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How My Meal Today Affects the Climate Crisis

- Focusing on Food waste policy and carbon-neutral scenario through Mixed policy model

Da young Kim[1+], So Yeong Kwon[2#]

[1]Department of Public Administration, Chungbuk National University, 1 Chungdae-ro, Seowon-Gu, Cheongju, Chungbuk, Korea
[2] Department of Public Administration, Chungbuk National University, 1 Chungdae-ro, Seowon-Gu, Cheongju, Chungbuk, Korea

A B S T R A C T

The United Nations Environment Program revealed that 1 billion tons of food waste annually is the main culprit of greenhouse gas emissions through the issuance of the FOOD WASTE INDEX in 2021 (UNEP, 2021). The discussion on the seriousness of carbon emissions related to food waste emphasizes the importance of Korea's role in implementing separate food waste disposal and discussing the institutionalization process and the efficiency of recycling facilities for related collection and treatment methods. Then, this study will examine how the discussion of food waste in Korea is being operated in the climate crisis discourse, focusing on the food waste reduction plan and the 2050 carbon-neutral scenario. The formation of two systems as an environmental policy is analyzed through the Kern & Howlett (2009) policy mix model and the concept of government policy coherence used in the OECD-DAC. It is determined whether the two systems are compatible with each other and implement effective policy measures with the ultimate goal of resolving the climate crisis. In addition, systematic literature analysis of various domestic and foreign prior studies was conducted to reveal differences in research trends in Korea and abroad. Suggestions for additional points for currently operating systems were suggested using waste statistics.

Key words: Food-waste, Climate Risk, Carbon Neutrality Scenarios, Food Waste Control Plan, Policy mixed model, Policy Coherent

1. Introduction

The UN Environment Program announced through the issuance of the FOOD WASTE INDEX in 2021 that 1 billion tons of food waste per year are the main culprit in greenhouse gas emissions. This means that about 17% of the world's food production is thrown away, and the ratio of food waste is 61% in general households, 26% in the restaurant industry, and 13% in the retail sector. The U.S. Department of Agriculture and the U.S. Environmental Protection Agency has prioritized preventing or diverting wasted food. The Intergovernmental Panel on Climate Change found that 8 and 10% of total anthropogenic carbon dioxide equivalents (CO2e) emissions come from food loss and waste (IPCC, 2022).

1.1 Discourse on food waste and climate crisis

In terms of whether food waste is addressed in the climate crisis discourse, despite its environmental impact, food waste shows different aspects at home and abroad in terms of recognizing its relevance to the climate crisis and carbon. While the implementation of food waste separation has been slow overseas, discussions on the relationship between food waste and carbon continue to take place. The current situation is that the focus is more on the effectiveness and efficiency of the resource nation process rather than the discussion within.

In addition, the perception of the link between food waste and the climate crisis may be lower than other pollution or environmental abuse. Im-

pacts that are perceived to be probable can also be causative.

1.2. Characteristics of the food waste problem as an environmental problem

From a practical point of view, food waste control has the characteristics of adaptation measures to climate change, unlike the global environmental problem of the climate crisis, because it is crucial to establish adaptation measures in consideration of regional characteristics and realities. In addition, as mentioned above, the UN Environment Program focused on the impact of carbon emissions of food waste. It asserted that "through this survey, we have confirmed that all countries are experiencing food waste problems." It was set as a national problem, and for this purpose, governments, businesses, and citizens worldwide appealed for active participation in efforts to reduce food waste.

Korea implemented food waste separation in 2005 and joined the London Convention in 2012 to cooperate with prohibiting marine dumping of food wastewater discharged from food waste treatment. In the field of food waste management, it is in an advanced position in the field of institutionalization and implementation of collection and treatment methods. If so, how is the discussion of food waste in the climate crisis discourse proceeding? First, this study examines the system related to food waste treatment and management, and second, it examines the coherence of the domestic plan related to the climate crisis. Through this, we seek ways to deal with the food waste problem within the climate crisis discourse.

This course examines prior research on domestic and foreign food waste and climate crises. Then, the current food waste control plan in Korea will be reviewed, and the literature will be analyzed on the carbon-neutral scenario of local governments. The structure of this study for this purpose is as follows.

2. Theory & Literature Review

In order to conduct the research, considering that the upper system of climate crisis among various policy theories for the analysis of research was later issued and institutionalized in society, a theoretical review was conducted focusing on policy mix and coherence of government policies. Through this, We intend to derive the analysis and results of the study.

After reviewing the theory, research trends and implications for food waste are identified through a review of domestic and foreign prior research.

2.1. Policy Mixing and Policy Coherence

The policy blend model explains the changes in the system based on the consistency and continuity of policy objectives and means (Sun-Hee Kim, 2019). The policy blend model proposed by Kern and Howlett (2009) used as the basis for this study is the It is a model that explains the endogenous change of coloration based on persistence. They suggested stratification, drift, transition, and substitution as the types of policy mix based on the continuity of policy means and the consistency of objectives. They viewed that they evolve path-dependently with time. Afterward, Howlet and Rayner (2013) extended the type of policy design to policy bundles and policy additions, and bundles are cases where new policy packages with similar purposes and means are introduced. Policy addition takes place in the case of supplementing the deficiencies in the existing classification, which appears in the types of stratification, drift, and transformation in the existing classification (Kim, 2019).

<Table 1> Types of policy design and mix

		Tool	
		Consistent	inconsistent
Goal	Coherent	Displacement	Conversion
	incoherent	Drift	Layering

Ker&Howlett(2009)

The discussion of policy coherence is a concept discussed at the OECD-DAC as part of the policy design for the policy effect of the country to which the policy is to be implemented in policy intervention between countries among these policy-making processes. It can be seen as a concept designed for applying transnational discussions in the discussion of gender.

Policy coherence is a concept that goes beyond the consistency of related policies, meaning that government policies for development must be overall consistent (KOICA, 2008). It also includes the concept of whole-of-government approaches for development goals beyond a single national level, coherence in development programs among different donor countries, and policy coherence between donor and recipient countries (Kindornay, 2011).

This study considers policy coherence, a concept of national policy analysis and evaluation, and policy mix because food waste and climate crisis are regional and international issues.

2.2. Literature Review

2.2.1 .Overseas Prior Research

According to the United Nations Environment Programme, 1 billion tons of food waste per year is the main culprit in greenhouse gas emissions. Korea reported it emitted 81 kg, above the global average of 74 kg. Also, in order to suppress such food waste, it is reminded that SDGs No. 12 is a sustainable production and consumption item, and item 3 among them is specified as a content to reduce food waste. highlighted the importance of

Research interest in household food waste and consumer behavior has continuously increased since 2010, and in particular, individual consumption behavior has been the main research subject (Hebrok & Boks, 2017; Roodhuyzen, Luning, Fogliano, & Steenbekkers, 2017; Principato, 2018; Schanes, Dobernig, & Gözet, 2018; Stangherlin & de Barcellos, 2018).

Quested et al. (2013) used the term “spaghetti soup” to describe the relationship between consumers and food perceptions in a complex situation of potential interactions between behaviors and influencers.

Neff et al. (2015) conducted an extensive survey on American consumers' food waste awareness and behavior. Through this, Americans believe that food waste is not wasted and the belief that food waste can be recycled. Reported to be present. Through this, it provided accurate environmental knowledge and information on individual environmental awareness that should be considered when establishing policies of local governments. In addition, it revealed the importance of individual awareness concerning food waste suppression by revealing that providing food as an obstacle to food waste control is in the category of 'good' as the existing notion about food affects it. (Graham et al., 2014;2015).

Roodhuyzen et al. (2017) pointed out that although research on environmental psychology and environmental behaviors on the relationship between household food waste and behavior has been developed, there is no study on the influence of groups or societies, including individuals. Boulet M. (2021) conducted a multi-level study that considered multidimensional aspects in consideration of this point, collecting factors at the micro (individual), intermediate (home), and macro (outside the home) level, and reciprocal behavior and food waste. Claimed to come from action.

Breadsell & Morrison (2020) pointed out the paradox of narrowing down the scope of research in carrying out waste-related research and argued for the need for research considering the mobility of residents in modern society. They argue that, rather than individual attitudes and beliefs, the causes of resident behavior for resource use should be mainly considered (Breadsell & Morrison, 2020).

Parizeau et al. (2015) revealed that food waste is a social problem and showed that people who regard food waste as a social problem produce less food waste. Additionally, consumers who believe in their ability to reduce food waste and consider reducing it over their control are more likely or at least more willing to reduce it directly (Graham-Rowe). et al., 2015; Stancu et al., 2016; Visschers et al., 2016).

Despite individual and social studies and international research publications on the suppression of food waste, it was confirmed that the awareness of the relationship between food waste and the climate crisis has not been sufficient. A study by Watson and Meah (2012) reported that none of the study participants responded to the explicit relationship between greenhouse gas emissions and food production.

Veeramani et al. (2017) quantitatively evaluated the effect of the Canadian diet on global warming, and Ontario residents of Canada prefer DP rich in animal products (especially beef) with very high Global Warming Potential (GWP) so that Reducing waste can reduce GWP by up to 8%.

Parizeau et al. (2015) investigated the relationship between food-related consciousness, perception of waste, family lifestyle, pursuit of a convenient lifestyle, and food waste patterns. Through this, it is argued that it is important to understand the diversity of factors that can influence food waste behavior at the household level in order to design a waste management system and policy to reduce food waste (Parizeau et al., 2015).

Nordin K et al. (2020) found that the common disposal of food waste in developing countries is dumping or landfill and reported that this common dumping (95%) is addressed in landfills that are converted to methane and other greenhouse gases that affect climate change. As a result, it is meaningful to contribute to the government policy on household food waste management and national goal setting for sustainable development (Nordin K et al., 2020).

The U.S. Department of Agriculture and the U.S. Environmental Protection Agency has published their priorities to prevent or divert wasted food. The Intergovernmental Panel on Climate Change has found that 8-10% of total anthropogenic carbon dioxide equivalent (CO2e) emissions come from food loss and waste. Revealed (waste360 2022.07.01). This will enable state and local regulators in the United States with the power to minimize environmental impacts to call for development projects (particularly those related to the

food industry) to offset increasing greenhouse gas emissions through food waste reduction (waste360 2022.07. .01).

As such, in the research to identify the causes of individual food waste occurrence at the individual level, the research on the complexity and diversity of the causes and the linkage with carbon emission, the main cause of the climate crisis, are studied, and the need for government policy establishment is argued. It was found that research related to foreign food waste is progressing as a result of the research flow. In addition, it was confirmed that the re-name phenomenon of 'resource nation' did not occur for food waste.

2.2.2. Domestic Prior Research

For the analysis of prior domestic research, the preceding research was conducted using food waste as a keyword and was based on academic papers published in Korea within ten years. As a result, it was confirmed that the papers with the following research fields and keywords were mainly researched.

Before the detailed review of prior research, it can be confirmed in the field of research that the research on food waste that has been done within the last ten years is mainly related to the technology of food waste. Also, in the case of studies related to social services, studies related to health or school meals and hygiene were predominant rather than studies related to institutions.

<Table 2> Characteristics of Articles

Characteristics	n
Research field	
Engineering	22
Social welfare work	10
Architecture/ Business/ diet & clinical nutrition/ diet & clinical nutrition	3(4)
Architecture/economics/environmental services/law/mathematics/public health	2(6)
Ecology./government/social science/zoology	1(4)
Keyword(top 5)	
Food waste	100
Environmental engineering	41
Soldier Fly	17
Bio-gas	10
Composting	10
Database	
Korean Studies Information, Korean Citation Index, DBPIA, KoreaScience, Kyobo Scholar (교보스콜라), eARticle23, KoreaMed – Korean, Korean Academic Journals	

Shim(2022) tried to empirically identify the effect of consumer citizenship on food waste reduction efforts by recognizing the importance of food waste reduction.

Shin et al. (2021) reveal that the volume-based food waste price is affected by spatial interaction due to comparative competition between local governments and explain the causes of the volume-based food waste pricing system, but study the effect of these prices on food waste control, not included in

A study was conducted to analyze the recycling status of domestic food waste on the subject of direct linkage between food waste and carbon emission and propose a virtuous cycle system for additional reduction (Lee, Park, et al. 2020).

A study that mentions the indirect link between food waste and carbon emissions, a study that suggests a systematic way to link the RFID system for food waste treatment with individuals or apartment complexes to activate the carbon point system (Kim Jeong-in, Kim, et al. 2021). Above all, Kim et al. (2021) pointed out that the level of recycling of food in metropolitan areas through tracking the amount of FW generation by region was unacceptable. In addition, although the diet education budget continues to decrease, focusing on studies on school meals related to food waste suppression, a study showing that there is a clear food suppression effect, and a study on the actual condition to reduce the leftovers of school meals in Gyeonggi-do It was implemented, and for this purpose, the necessity of education for recognizing the relationship between food waste and environmental protection was suggested (Choi & Lee 2019, Joo et al. 2020)

Lee (2017) reported on food waste reduction activities in Europe and pointed out that greenhouse gases generated during food waste treatment are significant among environmental costs. Nevertheless, when reporting, European legislation pointed out that there was no specific legislation for food because food waste was a part of the waste, and there was no specific legislation (Lee, 2017).

Cho et al. (2015) empirically conducted an empirical study of factors affecting local government acceptance of the volume-based food waste system promoted by the central government for basic local governments in waste management areas from 2006 to 2013 before the full-fledged food waste separation. (Keun-Ho Lee, Choi et al. 2015). The empirical analysis of economic, social, and normative motivating factors, administrative and financial, political, and implementation guidelines as independent variables is significant because the study targets local governments, which are policymakers.

In discussions on food waste and climate crisis, the domestic discussion mainly focused on research for the efficiency and effectiveness of the

already enacted separate discharge system. Therefore, previous studies on environmental policy were reviewed for further review of previous studies.

Lester (1990) identified the will of local governments and efforts to preserve the environment as institutional capabilities. He suggested the need for continuous attention and active execution of leadership in environmental policy implementation as a framework.

<Table 3> Lester(1990)s' matrix

		Will of Leader	
		High	Low
Institutional Capacity	High	Progressive	Conflictive
	Low	delayed	retrograde

Lester's (1990) author rewrite

Fine dust is a substance that must consider regional characteristics due to topography, atmosphere, industrial, and transnational characteristics. It shows the complexity of environmental policy targets such as food waste. Baek&song(2019) argue that, for effective fine dust management, management at a regional level considering the transcendental characteristics of fine dust is essential. In conclusion, it was confirmed that a regional reduction policy should be introduced considering the emission characteristics (Jeong&Jae, 2019). In previous domestic studies, research centered on food waste mainly focused on the efficient operation of technology and resource-making facilities or well-being. However, cooperation between the central and local governments is important in terms of environmental policy, and Papers highlighting the importance of the based approach have been studied.

3. Related Environmental Regulation and Statics

This chapter presents statistical data based on national waste statistics to confirm basic statistics related to food waste. The legal basis for the food waste suppression plan and Korea's carbon-neutral scenario, the analysis's target, and the establishment's purpose and goal are described.

3.1 food waste statics

Food waste belongs to the category of food waste separated from household waste according to the 「Waste Management Act」. According to the national waste generation and treatment status announced by the Ministry of Environment and the Korea Environment Corporation in 2021, the trend of food waste generation nationwide for the past five years is as follows.

<Table 4> Trend in Food Waste

	'15	'16	'17	'18	'19	'20
Total	15,265	15,663	15,678	16,283	18,149	19,549
Household waste	1,871	1,963	1,952	2,045	2,116	2,254
Household waste - Food waste	519	525	526	528	522	516

Although the generation of waste has continuously increased over the past five years, it has been confirmed that the amount of food waste in household waste is repeatedly increasing and decreasing.

The progress of treatment change for waste is as follows. Although there is no significant difference by year, it can be seen that the rate of the landfill has decreased when preparing for 2015 and 20. Other treatment methods include chemical and biological disposal

<Table 5> Changes in Waste disposal Method

	'15		'16		'17		'18		'19		'20	
	gen	%	gen	%	gen	%	gen	%	gen	%	gen	%
Total	1,871	100.0	1,963	100.0	1,952	100.0	2,045	100.0	2,116	100.0	2,254	100.0
Landfill	282	15.1	289	14.7	264	13.5	275	13.4	268	12.7	265	11.8
Incinerator	481	25.7	497	25.3	486	24.9	502	24.6	545	25.7	575	25.5
Recycle	1,108	59.2	1,177	60.0	1,202	61.6	1,268	62.0	1,263	59.7	1,342	59.5
Etc	-	-	-	-	-	-	-	-	40	1.9	72	3.2

<Table 6> Waste disposal facility budget

	Total	Landfill facility	Etc		Total	Landfill facility	Etc
Nationwide	13,808,729,370	55,478,011	145,617,822	Gyunggi	1,297,615,733	0	2,180,003
Seoul	774,984,748	0	2,388,217	Gangwon	247,140,443	11,557,221	31,818,602

Busan	311,401,082	2,507,970	6,534,753	Chungbuk	141,394,370	444,925	938,784
Daegu	208,002,327	0	5,705,000	Chungnam	8,844,309,377	18,857,280	18,759,305
Incheon	309,730,906	0	764,061	Jeonbuk	216,375,063	4,386,205	8,339,480
Gwangju	127,061,940	0	0	Jeonnam	191,654,726	7,212,697	13,778,851
Daejun	157,957,517	4,630,670	9,500,000	Gyeongbuk	339,556,789	314,000	4,543,188
Ulsan	108,391,306	0	0	Gyeongnam	343,174,798	5,567,043	37,861,701
sejong	38,020,622	0	35,382	Jeju	151,957,623	0	2,470,495

<Table 7> Operational status of food waste resource facility

Recycle Facility	T/D	T/Y	Recycle	Incinerator	Landfill	Etc
FeedStuffing	3,541	846,680(39.5)	132,080	50,662	22,485	55,127
Composting	2,341	689,872(32.2)	61,225	34,700	18,419	82,958
anaerobic digestion	2,349	603,757(28.2)	10,649	23,331	36,574	40,296
Total	8,231	2,140,309	203,954	108,693	77,478	178,381

According to the municipal waste management budget by province, the requirement for facility installation cost was revealed only in specific local governments in the case of reclamation facilities in 2020, so it can be inferred that local governments have special conditions, including landfills.

In the case of food resource recycling facilities, anaerobic digestion, feed conversion, and composting resource conversion facilities were the main ones, and the amount of food used as a resource was found to be the largest among them. However, it is pointed out that in the case of composting or fodder conversion, food wastewater is inevitably leaked during the recycling process, and the consumption of feed converted into food waste is not continuous.

Recycling through anaerobic digestion As a fuel conversion method using methane gas, the Korean government established a basic plan for resource circulation in 2018. It said that it would increase the conversion of waste into resources and its recycling.

3.2 Food waste reduction plan

According to the revision of the Waste Management Act, the food waste control plan, which local governments must establish, is established every five years. It is a statutory plan requiring local governments to establish and implement a comprehensive food waste management plan, including a preemptive one.

This can be seen as providing the basis for the establishment of food waste generation suppression and, at the same time containing the will to change the policy direction of local governments to generation suppression rather than treatment after generation.

Lee Min-gyu et al. (2020) classified the characteristics of the「Food and Logistics Waste Generation Control Plan」into a statutory, comprehensive, strategic, and policy plan. It is defined as a strategic plan linked with higher-level and regional plans, such as the comprehensive waste management plan established by the government, asserting the importance of establishing a plan that predicts and considers changes in local management conditions.

The main policy flow under the theme of “reducing food waste” began with the “Basic Plan for Food Waste Reduction and Recycling (1998~2002)” established by the Ministry of Environment in 1998.

After that, “Comprehensive Measures for Food and Logistics Waste (2006~2010)” were established. In 2010, the "Comprehensive Measures for Reducing Food and Drinking Waste" was promoted in cooperation with related ministries. At this time, measures were prepared to achieve the vision of realizing low-carbon, green growth by creating an eco-friendly food culture and saving energy.

In addition, food waste is included in waste, so it was treated as a part of the resource recycling plan. Korea is setting goals for recycling waste following the 1st Basic Resource Circulation Plan.

However, in the case of food waste, according to the current state of national waste generation and treatment, only the amount of food waste that can be estimated through the volume-based collection is targeted. Discussions about large-scale discharge plants and unauthorized dumping are ongoing. Although there has been an increase or decrease, it is important to establish a plan for the basic local government to suppress the generation of food waste because there is a decrease in the

proportion of food waste in household waste and difficulties in recycling it.

3.3. Local Government Carbon Neutral Scenarios

In October 2020, the Moon Jae-in government declared 2050 carbon weight and announced a plan to prepare a carbon-neutral scenario. Waste was also selected as an emission category in the carbon-neutral scenario. Korea has set an intermediate goal of achieving 2050 carbon neutrality through the 2030 National Greenhouse Gas Reduction Target (NDC).

The government predicted that the amount of waste generated in 2050 would be 152.8 million tons, a decrease of 6.1% from the 162.8 million tons generated in 2018 through reduced and expanded recycling. It is suggested that the premise is to expand gas utilization and reduce generation.

Based on these premises, restrictions on the use of single-use products, reduction of food waste, mandatory use of recycled raw materials, minimization of landfilling of greenhouse gas wastes, maximization of recycling, and strengthening of standards for landfill use were presented.

In addition, the Basic Act on Carbon Neutrality and Green Growth (abbreviation: Carbon Neutral Basic Act) was enacted to respond to the climate crisis, and it was defined as a duty of local governments. The relevant regulations are as follows.

To this end, each local government is trying to establish basic carbon-neutral ordinances and policies, but no local governments have promulgated ordinances yet.

<Table 7> Framework Act-On Low Carbon, Green Growth

FRAMEWORK ACT ON LOW CARBON, GREEN GROWTH Act No. 16646, Nov. 26, 2019
Article 10 (Establishment and Implementation of Action Plans by Central Administrative Agencies) (1) The head of each central administrative agency shall establish and implement an action plan for matters under his/her jurisdiction (from now on referred to as "central action plan"), as prescribed by Presidential Decree, so as to execute the national strategy for green growth efficiently and systematically. (2) The head of each central administrative agency shall, whenever he/she establishes or revises the central action plan, report it to the Presidential Committee on Green Growth under Article 14, as prescribed by Presidential Decree: Provided, That the foregoing shall not apply to modifications to minor matters prescribed by Presidential Decree.
Article 11 (Establishment and Implementation of Action Plans by Local Governments) (1) The Special Metropolitan City Mayor, each Metropolitan City Mayor, each Do Governor, and the Governor of a Special Self-Governing Province (hereinafter referred to as "Mayor/Do Governor") shall establish and implement a local action plan for green growth (hereinafter referred to as "local action plan") in conformity with the national strategy for green growth, as prescribed by Presidential Decree, so as to facilitate each local government's low carbon, green growth. (2) Each Mayor/Do Governor shall, whenever he/she intends to establish or revise the local action plan, report a proposed bill to the local council after bringing it to the local committee on green growth under Article 20 for deliberation, and then submit it to the Presidential Committee on Green Growth under Article 14 without delay: Provided, That the foregoing shall not apply to modifications to minor matters prescribed by Presidential Decree.

4. Analysis and Result

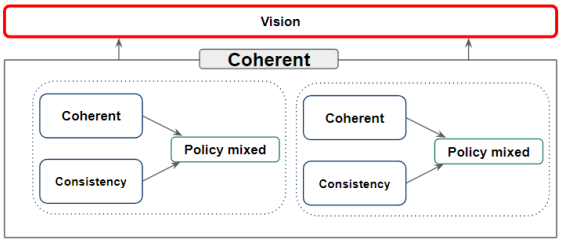
This study analyzes the necessity of holistic unity to solve ultimate social difficulties and complex problems through the concept of policy coherence in Kindornay (2011) as well as the policy mixture model suggested by Kern and Howlett (2009).

The policy hybrid model proposed by Kern and Howlett (2009) attempts to explain the endogenous changes in the system with two mechanisms in focus. The first is continuity, which is reinforcement between policy instruments to pursue policy objectives. The second is consistency, meaning the logical coexistence of policy objectives and policy means.

Since this model basically focuses on the endogenous change mechanism of the system, it can explain each of the changes in the two statutory plans that must be established by local governments. However, as discussed above, as waste-related matters are included in the basics of green growth, it is necessary to consider the hierarchy between policies as well as internal institutional changes.

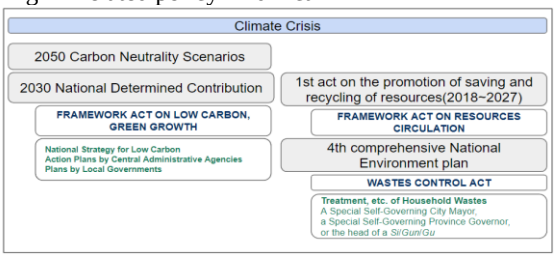
This study asserts that the establishment of waste policy and food waste suppression policy should be consistent within the climate crisis discourse. To this end, it is assumed that an additional concept of policy coherence should be introduced to ensure consistency in the carbon-neutral scenario for the policy goal of responding to the crisis.

<fig2 > Analysis Model



4.1 Food waste policy is seen as a mixed policy model

<fig1 >Related policy And Act



The food waste generation suppression plan started with the first and second comprehensive national waste management plan. It was merged and abolished in the establishment of the third plan and modified into a resource conversion management plan, not waste.

In terms of coherency, the food waste reduction plan has changed policy goals for dealing with food waste over time. The first waste management plan focused on minimizing household waste, the second plan focused on minimizing industrial waste and technology development, and the consideration of food waste began. The change in the policy goal can be viewed as a flow from the post-processing of waste to resource conversion and generation suppression.

The central government implemented a volume-rate system to reduce food waste, and the discussion on food waste recycling began

in earnest. In terms of consistentancy, it is confirmed as a major change in the flow of policy means that the waste policy, which the central government managed, has come down to the authority of local governments. However, it was confirmed that it was difficult to respond to this due to the lack of authority of the local government to manage food wastes generated at the local government level, and the duty to establish a plan to suppress the generation was given considering the conditions of the local government.

As a result, the policy goals that exist within the system are in a state where occurrence control, post-processing, and resource nation are all mixed and coexisting in a form with different priorities. As a policy tool, it became possible to establish a plan that reflects the conditions of local governments, but it is confirmed that the plan is established according to the guidelines of the central government.

In terms of coherence of government policies, a carbon-neutral scenario, identified as the main cause, was planned to respond to the international environmental disaster called the climate crisis. This should include green growth measures and a carbon-neutral action plan for each local government. In addition, reducing carbon emissions from waste is specified as a goal of carbon neutrality. Nevertheless, it can be seen that the mandatory provisions for waste are omitted in the establishment of plans for each local government or national plan for carbon neutrality under the Basic Act.

In addition, the basic resource management plan and food waste control measures operated based on the Waste Management Act is established before the mandatory statutory plan or the carbon-neutral scenario, and related statistics have been established. For the two policies' performance, the goals' coherence through policy coherence must be ensured.

The waste management plan confirmed that discussions on climate response continued in the government guidelines and policy data. Specifically, in the Resource Management Master Plan, efforts were made to increase waste recycling and significantly reduce landfills' proportion to prevent the outflow of gases that cause global warming and to minimize carbon emissions from landfills.

Despite the continuous discussion and interest in carbon emission. The similarities between the discussion of carbon reduction policy measures in the second plan and the current master plan for resource conversion and the cause of externalities or fragmentary policy measures through continuous waste increase. It is analyzed that the policy is drifting.

The carbon-neutral scenario was established in 2018 based on the same policy goals as the food waste policy. The main content is a scenario related to green growth that kills gradual carbon emission by sector to achieve zero carbon emission by 2050.

The carbon-neutral scenario required multi-disciplinary considerations to deal with the major cause of the climate crisis, called carbon neutrality and was considered as one part of the scenario because waste is also a cause of carbon emission.

As the basis for this scenario, the government suggested the use of biogas, including the increase in resource recycling and the eradication of landfill use. However, practical consideration of the resource conversion facility by local government, which is the policy means of the waste control system, and the diversification of resources other than feed, compost, and biogas have not been secured. According to the national waste statistics, it can be seen that in order to increase recycling, the consumption of waste-to-resource products according to the increase in recycling should be stimulated. In particular, in the case of household waste that contains food waste, the recycling rate is gradually decreasing, and the discussion on prohibiting the use of feed continues. Therefore, measures for the consumption of recyclable products, including the diversity of recyclables, should be considered.

In terms of the coherence of government policies, the carbon neutrality discussion in 2018 can be seen as an acknowledgment of the need for multi-sectoral consideration in consideration of the complexity and diversity of the climate crisis issue. In the case of food waste suppression and carbon-neutral scenarios examined in this study, it is confirmed that they are consistent in government policy. It was confirmed that the consideration of food waste in waste and the understanding of its current status was insufficient as it was difficult to consider in detail due to the nature of the large plan.

4.3 limitation

This study's limitations and the analysis's limitations are summarized as follows.

The policy mixture model is an analysis frame for the implemented policies, and it is seen as a limitation of the first analysis that the carbon-neutral scenario, which is currently in the initial stage of implementation, is the target of the analysis. The food waste control plan is currently in the stage of carrying out the second plan ('21~'25), but in the case of the carbon-neutral scenario, it is in the initial stage of establishment. It seems that it will take time for it to appear.

Second, there is a problem with collecting relevant data to claim that food waste is the main cause of carbon emission. Food waste is treated as a detailed item in the national waste statistics survey. In the case of greenhouse gas emission statistics, only waste incineration is covered based on national greenhouse gas statistics. Additional evidence is required.

Third, it is required to understand the relationship between various related laws and regulations. Although this study dealt with the legal systems and policies corresponding to the two systems, domestic and international policy considerations should be taken into account in consideration of the characteristics that the climate crisis is transnational and the waste problem is local.

5. Conclusion

Considering that food waste is identified as the main cause of carbon emission, and the main emission source is household or domestic waste, carbon-neutral consideration of food waste in the waste policy should be further strengthened. Nevertheless, there is a lack of discussion in Korea on the relationship between carbon emission and food waste recycling.

The complexity of the food waste problem and the climate crisis as an environmental problem is an international and local problem. It is an important issue to reach an agreement through sharing the final goal as it includes the problem of conflict.

This study shed light on the phenomenon that the food waste issue was not specifically addressed in the climate crisis discourse. And suggests that policy measures considering such consistency and regional specificity should be considered in the plan at the local government level to be established as a statutory plan in the future.

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Profile

Da Young Kim (kdkdkdy@naver.com)

She is a Ph.D. Student in Chungbuk National University, Korea. She received her masters' degree from Chungbuk National University, Korea, in 2017. She served as the president of the SGPF academic conference in 2020 and was selected as a scholarship student in the Global Ph.D. Fellowship of the Ministry of Education during her Ph.D. degree.

So Yeong Kwon (thdud4618@naver.com)

She is in the Master's course in the Department of Public Administration at Chungbuk National University. Her interesting subject and area of research and education is local self-government and intergovernmental relations.

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