonomy may not encourage more creative and experiment programs to change the linear urban food system. Instead, it probably widens the division and conflict between the two groups.

Through more engagement with professional farmers and opening opportunities for them to do urban farming in the city, the government could overcome their skepticism toward urban agriculture. Given that there are 325,000 professional farmers (12.3% of national professional farmers) in the peri-urban areas, their extensive knowledge about planting and soil nutrients management can be a valuable asset for "professional-urban farmers' cooperation" and for upscaling farming in the city. Ultimately, the profitability-based differentiation between urban and professional farmers could be discarded, allowing more innovative business models and ideas.

Cross-departmental collaboration and communication within the government would be a great start. (Peri) urban agriculture has a crucial connection with the city's high-level policies and agendas— climate change, biodiversity, and sustainable food. The circular food system can be an enabler supporting the city and outskirts achieving sustainable goals. As more integrating approaches have been implemented and tested in the government, there is a tremendous potential to pave the way for a circular future.

Opportunity 5. Rebuild Food Systems in the Post-COVID Period

The COVID-19 pandemic has hit the long and global food supply chain, but it may trigger urban farming movements. More and more Koreans now care about their food source[42]. Social distancing practices and endless lockdowns cut citizens' outdoor leisure activities and impact on their mental health. Rooftop farming and urban agriculture would be a solution to psychiatric disorders and fragile food systems.

FOOD LOSS* REDUCTION IN HIROSHIMA CITY & SAPPORO CITY

*The definition of “food loss” in Japan is different from the one defined by the Food and Agriculture Organization of the United Nations (FAO). In Japan, “food loss” is particularly defined as “food that can be eaten but discarded”. In the Japanese context, food loss can happen in the production and distribution parts of the food supply chain as well as at the household level. In order to avoid context twisting, in this chapter, Japan’s definition of “food loss” is adopted.

Photo from Jakub Dziubak on Unsplash

Reducing food loss has become a norm in Japan after a decade of efforts. To be more ambitious and to align with sustainable development goals, the society aims to cut 50% of the amount of food loss generated from households by 2030, compared to 2000. Governmental agencies, businesses and individuals are encouraged to explore methodologies to achieve the target. Among all cities, Hiroshima City and Sapporo City are two frontrunners paving the way for a zero-waste and circular economy. This chapter focuses on the practical approaches taken by Hiroshima City and Sapporo City.

Hiroshima City is located in the west part of Hiroshima prefecture. It is surrounded by mountains and hills of Chugoku Sanchi, and the southern area is open to the Seto Inland Sea. These geographical features bring a rich natural environment and mild climate to the area. Six rivers pouring from the Ota River flow into the center of the city, which is why Hiroshima City is called “City of Water.”

The manufacturing industry has contributed to Hiroshima City’s economy for a long time. In recent years, the service industry became the leading industry supported by the largest population in the region. Hiroshima City takes an important role in the field of public administration, industry and economy in the region.

Hiroshima City has been a champion for waste reduction and management, including food waste. The amount of waste in Hiroshima City used to be the smallest among 12 designated cities in Japan, though it has slightly increased in recent years partly because of the disaster waste brought by large-scaled landslides in 2014. The city reinforced the waste reduction policies in 2015, and statistics show that households’ kitchen debris accounts for almost 37.2% to the total amount of general combustible waste, consisting of food scraps (29%), leftovers (4.5%) and untouched food (3.8%). Based on the numerical data, the city soon prioritized food loss reduction policies.

Sapporo City is the prefectural capital and the center of public administration, economy and culture in Hokkaido. With 10 sub-districts, Sapporo City is the 4th most populated city in Japan. Despite the scale of the population, a rich natural environment remains in the city as more than 60% of the city area is covered by mountains and hills. The climate in winter is severe with heavy snow, but summer is relatively comfortable and less humid than other parts of Japan.

According to the Economic Census conducted in 2016, the service industry— including retails, hotels and restaurants, real estate business and medical care— is the major industry in terms of the number of companies and the number of employees. The city’s economy has been slightly shrinking in recent years, but it maintains well thanks to the booming tourism industry.

Sapporo City has been famous for its leadership on environmental protection and renewable energy. The city has a clear objective of achieving an environment-friendly and a sound material-cycle society. It aims to reduce the amount of waste to the lowest among 12 designated cities in Japan by 2027. Food loss is identified as an essential factor to determine if the city can meet this goal.

> ***“The challenge is to synergize the food production, consumption and disposal in a circular manner.***

Togo Uchida, Executive Director of ICLEI Japan

Reducing Food Loss as a Circular Economy Approach

Reducing food loss is a circular economy approach to preserve what we already have and to retain nutrients and economic value. We utilize land and water to produce food. Throwing food away is equal to discarding all inputs and resources used in the production process. Also, less food loss would (partially) solve the root of cities' greenhouse gas emissions. When food is thrown away, all the energy used to harvest, transport, and packaging is wasted. If the discarded food goes to landfill, it produces the most potent greenhouse gas—methane. Cutting food loss contributes to mitigating climate change and sustainable development.

Food loss reduction activities can strengthen communities. Through workshops and experience-sharing events, households living in the same neighborhood could share their food prevention tips. Households may face similar difficulties and can work together for solutions. Citizens discuss and explore the best way to store vegetables and keep them fresh. Communities host cooking demonstrations using near-expired food and ugly vegetables and invite all neighbours to enjoy the food. Households exchange best practices for better managing the amount of cooking. Community-based groups share food if one family cooks too much.

Food loss reduction also brings new businesses to cities and regions. Restaurants may overestimate the number of visiting customers so that they have excess food. Instead of throwing it away, virtual platforms to map demanders and suppliers are being created. Consumers can access the food at reasonable prices, and restaurants can sell delicious food without wasting. Users can subscribe to the service with a monthly fee and access good food with less price.

Background

In Japan, it is estimated that 6.12 million tons of food-loss were generated in 2017. This is equivalent to around 48 kg of food being discarded per capita, of which 46% (2.84 million tons) are generated from households, and the remaining 54% (3.28 million tons) are generated from businesses. The amount of food-loss in 2017 is the lowest in the historical data since the government started taking the official statistic annually from 2012. Yet it is still around 1.6 times the amount of food aid per year delivered by the World Food Program.

The government has the goal to halve the food-loss by 2030 (in comparison to 2000), set as 2.16 million tons from households and 2.73 million tons from businesses respectively. With its very low food self-sufficiency on a calorie supply basis (currently at around 37%), Japan makes food security a high priority. Food security has been the key driving force for the government to establish laws and regulations on food-loss in recent years.

Waste Reduction Regulations and Policies

Food loss reduction policies evolve from waste reduction actions. In the last decades, Japan has achieved considerable success in reducing municipal waste and improving material productivity. This achievement was driven by the successful implementation of the *Basic Law on Establishing a Sound Material-Cycle Society* (promulgated in 2000), which integrated waste management and material management by improving the efficiency of the material cycle. The government intended to minimize raw and natural resources consumption and turn waste into valuable materials, including replacing import-dependent animal feeds with safe organic waste. Ultimately the government aimed to shift the linear production-consumption-waste pattern towards a circular system.

Japan's legislation on waste management can be dated back to the 1900s when Japan moved towards urbanization. Legislative frameworks were set to clarify local governments' roles and responsibilities to maintain and improve the hygienic environment for citizens' welfare. At that time, environmental conservation was the main focus because rapid economic growth generated evident pollution in the 1960s and 1970s. The endeavor to waste management merely aimed to mitigate ecological damage and prevent further adverse impacts on human beings. Meanwhile, the Oil Shock in 1973 hit Japan's economy and society, reminding Japan of its import-dependency on raw materials. This triggered the society to reckon on the way of using and producing materials.

As the global supply chain increased in its size and complexity, manufacturing companies in Japan found their new competitive advantage: improving material productivity and reducing its dependency on natural resources as much as possible. Environmental management and the Reduce-Reuse-Recycle (3R) principles, therefore, were considered as part of the economic policy. In the 1990s, several laws and regulations to promote recycling were enacted, which led to the formulation of the *Basic Law on Establishing a Sound Material-Cycle Society*.

The *Basic Law on Establishing a Sound Material-Cycle Society* has two pillars. One is the *Waste Management Law*, and the other is the *Law for Promotion of Effective Utilization of Resources*. By mainstreamlining waste management and effective use of resources, Japan reached significant success in recycling while it protects people's health.

Sound Material-Cycle Society

"A society in which the consumption of natural resources will be conserved and the environmental load will be reduced to the greatest extent possible, by preventing or reducing the generation of wastes from products, by promoting proper cyclical use of products when these products have become circulative resources, and by ensuring proper disposal of circulative resources not put into cyclical use"

The Basic Law on Establishing a Sound Material-Cycle Society, Article 2

Japan's Waste Management Laws History

1900

Beginning of urbanization

Local governments become responsible for waste management

Waste Sanitation Law (1900)

1950

Waste management as a part of environmental sanitation measures

Maintenance of hygienic environment

Public Cleansing Act (1954)

1960

Environmental pollution becoming evident

Waste management as a part of environmental conservation

Industrial waste: responsibility of the waste generator

Act on Emergency Measures concerning the Improvement and Construction of Environment Facilities (Wastewater and Waste Treatment Plants) (1963)

1970

Waste Management and Public Cleansing (WMPC) Law (1970)

Amendment of WMPC Law (1976)

1980

Improving waste treatment

Environmental conservation measures related to waste management

Act on Bay Area Marine and Environment Consolidation Centers (1981)

Purification Tank Act (1983)

1990

Idea of Reduce and Reuse

Developing various Recycling Systems Countermeasure to hazardous substances including dioxins

Introducing appropriate waste treatment system according to diversification of types and properties of waste

Amendment of WMPC Law (1991)

Act on Improvement of Designated Industrial Waste Disposal Facilities (1992)

Basic Environment Law (1993)

Containers and Packaging Recycling Law (1995)

Amendment of WMPC Law (1997)

Home Appliances Recycling Law (1998)

Dioxins Control Law (1999)

2000

Promoting 3R aiming to establish a Sound Material-Cycle Society

Reinforcing the system of industrial waste treatment

Reinforcing the countermeasures for illegal disposal

Reinforcing the countermeasures for disaster waste

Basic Law on Establishing a Sound Material-Cycle Society (2000)

Construction Material Recycling Law (2000)

Food Recycling Law (2000)

Law Concerning Special Measures Against PCB Waste (2001)

End-Of-Life Vehicles Recycling Law (2002)

Small Home Appliance Recycling Law (2012)

When Food-loss Receives an Attention

Based on the above Sound Material-Cycle Society principles, specific recycling laws were established in accordance with the characteristics of products— construction material, home appliances, containers and packaging, and our focus in this report, “food”.

The *Food Recycling Law* is successfully implemented to increase energy recovery from food waste and reduce the pressure on landfills’ capacity. In 2010, the food industry reduced, reused and recycled 82% of its food waste on average. About 62% of the food waste was recycled into new products and out of which, 76% were recycled to animal feed, 17% were recycled to fertilizer, and 7% to other products such as fuels and methane. However, though the *Food Recycling Law* leads to a substantial increase in food waste recycling businesses, the amount of food waste generation continued to remain roughly at the same level as it was in the 1990s. Food recycling policies and actions have not significantly led to reducing food waste. The root of the problem has not yet been solved.

With the fact that Japan remains heavily dependent on food imports and sustainability has been mainstreaming internationally, people worry about Japan’s food security, along with the ethical and moral issue of generating vast amounts of food-loss. Policymakers and politicians gradually notice that food-loss is a severe problem.

In 2019, the *Law to Promote Food-loss Reduction* (hereafter: the Law) was introduced, and the *Basic Plan to Promote Food-loss Reduction* was approved in the next year. The Law aims to halve the amount of food-loss from the supply chain by 2030 (compared to 2000). Both businesses and households are seen as key actors to achieve the target.

The Law creates an opportunity for different ministries to coordinate and collaborate, as food loss is a cross-cutting issue. With the support from leading coordinating agency Consumer Affairs Agency (CCA), at least five ministries are fully engaged to tackle food-loss, including the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Ministry of Health, Labor and Welfare (MHLW), Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Economy, Trade and Industry (METI), and Ministry of Environment (MoE).

The Food-loss Reduction Promotion Council was created under the Cabinet Office and chaired by the Minister of State for Consumer Affairs and Food Safety (Minister for Consumer Affairs Agency). The council was the superior body responsible for preparing the Basic Policy based on the *Law for Promoting Food-loss Reduction* in 2019. The council is composed of ministers from each ministry and stakeholders from industry groups, NGO/NPO, local governments, and academia.

When the draft policy was discussed at the Cabinet and approved in March of 2020, council members were involved and contributed. Since then, line ministries showed the leadership to proceed with the Basic Policy under their institutional mandates and conducted joint initiatives to facilitate food-loss reduction campaigns. Ministries regularly meet through liaison meetings to share the progress and make sure that efforts to reduce food-loss are coordinated effectively.

Ministries play a vital role in the recent food-loss policies and advocacy. For instance, the Ministry of Environment runs a “Food-loss web portal” sharing useful information and tools. It is for both food consumers, businesses and local governments. Visitors of the website can access practical “how-to” solutions to reduce food loss.

The Role of Local Government in Food Loss Reduction

Food-loss from the businesses accounts for 54% of food-loss in Japan, and the remaining 46% is generated from households. The reason behind food-loss is complicated. In the business sector, the food is discarded due to falling outside the specifications or standards (e.g. defective products) or not being sold during a specific period. For households, the dearth of food stock management knowledge would be one of the reasons.

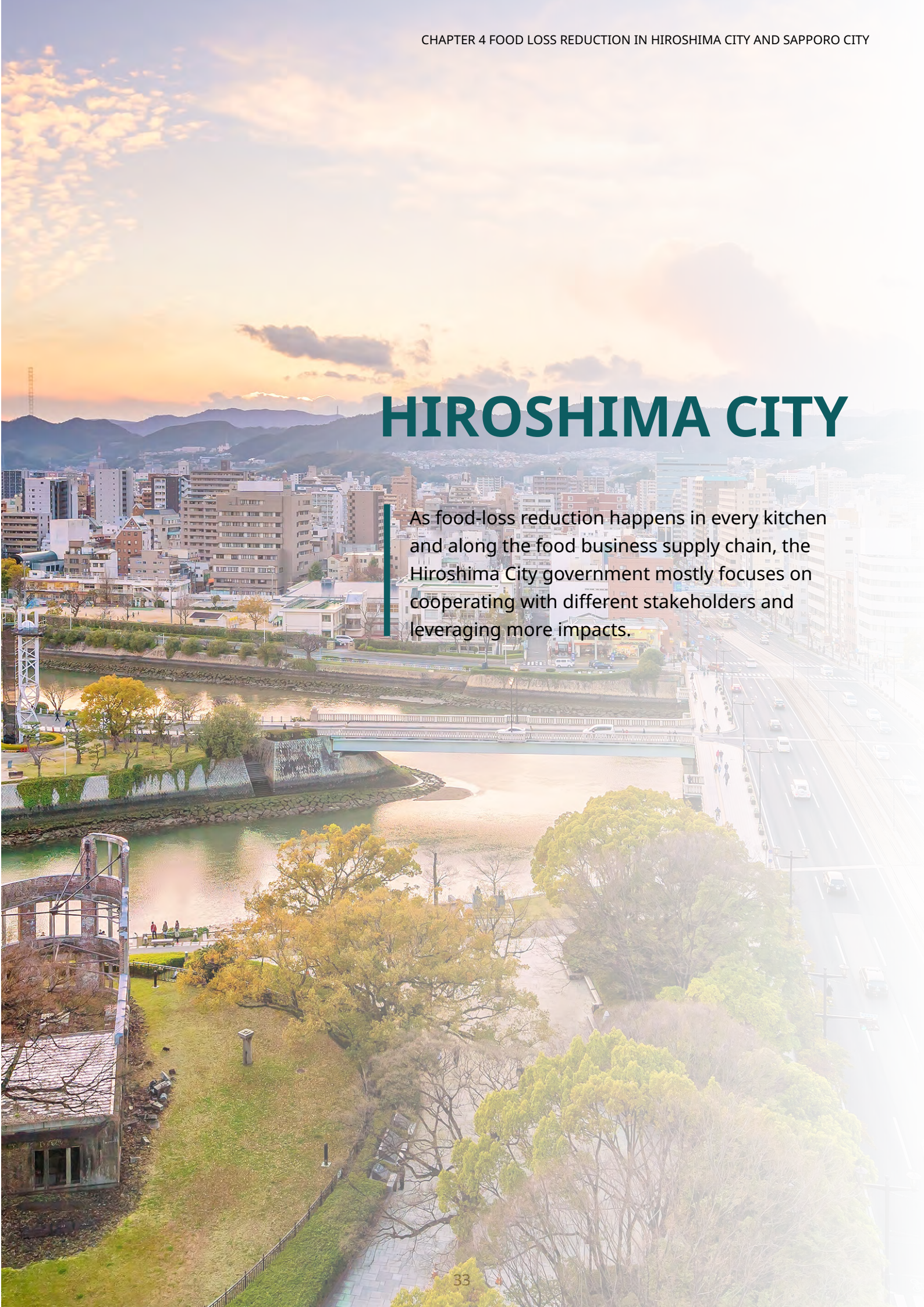
Before the *Law to Promote Food-loss Reduction* was enforced, local governments viewed the food-loss issue through the lens of waste management. Measures and policies have been taken to cut food loss. According to the CCA statistics, all 47 Municipalities and 20 Designated Cities (Major Cities) and 58% of 1,700 other cities or local governments in Japan have responded that they have been working on food-loss reduction activities. These cities have carried awareness-raising activities, engaged with food banks, and conducted regular surveys to understand the food-loss situation.

Local governments collaborate and joint hands for effectively cutting food loss. Over 420 municipalities actively participated in the "No-leftover Campaign Network". This nationwide network facilitates government-to-government collaboration and public-private partnerships to reduce food loss. Since 2014, with the support from Ministries, the network and members have organized four "National Convention on Food-loss Reduction" events across Japan.

The enforcement of the *Law to Promote Food-loss Reduction* in 2019 sent a message that the food-loss issue is no longer only a waste-related issue. It is complicated, and it relates to resource management, environment, and society. Though main policies— such as business supply chain management (SCM) and resource efficiency— are led and implemented at ministries level, local governments still play a crucial role in advocacy, promotion, and information dissemination. Some local governments also incorporate food-loss reduction agenda with local SDGs policies, as the relevance of food-loss and SDGs has been made in Japan's *4th Basic Plan to Promote a Sound Material-Cycle Society* (2018).

To be more specific, under the framework of the *Law to Promote Food-loss Reduction*, local governments have mandates on (1) understanding the current situation of food-loss through conducting surveys and studies; and (2) promoting food-loss reduction activities through awareness-raising campaigns and other means. Since the Food-loss Reduction Promotion Council and the Law came in force, local governments have been preparing to enhance their projects and policies and better address the food-loss issue. The strong commitment partially thanks to the fact that local governments are well-engaged in the Food-loss Reduction Promotion Council.

Local governments are encouraged to formulate a plan on promoting food-loss reduction at the local level. Despite that it is not mandatory, a survey conducted by the CCA shows that 59 local governments were planning to develop the local plan by the end of 2020 fiscal year. Also, 74 local governments responded that they have been planning to develop a plan after 2021.



HIROSHIMA CITY

As food-loss reduction happens in every kitchen and along the food business supply chain, the Hiroshima City government mostly focuses on cooperating with different stakeholders and leveraging more impacts.

Implementation Strategies

Regulation and Planning

Hiroshima City has been making efforts to reduce waste and food loss for more than a decade. The city stipulated the *Hiroshima City Basic Plan on General Waste Management* in 2005. The success of implementation makes Hiroshima City be ranked as the best city in terms of the lowest amount of waste generation, compared to 12 designated cities in Japan.

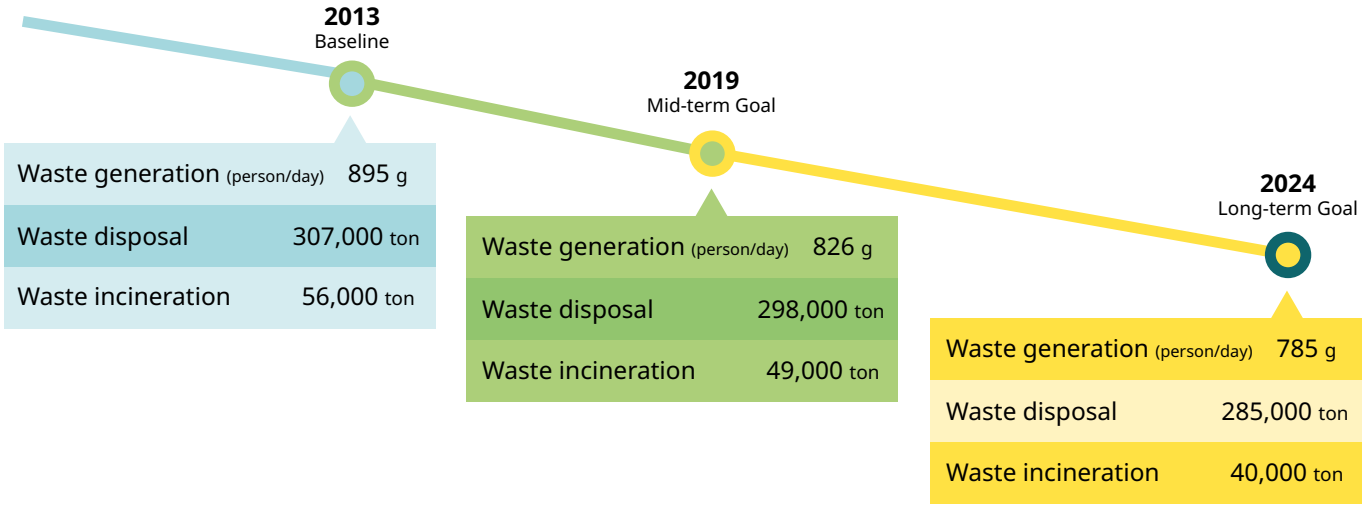
In 2015, Hiroshima City revised the Basic Plan. The updated Basic Plan aims to improve the waste management system for its stability and disaster-resiliency in the next decade. The Basic Plan aligns with policies and planning at different levels, including the national regulations and strategies towards the sound material-cycle society, Hiroshima Prefecture's waste management plan, and Hiroshima City's environmental plan.

Aligning with Hiroshima City's ambitious vision of zero-emission, the 2015 Basic Plan identifies five main priorities:

1. Promoting waste reduction and recycling with the cooperation by citizens, the private sector and the public sector
2. Ensuring proper and stable waste management system
3. Review and adjust the waste separation system and the garbage collection and transportation system
4. Reducing the cost of waste management
5. Promoting the development of a clean city where there is no waste

The Basic Plan embraces 3R principles (reduce, reuse, and recycle) while "reduction" is especially highlighted. The 2015 Basic Plan sets quantitative mid-term (by 2019) and long-term (by 2024) waste reduction targets. The amount of waste generated per person per day will reduce to 785g before 2024, compared to 859g in the baseline year of 2013. It is equal to 35,000 tons of waste reduction. Under the framework of the waste reduction target, Hiroshima City pays special attention to food loss, because kitchen waste accounts for one-third of the city's total amount of general combustible waste.

Hiroshima City is now reviewing its *Basic Plan on General Waste Management* in response to the *Law to Promote Food-loss Reduction* and the *Basic Plan to Promote Food-loss Reduction*. The city intends to efficiently and effectively incorporate national policies into local strategies.



Unit: per year amount

Cooperation and Collaboration

Since 2002, the government of Hiroshima City has been working with a variety of stakeholders. In the beginning, the collaboration was about plastic waste reduction. It soon expanded and covered the food-loss issue.

In 2002, the Executive Committee for Promoting Reusable Shopping Bags was established by civil organizations, retailers and the city office. It was formed to reduce the use of plastic bags. In 2016, restaurant and hotel businesses associations joined the Executive Committee and became members. The Executive Committee then extended its activities to overall waste reduction. The Committee's name was changed to "the Executive Committee for Waste Reduction and Recycling." Until today, the Executive Committee still plays a significant role in Hiroshima City's planning and implementation of environmental policies.

One example demonstrating the Committee's pivotal role is the "Smile! Hiroshima Campaign". It was initiated in 2017, and it has operated until today. To advocate food loss reduction in the business sector, the Executive Committee calls for restaurants and hotels in the city to register as "Cooperative shops for zero-leftover". Restaurants and hotels are recommended to design a menu with small portions and accept customers' request for taking leftovers away. Citizens are encouraged to order a moderate amount of food or bring unfinished dishes back home. Before this initiative, the Japanese norm did not allow consumers to take leftovers because restaurants were concerned about food poisoning. The "Smile! Hiroshima Campaign" receives support from businesses. As of 2020, there are 264 restaurants and hotels registered as cooperative shops.

The Executive Committee also encourages food retailers in the city to register as "Cooperative shops for food-loss reduction." Food retailers are recommended to introduce sales-by-weight schemes, develop small packages for food, and recycle food waste through food recycling facilities. Consumers visiting these stores can buy a moderate amount of food and learn tips to keep fresh food properly. As of 2020, there are 155 food retailers registered to cooperate.

Logo of food-loss reduction shops

photo from city.hiroshima.lg.jp

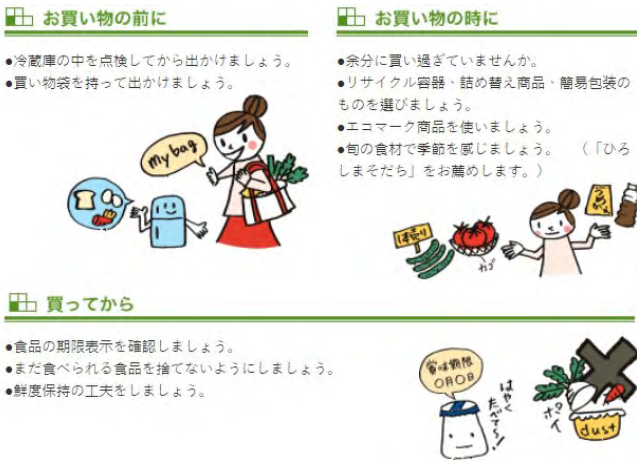
Logo of zero-leftover shops

photo from city.hiroshima.lg.jp

Information and Communication Instruments

Understandable information with simple texts and photos will help motivate citizens and businesses to take action. The Hiroshima City government has a comprehensive action list with 9 suggested activities to restaurants[43] and hotels interested in becoming the "Cooperative shops for zero-leftover". Restaurants and hotels have to comply with at least three actions for registering as cooperative shops. For food retailers interested in being the "Cooperative shops for food-loss reduction", the government provides a list with 12 activities and retailers have to comply with at least 3. These lists are guidance for businesses to review their existing practices and explore more methods for reducing food-loss.

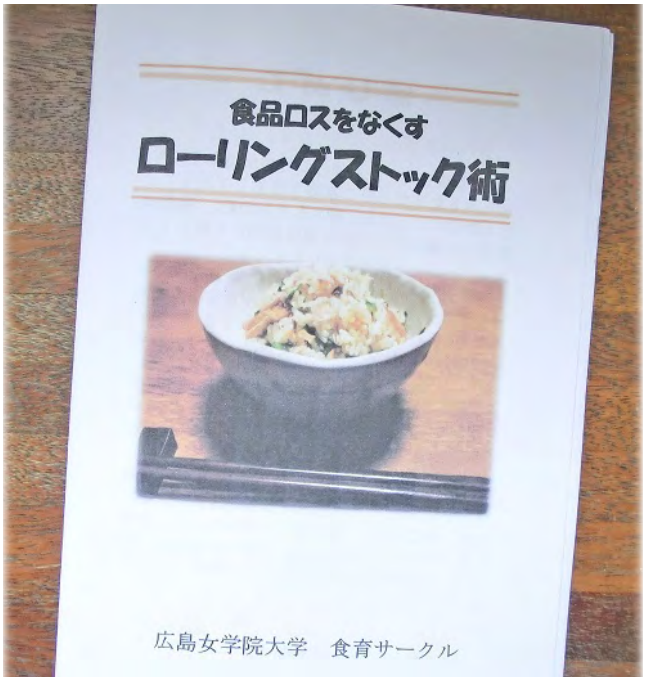
On the Hiroshima City government webpage, citizens can access detailed fridge management techniques to avoid food loss resulting from carelessness. According to the statistics, kitchen waste accounts for 37.2% of the total amount of general combustion waste, and the kitchen waste is composed of food scraps (29%), leftovers (4.5%) and untouched food (3.8%). The waste of leftovers and untouched food can be prevented if households apply fridge management techniques.



Eco-cooking advocates food stock management

photo from city.hiroshima.lg.jp/kankyou/ecocook/

Together with the Association of Registered Dietitian of Hiroshima City and Hiroshima Bunkyo University, the Hiroshima City government advocates "Eco-cooking. "Eco-cooking" means environmental-friendly habits and applying the concept of less waste in the process of food shopping, cooking, and eating. Cooking events are organized to demonstrate environmental-friendly cooking to citizens. Citizens learn how to use up purchased seasonal food with little food scrap. In addition, students from Hiroshima Bunkyo University develop eco-cooking recipe books, and the books are downloadable on the Eco-cooking webpage.



A hand book about cooking and food management developed by Hiroshima Jogakuin University

photo from city.hiroshima.lg.jp

As one of the "Smile! Hiroshima" Campaign activities, the "Waste Reducing Day" is the most influential one for information dissemination and awareness-raising. The first day of each month is set as "Waste Reducing Day". Promotion events and advocacies are held in supermarkets in Hiroshima City. Volunteers and civil society organizations set up a booth next to the checkout counter in supermarkets and ask customers questions about their food consumption patterns. It is an opportunity to raise citizens' awareness and participation in food-loss reduction. As it happens every month, citizens continuously receive information about food-loss reduction and generate curiosity to understand more. On that day, civil society organizations conduct surveys to understand consumers' behaviors. The survey data is valuable information when the city government makes policies and strategies.

Hiroshima Jogakuin University studients share tips about food-loss reduction

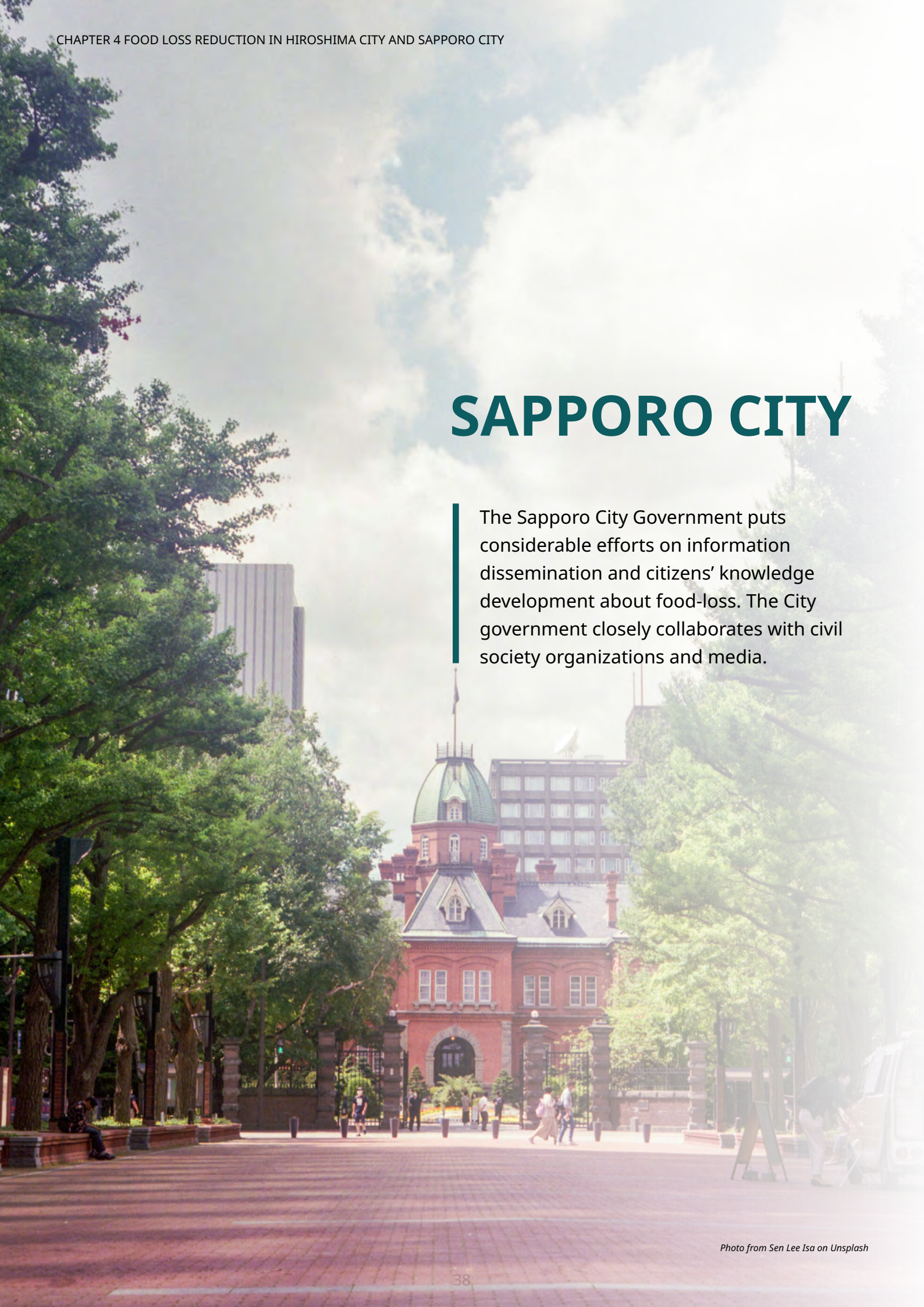
Research and Education Instruments

The Hiroshima City government relies on local civil society organizations' profession to conduct surveys and analyses. The results are regularly shared with the Executive Committee for Waste Reduction and Recycling, citizen representatives, businesses and government officials.

The Hiroshima Consumer Association, for example, has conducted a study about food-loss in businesses and households. The study investigates reasons for throwing food away and the efforts taken to reduce food-loss. The study also interviews families and businesses about challenges and difficulties.

According to the survey conducted in 2016, 32% of respondents reported that they would throw food away if the best-before date has passed, while 48% of respondents responded that they would check by using their five senses to decide whether to discard. In addition, 55% of respondents believed that food-loss is mainly from restaurants and convenience stores, and 14% of respondents thought households' kitchens are the place where food-loss is mostly generated[44]. That specific and local information contributes to the Hiroshima City government's policies and strategies.

Young people in universities are motivated to contribute their expertise and creativity. Students and faculties of Hiroshima Jogakuin University collaborate with the Hiroshima city government's Environment Bureau for developing techniques about households' emergency food stock management and food-loss reduction. As every Japanese household stocks water and food for disasters, the food often expires before being noticed if there are no proper management skills. The city government's Environment Bureau and other three local universities also collaborate on developing recipes that can keep nutrients and extend storage time.



SAPPORO CITY

The Sapporo City Government puts considerable efforts on information dissemination and citizens' knowledge development about food-loss. The City government closely collaborates with civil society organizations and media.

Photo from Sen Lee Isa on Unsplash

Implementation Strategies

Regulation and Planning

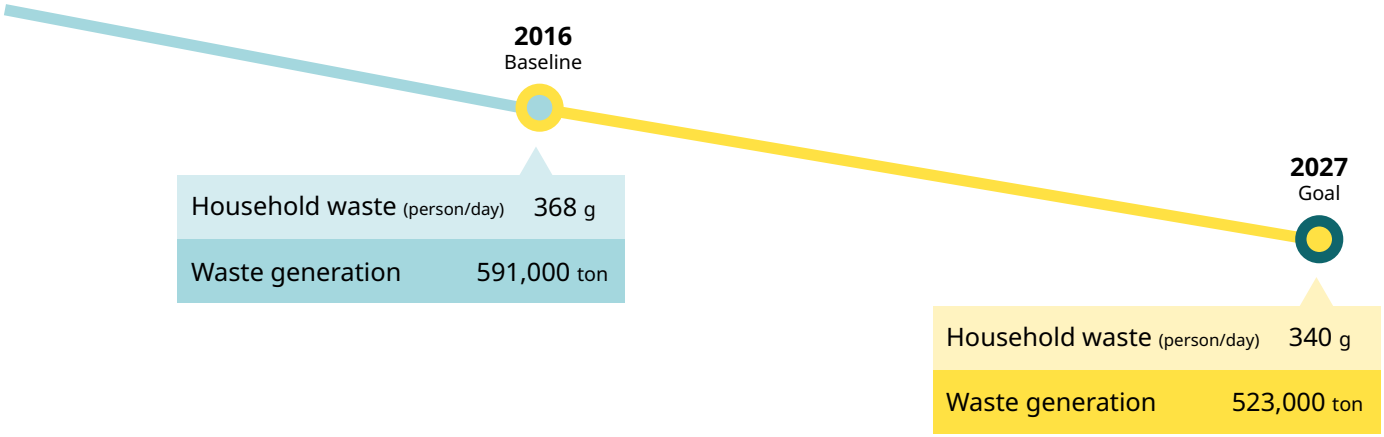
Sapporo City prioritizes environmental protection and clean energy. With this background, the general waste management plan— "Slim City Sapporo" — was stipulated in 2008 to realize an environment-friendly and sound material-cycle society. During the implementation period, waste separation categories were revised, and a new separation system was introduced. The separation scheme successfully impacts general waste reduction: one of the four waste treatment plants shut down in 2011.

To further accelerate waste reduction, Sapporo City updated the "Slim City Sapporo" waste management plan in 2018. The "Slim City Sapporo" waste management plan aligns with the global and national policy agenda on sustainable consumption and production, including the United Nations SDGs, Japan's Sound Material-Cycle Society vision, and Sapporo City's basic environment plan.

The 3R (Reduce-Reuse-Recycle) principle— especially reduce and reuse— is highlighted in the 2018 "Slim City Sapporo" waste management plan. The city targets to reduce 100g of municipal waste generated per person per day before 2027, aiming to reach the lowest level of waste generation by 2027 (compared to the 12 designated cities in Japan). Promotion and collaboration in a cost-effective way are critical to achieving the goals.

In the context of waste reduction, cutting food-loss is considered as an essential factor to determine if the city can reach its ambitious goals. According to the city's statistics in 2016, food-loss accounts for 20% of households' kitchen waste. It equals that each person generates 27g food-loss every day. The astonishing data triggers various activities and programs advocating food-loss reduction.

Sapporo City is one of those cities intending to develop a local plan on food-loss reduction in regard to the Law to Promote Food-loss Reduction. The city is working on the "Promotion Plan for Reducing Food Loss", and it is expected to be issued after 2021.



Unit: per year amount

Economic and Financial Instruments

In Japan, not all cities implement the quantity-based charging system on household waste. Households are asked to categorize waste into at least three groups: recyclables, combustible waste, and non-combustible waste, though the classification varies according to city ordinances. Combustible waste includes non-recyclables and kitchen waste (including food loss and food waste), and it is often placed in any plastic or paper bags. Households do not explicitly pay for the garbage that they generate.

Since 2008, all Sapporo citizens have been requested to purchase and use garbage bags designated by the city government for household combustible waste. Citizens can buy bags at convenience stores and grocery shops. The smaller size of the bag is, the lower the price households pay. This system directly connects the cost of throwing garbage with the waste amount, and it successfully encourages people to cut food loss and food waste.

Cooperation and Collaboration

In 2005, the “Sapporo Slim Net - network on waste reduction activities” was established for expanding activities about reducing and recycling with the cooperation of the citizens, business sector and the city office. Since then, the Sapporo Slim Net has played a significant role in advocacy and campaigns for several 3R-related programs.

The Sapporo City government collaborates with businesses to pilot the “take-home” practice in restaurants and hotels. As both consumers and restaurants are in the transition period to adopt the “new norm” — bring leftovers back home, the city’s Environmental Bureau published guidelines about appropriate actions for consumers and restaurants to avoid food poisoning. The Sapporo City government also works with local businesses to develop doggy bags made of recycled paper. The City government provides the doggy bags to restaurants for free, with the attempt to encourage no-food-loss practices.

Doggy bag made of recycled paper
photo from city.Sapporo.jp

Information and Communication Instruments

The “Reducing Waste Campaign” was initiated with primary support from the Sapporo City Government. Several events, seminars, and workshops have been regularly hosted. Promotion materials such as leaflets and videos are available on web-channels. Workshop lecturers introduced practical food-loss cutting tips and techniques which can be implemented easily in everyday life. Events were held at open spaces where tens of thousands of citizens passed through, such as subway stations, to reach more citizens and disseminate the knowledge. The Mayor of Sapporo also participated in a TV program to advocate food-loss reduction by introducing fridge management methods.

Sapporo City launched the “Sapporo Slim Sunday” campaign to encourage citizens to check food storage in fridges every Sunday and consume it before expiration. Citizens can download practical tools for food stock management from the city government’s website.

According to local surveys, veggies are the most common food-loss due to improper storage methods. Tomato, cucumber, and lettuce are the top three losses. In light of this, the “Hokkaido vegetable promoters”, a group of activists promoting local vegetable consumption and production, filmed a TV program and demonstrated how to store these veggies, with support from the City government.

The city launched the “2510 Smile Party” campaign, targeting to reduce food-loss generated from parties and business gatherings. It advocates party-goers and gathering participants to adopt the five principles:

1. Concentrate on enjoying meals, especially in the first 25 minutes and the last 10 minutes of the party.
2. Pass the plates to the other table if there is remaining food.
3. The party organizer is encouraged to tell the restaurant about the composition of participants (such as age, genders, and food preferences) for properly preparing the food amount.
4. Reminder each other not to leave leftovers.
5. Try to finish all the food and cut off the waste meanwhile also considering personal health conditions.

Restaurants and hotels are encouraged to download the foldable leaflets of the “2510 Smile Party” campaign from the Sapporo City government’s webpage, reminding participants to take actions for food-loss reduction.

Promotion material developed by Sapporo City

Photo from Kelly Sikkema on Unsplash

Research and Education Instruments

Schools can be a place to experiment with approaches towards circular food systems. The Sapporo City government works with public elementary and junior high schools to mainstream the 3Rs measures in school meals management and education.

Sapporo City views the food-loss issue goes beyond waste management, and it is not sufficient to only rely on environmental education curriculums for awareness-raising. Therefore, the city government and stakeholders introduce an integrating food education program, in which students and catering companies work together to deliver sustainable food for school lunches. Students grow vegetables and fruits. Catering companies procure local food as well as use vegetables cultivated by students. If there is any food waste, it will be converted to fertilizers applying on school grounds. Students are involved in the food lifecycle, and they experience the value of food. This experience encourages them to reduce food-loss and treasure food with respect[45].

In terms of research, the city government conducted surveys[46] to get data for better policy design and decision making. The city government outreached 13,141 local businesses in 2019, trying to understand how enterprises perceive food-loss. Though the response rate was not high (7%), 862 businesses shared their current food loss reduction practices and their expectations for the city government's support. This information is essential for the government's upcoming "Promotion Plan for Reducing Food Loss".

Best Practices

The Food Drive Program in Hiroshima City

The "Food Drive" program in Hiroshima has co-benefits of food-loss reduction and social solidarity improvement. The Food Drive program, supported by the Hiroshima City government and civil society organizations, calls citizens to explore their fridges and shelves if there is any "food that can be eaten but is untouched". The program works with local food banks and social welfare organizations in which citizens can donate food to support those who are most in need.

The Hiroshima City government regularly works with sports activities and universities on "Food Drive" activities. The Environmental Bureau of the Hiroshima City government has consecutively organized "Food Drive" in the previous three years in the Hiroshima region's annual environmental festival—Environmental Day Hiroshima Rally. The city government set up a booth and called for citizens' donation of food that still can be eaten. Canned foods, sweeties and cookies, and noodles are the most common ones. After the one day event, the Hiroshima City government handed over the food to a local food-bank organization—Aiai Net. Established in 2008, Aiai Net has been one of the key players in the Hiroshima region to provide food support for vulnerable groups, including single-parent households and homeless people.

The Environment Bureau collaborates with the local soccer club— Sanfrecce Hiroshima— to organize "Food Drive" in front of the stadium when soccer matches are held. When people enter the stadium, they see the "Food Drive" booth and get information about food-loss reduction. In the previous two years, the collaboration with the soccer club was significantly successful. Overall, 338 items of food were donated to Aiai Net.

The social and environmental co-benefits motivate students and youths to join the movement. Volunteering students from Hiroshima Bunkyo University worked with the Hiroshima City government and Aiai Net to host one "Food Drive" activity on the university's open day. "Food Drive" provided an opportunity for both students organizing the activity and high-school visitors to be more aware of food-loss issues and social impacts.

Food Drive activities in Hiroshima City

photo from city.hiroshima.lg.jp

Donated food from Food Drive activities

Photo from Louis Hansel on Unsplash

The Salvage Party Program in Sapporo City

The Sapporo City government and civil society organizations operate a trial program—The salvage party, which encourages households and citizens to maximally utilize every part of vegetables and reduce food-loss. The word "Salvage" refers to "rescuing food from being discarded".

The salvage party is a learning-and-sharing cooking workshop organized by the Sapporo Consumers Association with support from the Environment Bureau of Sapporo City government and the Sapporo Slim Net. The Sapporo Consumers Association is an organization advocating consumers' rights and providing information about consumption. As households' food-loss is highly relevant to consumers' behaviour changes, the Association initiates the salvage party program. As of 2020, two workshops have been organized.

In the workshop, households brought food they want to throw away even though the food can still be eaten, including old vegetables, canned food prepared for disasters, and foreign canned food. Households either had no ideas for cooking it or did not like it. Lecturers supported analyzing the food and provided cooking ideas. Participants were divided into groups and cooperated to make a dish. The workshop also introduced knowledge about food-loss and how to reduce food loss in the kitchen.

The salvage party provides practical solutions and cooking methodologies to reduce food loss. Participants can easily apply the techniques when they go home. The workshop is also a platform for citizens to socialize and, at the same time, learn how to treat food with more respect.

Challenges and Opportunities

Challenge 1. Engage with More Businesses and Restaurants

If surplus food happens in restaurants and hotels, it is challenging to immediately redistribute food to those who are in need. Though new businesses emerge to fill this gap through providing online mapping service, most restaurants still have doubts about the collaboration mechanism and potential risks.

Businesses may need to change the original operation process for cutting food loss, including but not limited to stock management and data integration. Staff needs professional training to be aware of food-loss issues and the relevance to daily duties. Restaurant managers need to obtain new skills in menu design. Compared to the business-as-usual scenario, restaurants and small retailers have to make critical decisions between different expenses: the expenses of operation process change and the cost of food loss.

If surplus food happens in restaurants and hotels, it is challenging to immediately match those who are in need with those who have a surplus. Though new companies and business models emerge to fill this gap by providing online mapping services, most restaurants still doubt the collaboration mechanism and potential risks.

Photo from Tim Cooper on Unsplash

Challenge 2. Trigger Households to Take Actions

Influencing citizens' daily food consumption behaviour in their kitchens and dining rooms for cutting food-loss is challenging. Though in general households in Japan have the awareness of food loss and waste, it needs more effort to encourage people to convert knowledge and understanding into actions.

To cut food loss, home cooks need to have meticulous management tactics such as planning before purchasing, consumption amount estimation, and stock control. Learning-by-doing is an important process to overcome obstacles, but people may lose interest in practice before significant achievement has been achieved.

Opportunity 1. Embrace Innovation and Technologies

Innovation and technologies provide solutions. Mobile devices and geographical information can support connecting food surplus with those who are in need. For instance, an organization in Hiroshima City experiments with a new methodology to collect different sources of information on one platform and match excess food with demanders.

Local governments can play a role to mitigate users' concern about food quality and potential risk by establishing standards or inspection schemes. If a clear guideline to clarify the responsibility between businesses wanting to redistribute food surplus, intermediate companies operating matching platforms, and people receiving food can be developed, it will protect each party and reduce food loss. If local governments can set an inspection system for such food surplus redistribution and integrate it with regular safety checks, people can further work together to cut food loss.

Public schools and local governments can collaboratively smartly utilize weather forecast information when preparing school lunches. Daily weather conditions influence students' appetites. If the temperature is expected to rise, schools can prepare cold meals with more vegetables.

Schools can establish a system that will automatically inform catering companies for not preparing meals if schools are shut down due to typhoons or heavy rains. The current practice is that most schools are informed manually by local governments to take precautionary measures to cancel classes. Once the information is received, schools then contact catering companies for meal cancellations. Sometimes catering companies have prepared food before they receive schools' phone calls. An automatic system can solve the time-lag problem.

Photo from Ksenia French on Unsplash

Opportunity 2. More Collaboration after the New Law

The *Law to Promote Food-loss Reduction* has provoked more dialogues among stakeholders both at local and national levels. Food-loss issues have never ever received much attention as it is now. The Law creates a momentum for people to reckon food from a systemic, value-chain perspective.

Multi-stakeholders dialogues may trigger some regulation amendments to give local governments more flexibility to facilitate food-loss reduction. As city governments are encouraged by ministries to develop local planning and policies, it is expected that cities and regions will soon develop innovative and integrated approaches.

KEY TAKE-AWAYS

Photo from Nord Wood Themes on Unsplash

Regulation and Planning

Subnational governments can set local ordinances and specific action plans for their circular practices. Subnational regulations and plans support and align with national policies and strategies.

Subnational regulation and planning are effective enablers that local governments can utilize to facilitate circular practices. Before setting a new framework, cities shall also carefully review the existing sectoral plans and identify potential synergies to avoid overlapping and duplication. Horizontal coordination between different departments is essential to share information and experiences.

Economic & Financing Instruments

Cities can use economic and financing instruments to change the cost and monetary benefits of circular practices to make them more attractive. Subnational governments often impose subsidies, levies, and local taxes to move the gears of circular economy.

Cities which intend to use economic and financing instruments can also consider tax credits and other incentives, depending on the targeting group. By internalizing externalities in the market activities, actors will be redirected to deliver products and services that have positive impacts on food systems.

Cooperation and Collaboration

Government, businesses, and CSOs often work together to deliver circular economy practices. In the three cases, we find intense relationships have been built, and outcomes are diverse and thriving.

Businesses and CSOs have extensive knowledge and practical experience that can contribute to urban food systems circularity. Local governments can first outreach to relevant associations and leading NGOs/NPOs and understand their insights about the city's circular economy. Starting from some small scale pilot projects is an efficient way to build mutual trust.

Information and Communication

Websites and social media have been the dominant tools. Events and workshops have significant impacts. Depending on the information types, a communication toolkit blending with different tools can be developed for the promotion of circular food systems.

Information dissemination and knowledge sharing need all stakeholders' engagement and participation. Local governments can take the lead to enable the environment and provide necessary resources to facilitate innovative communication tools development.

Research and Education

Subnational governments can work together with research institutes to develop knowledge and innovative solutions for circular food systems. Professional and school education enable more people to get training about circular practices.

Universities and schools have talented young people to develop innovative practices pushing the envelope of food systems. Local governments can first build relationships with educational institutions and explore the potential to start pilot programs.

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