KNOWLEDGE SHARING PROGRAM

2011 Modularization of Korea's Development Experience:

Volume-based Waste Fee System in Korea

2012

MINISTRY OF ENVIRONMENT

Korea Environment Institute

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Preface

The study of Korea's economic and social transformation offers a unique opportunity to better understand the factors that drive development. Within one generation, Korea had transformed itself from a poor agrarian society to a modern industrial nation, a feat never seen before. What makes Korea's experience so unique is that its rapid economic development was relatively broad-based, meaning that the fruits of Korea's rapid growth were shared by many. The challenge of course is unlocking the secrets behind Korea's rapid and broad-based development, which can offer invaluable insights and lessons and knowledge that can be shared with the rest of the international community.

Recognizing this, the Korean Ministry of Strategy and Finance (MOSF) and the Korea Development Institute (KDI) launched the Knowledge Sharing Program (KSP) in 2004 to share Korea's development experience and to assist its developing country partners. The body of work presented in this volume is part of a greater initiative launched in 2007 to systemically research and document Korea's development experience and to deliver standardized content as case studies. The goal of this undertaking is to offer a deeper and wider understanding of Korea's development experience with the hope that Korea's past can offer lessons for developing countries in search of sustainable and broad-based development. This is a continuation of a multi-year undertaking to study and document Korea's development experience, and it builds on the 20 case studies completed in 2010. Here, we present 40 new studies that explore various development-oriented themes such as industrialization, energy, human capital development, government administration, Information and Communication Technology (ICT), agricultural development, land development and environment.

In presenting these new studies, I would like to take this opportunity to express my gratitude to all those involved in this great undertaking. It was through their hard work and commitment that made this possible. Foremost, I would like to thank the Ministry of Strategy and Finance for their encouragement and full support of this project. I especially would like to thank the KSP Executive Committee, composed of related ministries/departments, and the various Korean research institutes, for their involvement and the invaluable role they played in bringing this project together. I would also like to thank all the former public officials and senior practitioners for lending their time and keen insights and expertise in preparation of the case studies.

Indeed, the successful completion of the case studies was made possible by the dedication of the researchers from the public sector and academia involved in conducting the studies, which I believe will go a long way in advancing knowledge on not only Korea's own development but also development in general. Lastly, I would like to express my gratitude to Professor Joon-Kyung Kim for his stewardship of this enterprise, and to his team including Professor Jin Park at the KDI School of Public Policy and Management, for their hard work and dedication in successfully managing and completing this project.

As always, the views and opinions expressed by the authors in the body of work presented here do not necessary represent those of KDI School of Public Policy and Management.

May 2012

Oh-Seok Hyun

President

KDI School of Public Policy and Management

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Summary

After 1960s, rapid urbanization, increases in income and consumption inevitably gave rise to environmental pollution as well as mass generation of waste on an unprecedented scale. The changes in consumption pattern for most people preferring luxurious goods also resulted in shortening of product life span and brought about early discard of products, such as furniture, and home appliances. And use of disposable products, excessive packaging and excessive food waste were creating greater challenges for waste management authorities. Moreover, waste treatment facility was necessary but construction of sanitary landfill site and incinerator caused big social conflict between local communities. To overcome the problems, government started to shift its focus from "how to treat the waste" to "how to reduce the waste." In order to reduce waste and maximize recycling, the Korean government introduced the Volume-based Waste Fee (VBWF) System in 1995.

In the past, waste collection fee was charged on a fixed rate through property tax or monthly fee regardless of the amount disposed. However, with the introduction of VBWF System, households and small sized commercial sectors are required to purchase specified bags to throw away their garbage, thus waste collection fee is charged in proportion to the amount thrown away. The main objective of the VBWF System is two-fold: to impose waste treatment cost on each polluter based on the amount of waste generated, and to provide free collection service for recyclable wastes, thereby inducing reduction in generation of wastes at source.

The type of waste subject to the VBWF System is municipal solid waste from households, commercial sectors, small businesses and office buildings. The wastes from commercial sectors should be similar to those of household wastes, in that they can be collected, transported, stored, and treated in the same way as the household wastes. The emission sources are residential houses, commercial sectors, office buildings, institutions such as schools and government, and small-sized businesses disposing of less than 300kg waste per day. Large-scale generators producing more than 300kg per day are not subject

to the VBWF System and they are required to treat wastes on their own responsibility. They can commit waste collection and treatment to private hauler. The system does not apply to burnt coal briquettes, recyclable wastes and bulky wastes such as discarded refrigerators and furniture.

The VBWF System had a far-reaching effect on the reduction of waste generation and recycling in municipal solid waste. The system led to 17.8 percent reduction in municipal solid waste generation and 26 percent increase in recyclable wastes in the first year 1995 only. During the period of 1994~2004, the system led to 13.96 percent per year average reduction of generation of municipal solid waste. The system has been evaluated as being successful even though it has barriers such as illegal dumping and burning in rural area.

It has also changed the pattern of waste generation, awareness of the public toward waste disposal, as well as, the behavior of consumers and producers. Although the system still has room for improvement, VBWF System is an excellent example of a market-based environmental policy.

The developing countries usually have high population in rural area without proper waste collection system. And organic waste occupies big portion of total waste. In this regard, Village-level Volume-based Waste Fee System can be one alternative. The Village-level Volume-base Waste Fee System was conducted to fit the need of rural area with small population which lacks frequent waste collection system. Also, organic waste recycling should be considered due to its importance.

Chapter 1

Introduction

1. Volume-based Waste Fee System in Korea
2. About Korea and Korean waste management
3. Contents

Introduction

1. Volume-based Waste Fee System in Korea

Environmental civic group Green Korea conducted a survey on "Top ten environmental news" in last five decade with 100 environmental experts; public officers, professors, environmental activist etc., in 1999. The phenol release in Nak-dong river[1] hold the first rank and introducing Volume-based Waste Fee System in 1995 ranked the fourth place. The Volume-based Waste Fee System aims at reducing household wastes by introducing economic incentive system in waste disposal. The government levies a waste collection fee based on the volume of waste discharged. The waste generation per capita following the implementation of the Volume-based Waste Fee System has been reduced to a level equivalent to the developed world, and the amount of recyclable waste collected has doubled. It also contributed green consumption patterns ingrained among the general population.[2] According to the OECD's 2007 "Korea Environmental Performance Reviews," Korea is praised for the growth and development of its environmental policy. Among these, the most notable praise was the initiation of waste management policy.[3] A number of countries are adopting Korean waste management methods as a model, and many overseas trainees from developing countries have come to Korea to learn. The most notable aspect of Korean waste management policy is without question the Volume-based Waste Fee System.

1 In March 1991, 30 tons of phenol spilled into the Nakdong River from a damaged pipe in a Doosan Electro-Materials factory in Gumi City, causing thousands of residents downstream in Daegu to become ill.

2 http://eng.me.go.kr/content.do?method=moveContent&menuCode=pol_rec_pol_system

3 OECD Environmental Performance Reviews KOREA, 2006,(http://www.oecd.org/dataoecd/24/4/37436565.pdf)

2. About Korea and Korean waste management

2.1 General Information

Korea is located between 33° 06' 40" N and 43° 00' 39" N parallels in the northern hemisphere. Because of its location, Korea has four distinctive seasons. The latitude of Korea is similar to that of Italy, Spain, Portugal, Greece, Turkey, China, Japan and the U.S. (See Figure 1-1).

Figure 1-1 | Location of Korea

The combined territories of South and North Korea encompasses approximately 220,000 square kilometers, similar in size to LAOS, Oman, Romania, the United Kingdom, Belarus, Ghana, Gabon, Guinea, Uganda, Guyana, Ecuador and New Zealand. South Korea alone(roughly 99000 m^2) is similar in size to the United Arab Emirates, Jordan, Austria, Portugal, Hungary, Azerbaijan, Guatemala, Honduras and Cuba.[4]

As of 2011, South Korea's total population was estimated at 49,780,000 with a density of 489 people per square kilometer. The nation's rapid industrialization and urbanization in the 1960s and 1970s was accompanied by continuing migration of rural residents to the cities, particularly Seoul, resulting in heavily populated metropolitan areas. Korea's urbanization rate is 90.8% by 2009.[5]

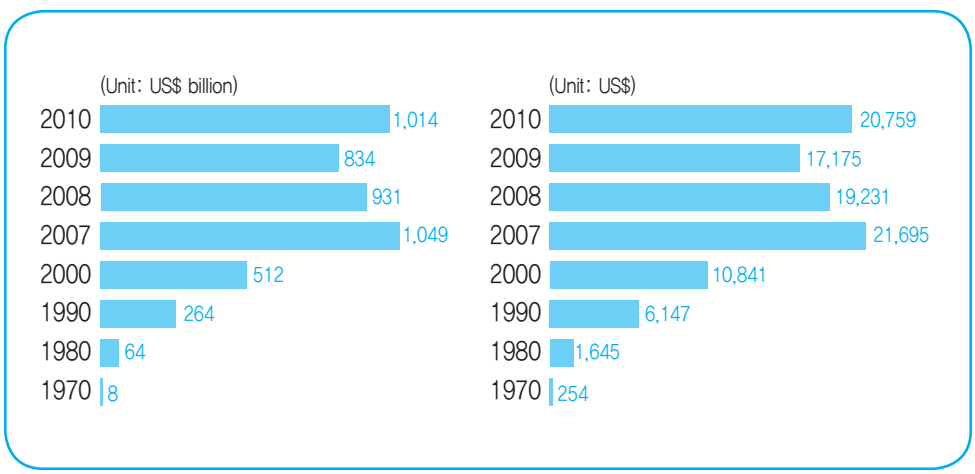
4 Land portal, www.land.go.kr
5 Korea Statistical Information Service, kois.kr

2.2 Economic Development and Environmental Degradation

Korea gained independence from Japan in 1945 but was in political turmoil and extreme poverty due to exploitation during colonial period. The devastating Korean War which took place from 1950-1953 worsened the situation and Korea was one of the poorest countries in the world with per-capita GNP $67. However, during 1960s~1980s, Korea realized tremendous economic expansion in a relatively short period, dubbed "the Miracle on the Han River." Now Korea has per capita income US$ 20,000 level (See Figure 1-2). Through properly designed development strategies and effective use of foreign assistance, Korea has grown into a leading producer of ships, steel, automobiles, and semiconductors.

In 1995, Korea was excluded from foreign assistance recipient country list of World Bank. In 1996, Korea proudly joined the Organization for Economic Cooperation and Development (OECD). It has been said that never before has a country developed so much in so short a period of time. Korea was welcomed as the 24th member of the OECD Development Assistance Committee (DAC) in November 2009.

Figure 1-2 | GDP Growth /Per Capita GNI from 1970-2010



Source : The bank of Korea

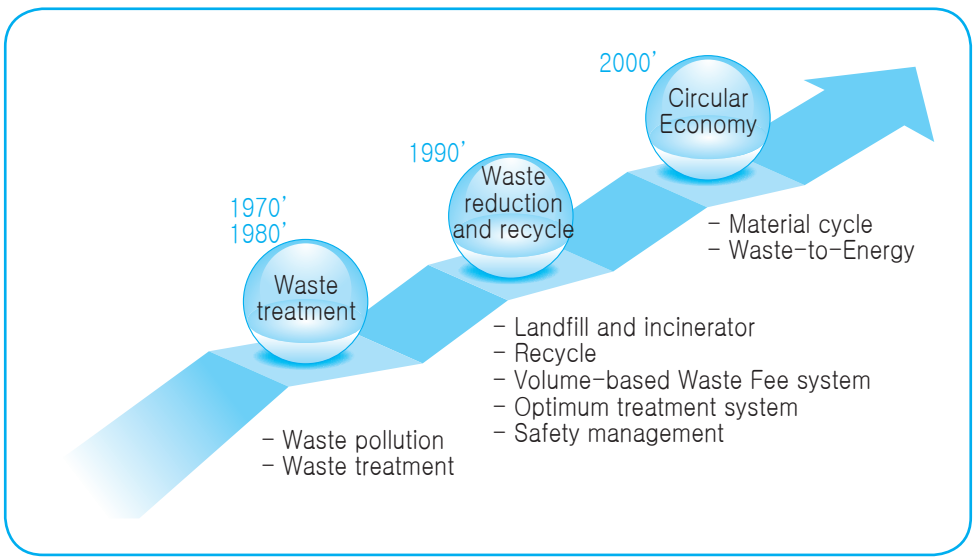
After rapid industrialization and economic growth, Korea is facing various environmental problems since environmental concerns were superseded by developing interests. And this significantly threatened the environmental sustainability of the country's development. Furthermore, Korea is a densely populated country with low environmental capacity. To overcome environmental difficulties and damages, Korea has made an effort to develop environmental legislations and policy in the late 1970s.

Environment degradation is unavoidable during economic development to a certain degree. However, developing countries can learn from industrialized countries' experience and their adaptation technology. Especially, Korea has overcome many of the adversities and challenges that developing countries are struggling with today and wants to share experience to avoid trials and errors.

2.3 Waste Management Trend in Korea

In Korean traditional society, careful recycling and reuse of resources was norm, and the concept of "wastes" was nonexistent. The most agricultural wastes were all recycled, and resources underwent a natural process of circulation. Rice straw, for example, was used as animal feed, as thatching for roofs, and as fuel and then finally as fertilizer. Manure and leftover food were also reused as compost to restore the fertility of agricultural land. House items, made primarily of wood or earth, could be also naturally returned to the ground.

Figure 1-3 | Trend in Waste Management in Korea



Since the 1960s, with the arrival of industrialization and urbanization and the transformation of living styles, waste generation increased rapidly. In 1981, municipal waste generation amounted to 37,716 tons per day, 1.77kg per capita. This was comparatively high, as Germany produced 0.7kg and Japan produced 0.8kg at the time. One of the reasons for this was the generation of large quantities of ashes that resulted from the use of coal briquettes as fuel, as well as a Korean food culture that consumed much high moisture food. In 1985, total waste generation in Korea amounted to 57,518 tons per day, and waste

generation per person amounted to 1.95 kg per day. Out of this, coal ashes took 27,347 tons per day, assumed as 47.5%.

In Korea, the goal of waste policy before the introduction of the Volume-based Waste Fee system is the "proper management of generated waste," but its introduction added the "optimum generation and treatment of waste" as an important goal. And now the waste management trend in Korea is heading to circular economy since waste prevention and recycling after waste generated are not sufficient to overcome limits of multi-consumption society [Figure 1-3]. Korea has achieved very high recycling rate during last 10 years through EPR (Extended-Producer's Responsibility)[6] and Volume based fee system.

Efforts to resolve environmental problems within economic system are rising recently among many countries. The purpose of this study is to facilitate the introduction of the Volume-based Waste Fee System and minimize expected trials and errors for other countries that wish to adopt the system by introducing the progress and performance of the Volume-based Waste Fee System in Korea.

3. Contents

This study consists of the background, progress and result, detailed information, and implications of the Volume-based Waste Fee System. The background part reviews the social conditions and waste management system when the Volume-based Waste Fee System was introduced. The progress part divides the history of the system into the preparation stage, introduction stage, and institutionalization stage and reviews its result. The contents and improvement parts describe the meaning and characteristics of the Volume-based Waste Fee System, legal basis, contents of the system, administrative structure, and role sharing and review improved matters. The implication for developing countries part draws some lessons of this policy and describes matters to be attended to when consulting on the Volume-based Waste Fee System for partner countries.

6 The EPR is a system for fundamentally reducing waste volume from the planning and production stages, and expanding recycling by imposing recycling obligations. Recycling charge is imposed based on recycling expenses to producers of products and packing materials, who were given certain recycling obligations and do not attain the obligatory recycling rate.

Chapter 2

Background of the Volume-based Waste Fee System

Background of the Volume-based Waste Fee System

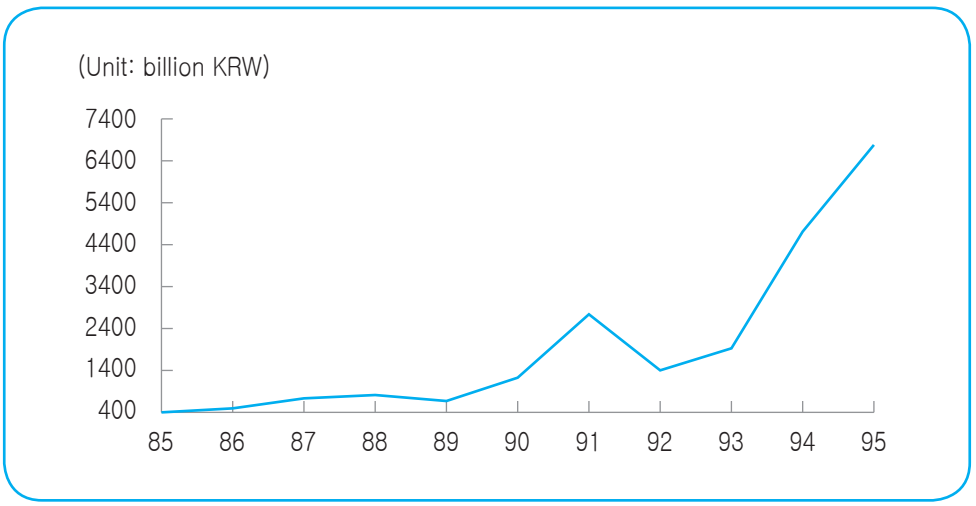
1. General Background

1.1 Environmental Status in 1990s

Korean government marked year 1990 the year of environment. There was the first earth day celebration in Seoul and the Environmental Office (founded in 1980) was upgraded as an Environment Agency. Although environmental rights were stipulated in the Constitution at the 8th amendment in 1980, and a plan for environment started to be added from 5th 5-year economic development plan (1982~1986), environmental pollution got worse. In 1990s, environmental movement sprung up nationwide and there were constant protest against environment-unfriendly development. Most industrial complexes of heavy industry have polluted land, water, and air severely. People who had experienced the damages of environmental pollution demanded a safe and sound environment. In particular, heavy industry had a significant impact on the environment.

As a result, in the first half of the 1990s, environmental administrative affairs increased sharply; Environment Agency was upgraded to Ministry of Environment in 1995 with continuous budget increase (See Figure 2-1). In short, the increased awareness of environment led the reorganization of the environmental legal system and administrative organizations. However, it took many years for environmental administration to function practically since many still thought that environmental protection is subordinated to growth of economy.

Figure 2-1 | Increase of Budget for Environmental Sector



Source : Fifty years of Korean environment, Ministry of Environment, 1996, 24p

In 1990s, many economic regulations were introduced to build environment-friendly production and consumption systems and secure finances for environmental investment. The Korean government introduced several recycling policy such as the Volume-based Waste Fee System (VBFWS, 1995), Extended Producers Responsibility[7] (EPR, 2003), Deposit Refund System,[8] Waste Charge System[9] and etc. Most successful recycling polices are known as VBWF System and EPR up to now.

1.2 Socio-Economic Status in 1990s

With respect to the social and economic indices of Korea when Volume-based Waste Fee System was first introduced, the gross national income (GNI) had increased sharply in the from USD 2,229/person in 1985 to USD 5,886/person in 1990. It kept increasing up to USD 7,811/person in 1993 and USD 8,998/person in 1994. Due to the expansion of educational opportunities, the middle school entrance rate was 99.9%, and the high school entrance rate was 98.6%. More than half of high school students entered junior college or university, and living space was expanded thanks to the continuous economic growth and increase in income (See Table 2-1).

7 Refer footnote 6

8 The 'Deposit Refund System' was adopted to promote collection and reuse of used containers by levying a refundable container deposit on consumers. At present, liquor or soft drink glass bottles are subject to the system

9 The 'Waste Charge System' is aimed at curbing waste generation by imposing charges on products that are hard to recycle or that contain hazardous chemicals. The charge rate is decided based on each product's environmental impact.

Table 2-1 | Main Social Indices of Korea in 1995

Year	1995
Population	44,851,000
Average age	31.2
GDP per capita (1994)	8,483 $
Portion of city population and population density (1990)	City residence 74.4% population density 437
Average income ratio of city and countryside	country/city=99.5
Women economic participation rate	47.9%
Government budget vs. education budget	22.8%
Education (1990)	Elementary graduate (33.4%) Middle school graduate (19%) High school (33.5%) College or higher (14.1%)
GNP vs. R&D investment	2.33% (1993)

Source : 1995 social index of Korea, Statics Korea

Politically, the democracy movement was full-bloom in Korea. There were insistent calls arose for decentralization, and many citizens eagerly asked for their democratic rights to elect their own representatives. 1995 is the first year when the local self-governing system was expanded nationwide and the 4 local elections (head of the metropolitan council, head of the local government, member of the metropolitan council, and member of the local council) were held for the first time.

In the mid 1990s. the GDP per person of Korea has reached 10,000 USD and mass consumption started to emerge in Korea. People stated to pursue individuality, product differentiation and diversification Thus in 1990s Koreans shifted from quantity-oriented consumption to quality-oriented consumption in food, clothing and housing[10] (See Table 2-2).

10 Nam, Eun yonung (2007),Korean Consumer Culture in 1990s: With focus on consumer consciousness and behavior, Society and history

Table 2-2 | Lifestyle of Korean and Consumers' Awareness in 1990s

Consumer's awareness	Living
- Conspicuous and over consumption - Sensitive on trend and aesthetic sense - Consumer conformity - Design, appearance, brand	- Prefer apartment - Younger generation (city) and Older generation (house with garden) - Regard on environment - Prefer wide-space - Raising concern on house interior
Food	**Clothes**
- Freshness, Brand - Gourmet dinning - Well-being food	- Color and design 〉 practical use - Fashion and style - Brand consciousness

Source : Nam, Eun young (2007), Korean Consumer Culture in 1990s: With focus on consumer consciousness and behavior, Society and history

2. Waste Management until the 1990s

2.1 General Situation

Originally, the waste collection method involved collection of household waste in human powered wheel barrows on designated days by local governments. Households placed waste in receptacles installed in front of their residences. Collected wastes were processed by transporting it to neighboring fields or paddies, and dumping as landfill, or were used in embankments.

Nanjido was a representative landfill site at that time (See Figure 2-2). It was converted into a landfill in the middle of the rapid urbanization of Seoul in 1978. From that time to 1993, 92 million tons of garbage including household wastes and construction and industrial wastes were dumped on the island, resulting in two massive mountains of garbage measuring over 90 meters in height. At all times, the landfill method was simply open dumping, and such practices continued until the late 1980s (See Figure 2-3).

From 1970s, the amount of waste kept increasing but landfill sites near big cities became increasingly scarce. In 1977, 9,300 ton of waste is produced in Seoul daily. In 1981, it increased up to 16,000 tons.[11] Mass-media urged the government to find solution but government could not figure it out (See Figure 2-5). Due to lack of space, landfill sites in more remote areas were used. Consequently, waste transport vehicles were used for prompt disposal service. However, landfill sites gradually became exhausted and the negative implications of simple open dumping for the environment and sanitation also became increasingly apparent.

11 Article from Dong A ilbo in 1977.8.22, Kyunghyang Daily in 1981 5.7

Figure 2-2 | Nanjido Landfill (1990.01.11)

Source : http://ehistory.go.kr/

Figure 2-3 | Landfill Dumping in Nanjido (1990.01.11)

Figure 2-4 | Sudokwon Landfill Dedication Ceremony (1991.11.20)

Source : http://ehistory.go.kr/

Figure 2-5 | Kyunghyang daily (1990.5.21) "Waste Flood"

However, as local residents became increasingly environmentally aware in the 1990s, opposition movements arose against the construction of waste processing facilities (including incinerators, landfills, and intermediate processing facilities etc.). In particular, public fear grew of dioxin emitted from incinerators, which is both a carcinogen and environmental hormone. As a result, it became necessary to take special measures to pursue construction and operation of necessary facilities and resolve local opposition to construction of waste processing facilities. Sudokwon Landfill was built for Seoul and adjacent areas, and landfill work started on Feb. 10, 1992 but it was expected to have a short life span compared to increasing rate of waste (See Figure 2-7).

To address these needs, the "Promotion of Installation of Waste Disposal Facilities and Assistance etc. to Adjacent Areas Act" was enacted in 1995. Nevertheless, the many difficulties in dealing with the NIMBY phenomenon were evident, as shown the fact that the act was amended some 25 times between the times it was first introduced in 1995 up to 2008.

2.2 Main Issues in Waste Problem in 1990s

2.2.1 Continuous Increase in Waste, Limited Disposal Capacity

To dispose of municipal waste sanitarily, the government planned in 1987 to construct garbage incineration plants, sanitary landfills, and intermediate treatment plants all over the country; however, the construction was suspended or the location of landfill cannot be determined due to lack of huge investment, increase in land value, and civil complaints of residents. The advent of mass consumption society in the 1990s exacerbated the waste problems.

Discharged municipal waste was 75,096 tons/day at the end of 1992, recording a high annual increase rate of 7%~10% after 1988 <Table 2-3>. Per person, it was 1.8kg (per person/day), which was much higher than that of the USA (1.3kg), Japan (1.0kg), UK (0.9kg), and Germany (0.9kg). Food waste composed large part of household waste [Figure 2-6]. Daily discharged food waste per person was 0.52kg, which was twice that of Japan (0.37kg), Germany (0.27kg), and UK (0.26kg).[12]

Table 2-3 | Waste Generation 1990-1994

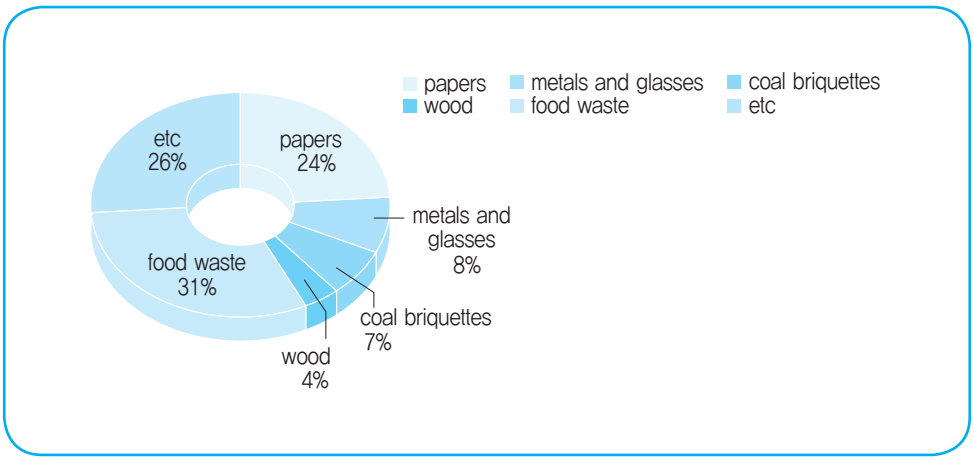
(unit : tons/day)

Year	Total	Municipal waste	Industrial waste	Generation per capita(Kg)/day
1990	145,374	83,963	61,412	2.30
1991	158,376	92,246	66,130	2.30
1992	144,535	75,096	69,439	1.80
1993	141,383	62,940	78,443	1.50
1994	147,049	58,118	88,931	1.30

12 Newspaper Dong A ilbo, 1996.6.3

This was attributed not only to the increase in consumption but also to the traditional Korean food culture, characteristics of Korean foods and excess amounts of food provided by restaurants. Korean treats their guest with large meal as a sign of hospitality and the most common side dish, Kimchi (traditional fermented vegetable with varied seasonings), generates a lot of vegetable waste when making.

Figure 2-6 | Composition of Household Waste Disposed in 1995



2.2.2 Increase in Harmful Waste and Disposable Products

Some wastes produce powerful greenhouse gases and others have significant health impacts on humans and animals. In the late 1970s, Korea transformed into an industrial society; as a result, municipal organic waste such as food, paper, and textile as well as waste containing harmful materials such as battery, bulb, and home appliances increased sharply. In addition, the westernization of consumption generated new waste such as plastic goods, textile, and aluminum. Such synthetic resins and metal take a long time to decompose. Disposable razor, toothbrush, plastic bag, wooden chopsticks, wet paper towel, paper cup, and paper, Styrofoam amounted to 35,900 tons/day in 1990 and 42,700 tons/day in 1992, increasing 0.5% annually. These urban municipal wastes incurred the fierce opposition of local residents and environmental groups on construction waste facility because they do not decomposed even after a long time when reclaimed, generating harmful gases and powerful carcinogens such as dioxin when incinerated.

2.2.3 NIMBY Syndrome

Whenever a community is faced with the prospect of a waste facility being located in its midst, the response is usually, “Not in my back yard!” That response has been dubbed

the NIMBY syndrome. NYMBY on building waste facility is still very common nowadays all around the world. In Korea, NIMBY caused from distrust on politics, awareness of individual right as well as environment, lack of mutual communication which is neglected under compressed Korean development process.

As in other countries, municipal waste management in Korea is a matter for local governments. It became a serious social and economic problem due to conflicts between local residents regarding the construction of a waste treatment facility. However, when the local autonomy system was introduced in the early 1990s, waste management, waste reduction and recycling became more difficult and complex.

Usually, local residents to participate regardless of burden for local community. Most landfills were vulnerable to toxic leachate and gases, with the pollution of underground water and river, bad smell, harmful insects. And free ride of other communities brings resentment of residents.

Waste treatment facility construction is difficult process and government should prepare suitable correspondent strategy. Effective waste management depends upon achieving informed consensus amongst interested parties. Deficiency of trust in government is caused by secret administration, one-sided policy making, and unsuitable pollution regulation. Usually, residents lack unbiased information about waste facility which is to be placed in local area. These brings question about the security of pollution treatment techniques and the management of public health. Government should try to bring environmental justice to all citizens, not just the poor and minorities.[13]

Figure 2-7 | Local People Insists on Moving Waste Incinerator form their Area (Korea)

13 Huh suk, A Study on the Citizen's Opposition to Public Policy Making : A Case Analysis on the Waste Treatment Facilities in Korea, Kon-kuk Univ

Figure 2-8 | Election of Monument to Show Objection on Building Incinerator (Korea)

노원구 상계·중계도 주민들이 13일 중계2동 1단지 아파트 앞마당에 「소각장 반대 주민결의 선언비」를 세우고 상계쓰레기소각장 건설계획철회를 요구하고 있다. <金舜喆기자>

2.2.4 Inadequate collection system and inactive separate collection

The necessity of separate collection was raised the end of the 1970s and introduced locally in the early 1980s, but many difficulties arose such as insufficient infrastructure to utilize and dispose of separated waste, indefinite standards for separate collection, and conflicts between garbage haulers. There were many skeptics that the separate collection of waste only bothers citizens since there was no recycling infrastructure after separation. [Figure 2-10] shows skeptical public opinion about separate collection of waste.

In 1991, separate collection became compulsory, and penalty of not more than KRW 1,000,000 was charged on those who violate it. However, still separate collection has not taken root in among citizens (See Figure 2-9).

Figure 2-9 | Kyunghyang daily (1991.6.16)


아파트 쓰레기 분리收去 하나마나
「재활용」 구분않고 버려
투입구 폐쇄율도 고작
장애인에
KAL 여객부의

Figure 2-10 | Joong Ang Daily (1991.8.7)

2.2.5 Low Waste Fee and Improper Calculation System

In 1994, the cost of waste disposal nationwide was KRW 962 billion, but the collection fee was KRW 142.8 billion. The fiscal self-reliance of waste fee was only about 15%. The low waste fee made it difficult to install environment-friendly waste disposal facilities (sanitary landfills) due to the insufficient budget.

In the flat rate waste fee system, waste fee was calculated by building area for apartment houses and property tax on building for detached houses. In short, the system assumed that households paying high property tax discharge more wastes because they were wealthy. In this system, however, there was no direct relationship between the generated waste and waste fee, and it failed to encourage waste reduction.

2.3 Paradigm Shift: From Maximum Treatment to Minimum Waste

Before 1990, the primary goal of local governments was how to enhance their capacities for treating waste generated in their jurisdictions by means of expanding disposal facilities. Korean society in 1990s was observing ever increasing waste volume in one hand and facing nation-wide NIMBY ("Not In My Back Yard") syndrome in the other hand. The waste with ever increasing volume could not find any place to go. There needed a revolutionary measure to deal with the severe waste problems. A better alternative proposed was reducing waste volumes to be treated before the waste was discharged. This idea has been realized by a paradigm shift in waste policies. The primary focus should be put on how to reduce waste volumes before generated or discharged rather than how to treat waste efficiently and in environmentally sound manner which requires more social cost than reduction.

In 1990s, the focus of waste policies shifted to controlling demand for waste services by concentrating on waste reduction aiming at waste minimization toward a Sustainable Waste Management. The responsibility for waste management has been changed from sole responsibility of (local) governments to shared responsibilities among governments, consumers and producers. This change contributed to enhancing public awareness of the significance of waste issues and inducing ordinary people to participate in activities for reducing waste volume. The policy tools had been diversified including various economic incentives for reducing waste volume and promoting recycling of the waste, from the downstream to the upstream of the waste flows, from controlling discharge and collection of waste in post consumption to integrated product polices in the generation phase.

At this time, various waste policies were introduced such as Deposit-Refund System[14] (1993), Waste Charge System[15] (1993), Packaging Waste Reduction[16] (1993), Control over the use of disposable Goods[17] (1994) (See Table 2-4).

14 Refer footnote 8

15 Refer footnote 9

16 The empty space in the packaging container after packing (the ratio of total packing size to the left space) and the number of packing layers are regulated by law for over packaging control.

17 This is to regulate the use of disposable goods at department stores, restaurants, public baths and other distribution and consumption sectors to establish a sustainable consumption pattern by encouraging the use of multiple-use products

Table 2-4 | Paradigm Shift of Waste Policy as of 1990

	Before 1990	1990s
Paradigm	Service Supply	Demand Control
Goal	Expand treatment facility	Reduce waste, increase recycling
Tools	Fixed rate waste fee	- Volume-based Waste Fee system - Deposit-Refund System - Waste Charge System - Packaging Waste Reduction - Control over the use of disposable Goods

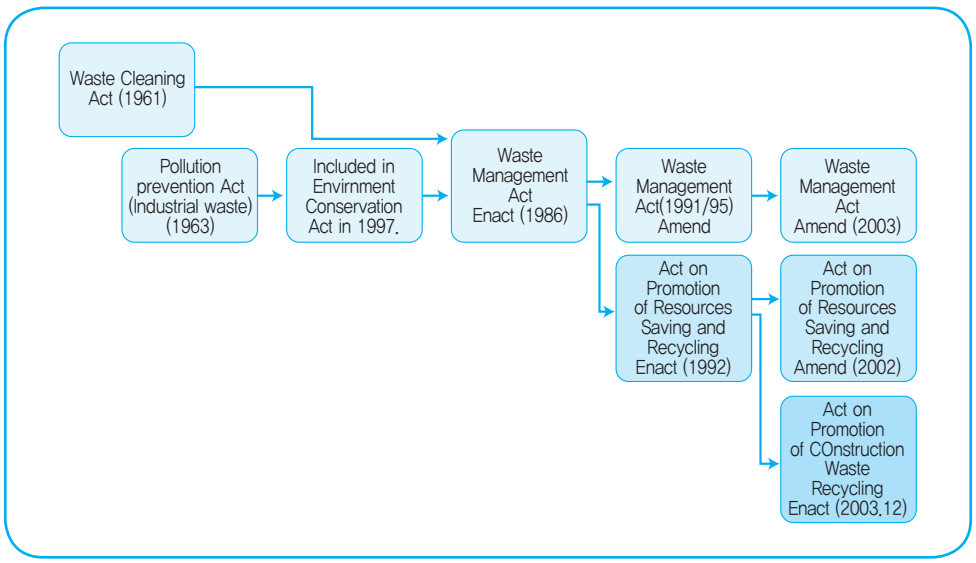
3. Waste Management Framework

3.1 Waste Law and Policy

In Korea, waste management became public works in the 1960s; in 1961, the Waste Cleaning Act was established to treat waste and excreta. In 1963, the management of industrial waste under the Environmental Pollution Prevention Act was established, with the overall environmental and sanitation regulations including waste treatment included in the newly established Environmental Protection Law in 1977. Until the 1980s, our budget, human resources, and equipment for waste management were concentrated on waste collection; the collected waste was thrown away around low and swampy places, empty lots, riverbeds, or house or factory construction sites. After the 1980s, environmental pollution such as bad smell, gas explosion, and pollution of river and groundwater due to leachate occurred because urban landfills did not adopt sanitary landfill but merely loaded waste instead.

Given the increasing importance of waste management, the existing Waste Cleaning Act and the management of industrial waste under the Environmental Pollution Prevention Act were integrated as an independent Waste Management Act in 1986 (See Figure 2-11). The concept of "Recycling" was legally adopted for the first time. With respect to the amendment of laws related to waste, Act 3 of the Waste Management Act (regulations on the suppression of waste and recycling) was divided in 1992, becoming an independent law on the saving of corporate resources and facilitation of recycling. In 1995, The Promotion of Installation of Waste Disposal Facilities and Assistance, etc., to Adjacent Areas Act which stipulates support for residents around the waste disposal facilities to decrease NIMBY was established. Waste Management Act and Act on Promotion of Resources Saving and Recycling was the major waste law in effect when Volume-based Waste Fee System was introduced.

Figure 2-11 | Main Stream of Laws on Waste from 1960 to 2000



3.1.1 Waste Managent Act (1986)

The basic legal framework of waste policies is established by the Waste Management Act. This act promulgates the basic things such as classification of wastes, responsibilities of central/local governments and citizens, comprehensive waste management plans, standards and rules for waste discharge and treatment procedures, and certification for treatment of designated wastes (toxic and hazardous wastes). Regulations on the municipal waste reduction were added in the Waste Management Act as a basis for the introduction of the Volume-based Waste Fee System in 1995. According to the Waste Management Act, government should devise a basic policy for waste management and provide technical and financial support to the local government, and the metropolitan local governments (cities and provinces) should mediate and provide financial support to local governments.

3.1.2 Act on the Promotion of Resources Saving and Recycling (1992)

This act promulgates the basic framework for waste recycling including basic plans for recycling by government, roles and responsibilities of enterprises and citizens for promoting waste recycling. It promulgates programs of waste labeling system, separate collection and discharge of recyclable wastes. It also provides regulations for the reduction of packaging waste, Waste Charge System.

3.2 Municipal Waste Management

3.2.1 Concept and Classification

Under the Waste Control Act, the term "wastes" means such materials as garbage, burnt refuse, sludge, waste oil, waste acid, waste alkali, and carcasses of animals, which have become no longer useful for human life or business activities (Waste Management Act, Article 2) and they are divided into municipal wastes and industrial wastes by source and volume of generation.

Due to the increase in income, change of lifestyle, and diversification of waste in quality and quantity, the classification of waste had been changed. Before the establishment of the Waste Management Act in 1986, our waste was divided into general waste and industrial waste. Hazardous waste was not defined in the act, but in the ordinance of Waste Management Act, "special industrial waste" was defined. In the 1st amendment of the Waste Management Act in 1991, they were divided into municipal general waste, industrial general waste, and designated waste.

In 1995, the waste classification system was reorganized based on harmfulness. Waste is roughly classified into two categories according to its source of origin: municipal waste from households and industrial waste from business sites or factories of large scale (generation of waste above 300kg/day). Industrial waste is further divided into two categories: 'general industrial waste' which consists of non hazardous such as slag, ash, dust, and construction waste, 'designated waste' which consists of toxic wastes such as waste acid, waste alkali, waste oil, waste organic solvent and so on (See Table 2-5, Figure 2-12). Waste is managed in dual system in terms of responsibility of generator. The local government is responsible for the final disposal of municipal waste, while the discharger of industrial waste is responsible for the final disposal of it.

Figure 2-12 | Waste Classification Outline in Korea

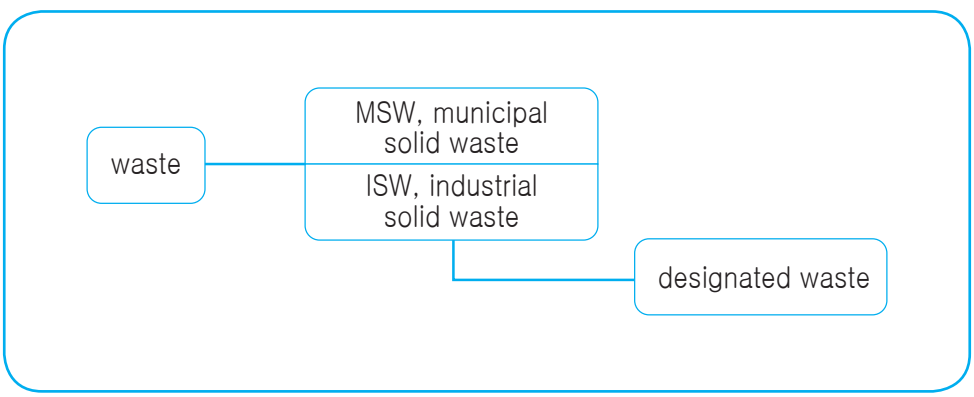


Table 2-5 | Concept and Classification of Waste

Waste	
Municipal Solid Wastes	**Industrial Solid Wastes**
Among materials which became of no use for human life, any wastes other than industrial wastes	**General Industrial Wastes** Any wastes generated from places of business with discharging facilities installed and managed in accordance with the Clean Air Conservation Act, the Water Quality and Ecosystem Conservation Act, or the Noise and Vibration Control Act or other places of business which discharge more than 300kg of wastes a day. **Construction Wastes** Construction wastes discharged in excess of 5 tons **Designated Wastes** Waste oil and waste acid, which may cause damage to the environment, or wastes produced by health and medical institutes, animal hospitals, research and inspection agencies that may cause damage to the human body, such as an extirpated parts of human bodies and the corpses of laboratory animals.

3.2.2 Waste Treatment Method

During the end of the 1980s to the early 1990s, most municipal waste was reclaimed in local or metropolitan landfills and very little waste was recycled. In 1991, however, recyclable waste increased due to the compulsory separate collection (See Table 2-6). Household waste is separated to recyclable material, food waste and the rest. Proportion of incineration and recycle kept increased while landfill portion kept decreasing in Korea.

Waste collection, incineration, land filling, and wastewater treatment have become common practices in industrialized parts of the world. In Korea, the disposal of municipal waste is divided into landfill, recycling, composting and incineration (See Figure 2-13, Figure 2-14, Figure 2-15).

Table 2-6 | Municipal Waste Treatment 1987-1994

(Unit : ton/day)

	Total	Landfill	Incineration	Recycle	Etc.
1987	67,031 (100)	63,411 (94.6)	1,508 (2.3)	1,562 (2.3)	550 (0.8)
1988	72,897 (100)	69,248 (95.0)	1,210 (1.7)	1,759 (2.4)	680 (0.9)
1989	78,021 (100)	73.294 (93.9)	1,478 (1.9)	2,275 (2.9)	974 (1.3)
1990	83,962 (100)	78.106 (93.0)	1,493 (1.8)	3,900 (4.6)	463 (0.6)

	Total	Landfill	Incineration	Recycle	Etc.
1991	92,246 (100)	82,411 (89.2)	1,497 (1.6)	6,786 (7.4)	1,552 (1.7)
1992	75,096 (100)	66,965 (89.2)	1,132 (1.5)	5,912 (7.9)	1,087 (1.4)
1993	62,940 (100)	54,227 (86.2)	1,480 (2.4)	7,233 (11.4)	-
1994	58,118 (100)	47,166 (81.2)	2,025 (3.5)	8,927 (15.3)	-

Figure 2-13 | Waste Treatment Process

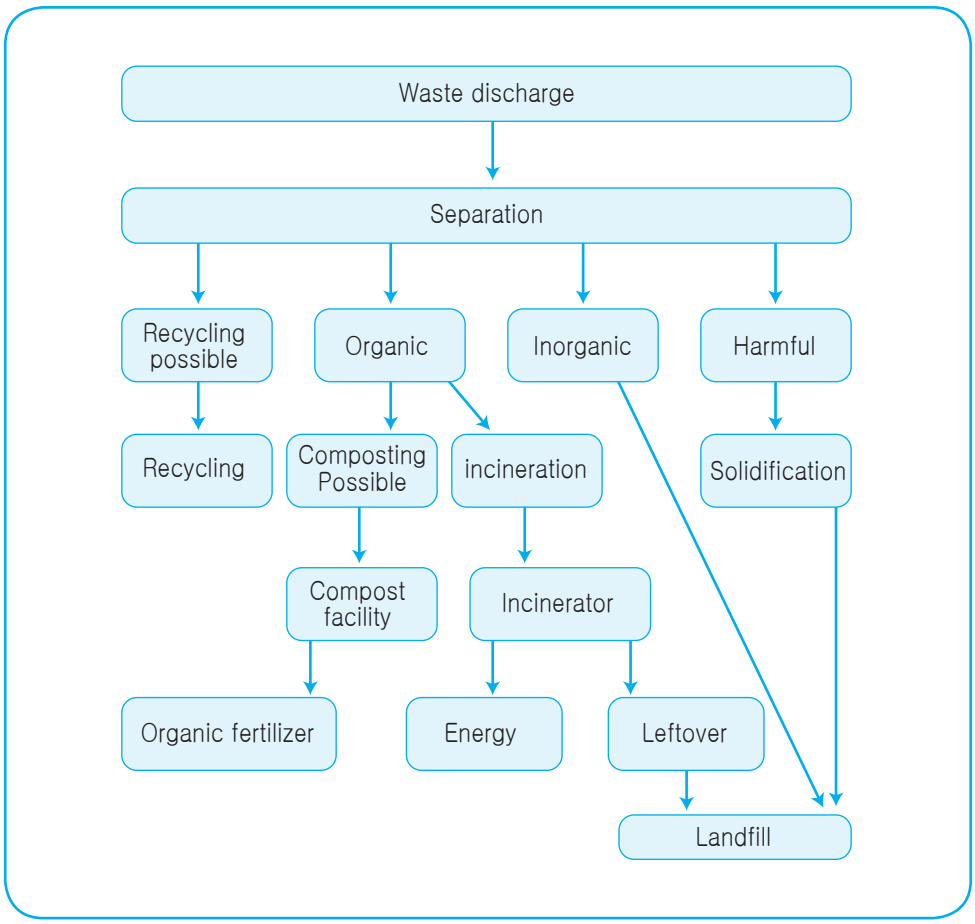


Figure 2-14 | Landfill in Daejeon Area in Korea

Figure 2-15 | Composting Facility

3.2.3 Management Budget

Before the introduction of Volume-based Waste Fee System, waste collection fee had existed. However, financial viability was very low. Demand in environmental sector continually increased and the waste management budget had to be drawn from other budget item which caused unbalanced national finance.

There was not much investment in waste management since it was not the priority of local government. Since the enforcement of the Waste Management Act in 1986 as the first independent law on waste, the central and local governments used the budget for waste management as <Table 2-1>. Around the time of the introduction of the local autonomy system, the budget for waste management increased dramatically. Up to 1990, the budget for waste management remained at a level of between 3 billion (US$ 4.2 million) to 7 billion Won (US$ 7.0 million) a year. In 1991, the budget for waste management increased to 24.5 billion Won (US$ 33.4 million), and in 1995, the budget increased to 145.6 billion Won (US$ 188.9 million). Nevertheless, increase was not sufficient for improve financial viability of waste management administration. This was one of the reasons to introduce Volume-based Waste Fee System.

Table 2-7 | Waste Management Budget 1987-1995

(unit: 1million KRW)

year	Total	State budget	Local budget	Loan	Municipal bond	Etc	Fee collection
1987	155,726	500	145,590	9,636	-	-	16,319
1988	153,041		146,361	3,094	-	2,777	28,118
1989	191,111	1,012	187,131	30	-	2,329	32,726
1990	377,379	119	370,504	6,756	-	-	53,182
1991	507,799	5,320	492,673	4,616	200	4,690	71,633
1992	662,127	3,750	606,867	3,565	7,711	40,234	78,790
1993	888,571	9,682	861,442	-	7,833	9,560	97,095
1994	1,049,935	19,818	984,159	-	11,811	34,147	142,800
1995	1,173,971	41,242	1,105,791	-	26,867	71	

Chapter 3

Progress of the Volume-based Waste Fee System

Progress of the Volume-based Waste Fee System

Collection and process of the enormous amounts of waste produced in the cities is a critical part of urban administration. The government set reduction, recycling, sanitary incineration and landfill as basic waste policies and enforced the Volume-based Waste Fee System as an economic incentive to resolve the waste problem, based on the "polluter pays" principle. Although the Volume-based Waste Fee System as a method to reduce waste had no significant procedural meaning because it is just a "collection" stage in the entire waste disposal procedure, in practical terms, it wielded huge influence on politics, economy, society, and culture as an important economic instrument in the environmental sector.

1. Preparation Stage

1.1 Feasibility Study on the Introduction of the VBWF System

1.1.1 Research for the feasibility study (September 1992~January 1993)

The Korean Society of Waste Management, which conducted the research, submitted a specific policy report containing introduction of VBWF system. The report included legal amendment, enforcement plan, expected effect, and ripple effect. Researchers cooperated with related agencies on the legal amendment, worked as adviser in the negotiation with the National Assembly, public persuasion, and promotion, and worked closely with government employees in the trial and actual enforcement of the Volume-based Waste Fee System.

1.1.2 Collecting the Opinions of Various People (February 1993~August 1993)

The opinions of various people related to the introduction of the Volume-based Waste Fee System were collected by holding public hearings and meetings with related

specialists, private organizations, and cleaning companies (February~July 1993); a meeting with consumer groups, housewife groups, and waste bag makers was held (July 1993), and the opinions of the heads of local cleaning departments and the subcommittee of waste were collected (July~August 1993).

1.1.3 Solicited the Opinions of Related Agencies on VBWF Bag

The mark of the local government can be used in the waste bag. As such, the waste bag for the Volume-based Waste Fee System is like an official document because it contains the mark of the city hall or borough office. Hence, its fabrication is the fabrication of an official document.

1.2 Pilot Operation

1.2.1 Enforcement Policy and Notice of Demonstration Plan (November 1993)

The National Waste Disposal Plan institutionalized the enforcement policy of the Volume-based Waste Fee System whose trial was to start in 1994, with the demonstration plan announced in the Meeting of Local Environmental Directors. As the plan of the Volume-based Waste Fee System took root, each group showed a different reaction. The local government, which handled its managerial affairs, was interested mostly in specific enforcement methods such as fee, method to distribute waste bag, and method to treat recyclable materials that were expected to increase; it then reviewed how to protect low-income groups and maintain the existing committed cleaning service system. On the other hand, social groups in each environmental sector focused on evaluating the problems in the trial and making public opinion by identifying the problems, reviewing the effects and drawing improvement schemes.

1.2.2 Trial of the VBWF System (April 1~December 31, 1994)

The Volume-based Waste Fee System was implemented in 1-3 selected regions of 15 cities and provinces (each city and province selected 1 urban area and 1 rural area). With the trial generating positive effects, other regions participated voluntarily; as a result, it was expanded from 33 regions to 89 regions in Nov. 1994. With the trial, waste was reduced by 40%, and recyclable materials increased by 100%. The press was pessimistic at first, but their attitude changed during the trial of the Volume-based Waste Fee System, as can be seen from following new titles.

1994. 3. 10 Unstable start of Volume-based Waste Fee System (Busan daily)

1994. 3. 12 VBWF System is causing illegal dumping (Daily international)

1994. 3. 31 Volume-based Waste Fee System, will this work? (Daily international)

1994. 4. 1 The first day of Volume-based Waste Fee System, citizens are suffering from War on waste, (Munhwa daily)

1994. 4. 5 VBWF System, continuous occurrences of side-effects (Busan economic)

1994. 4. 9 Volume-based Waste Fee System, predicted side effect became real (Busan daily)

1994. 4. 9 Volume-based Waste Fee System "The green light is on" (Daily international)

1994. 4. 29 Volume-based Waste Fee System, came to effect (Kookmin daily)

1994. 5. 15 There are increase on introduction of Volume-based Waste Fee System among local government (Chosun daily).

1994. 6. 23 Expansion of VBWF System will bring benefit of 476,821,192 USD (Chosun daily)

1.2.3 Interim Assessment by Private Sector (August 1994)

Because of the success of the trial, risks were taken by entrusting the most opposed civic groups with the assessment of the Volume-based Waste Fee System.

The private assessment team was launched on April 27, 1994 with 165 monitoring agents. Though they were inactive in the assessment at first, civil groups were surprised at the achievements of the Volume-based Waste Fee System, and they understood its positive features. As a result, they abandoned their preconceived notion that it is a system that passes the responsibility of waste reduction to residents and facilitates illegal waste discharge and viewed it as a positive system to improve environmental awareness related to waste management, set a new cooperative relationship between the public and private sectors, reduce the discharged waste, increase the discharged recyclable materials, improve the financial independence of waste, and decrease the budget.

In addition, attitude of households discharging waste were changed considerably by using shopping basket, reducing food waste, and removing packing materials when purchasing products.

〈Interview〉 Communication is the key for the success, Convince the public!

Jae-kon Shim

(Chief of Waste Policy Department,

Minstry of Environment in 1990)

Q: How did the VBWF System started at first?

A: At the beginning, Government started the project to find the way for effective waste separation system. Through the research and study of other country like Japan, Germany Switzerland, introducing VBWF System was considered as effective means to activate waste separation for recycling.

Q. What was the difficulty to go forward for implementation of VBWF System?

A: There were many objections from inside out. Concept of VBWF was very new and most people were skeptical about its success. However, the minster of environment was supportive and was not afraid of challenge (from the beginning to the end of VBWF introduction, the minister of environment had changed 3 times). Cooperation from other government department was necessary and it was very difficult to persuade them.

Q. How did you get support from other department?

A: Waste collection is duty of local government; therefore the cooperation from local government and ministry of home affair was prerequisite for the implementation process. I visited administration chief office asking for their cooperation and support but I did not even have chance to meet them. However, I did not quit visiting and finally I got a chance to explain about VBWF to secretary of office, later even to the President. People asked "Will this work?" and I answered "This will bring huge change to waste management in a positive way. I will risk my position"

Q. What were the key factors for the successful VBWF System implementation?

A: The strong will and persistence of administration is necessary since adjustment of conflicting interests is not easy. Therefore, communication is the most important. If you cannot persuade the public, the policy cannot be successful no matter how good and well prepared it is. We spent much time to explain and promote the VBWF System to government officers and the public. A successful policy is like a hot seller. You have to sell the policy to the people by convincing them. For that reason we tried to co-work with NGO's since they have nation-wide network to communicate with the public. Secondly, you need a down-to-earth strategy to train public officers who are in action. We tried to contact a public officer as much as we can. At the beginning there was hot-line to encourage them.

1.2.4 Workshop of the Relevant Civil Servants (June 1994)

With the trial of the Volume-based Waste Fee System, a workshop for the relevant civil servants was held in June 1994 in Jeju Island, with 330 members of the local government attending. The interim assessment of the Volume-based Waste Fee System and exemplary cases were reported, civil servants of related regions, scholars, experts, and journalists were divided into 20 teams, and 10 issues of problems and improvement of the trial were discussed.

1.3 Preparation for Nationwide Implementation

1.3.1 Establishment of supplementary guidelines (September 8, 1994)

Enforcement guidelines for national implementation that addressed the problems in the trial were delivered to each of the cities and provinces.

1.3.2 Assessment and Final Inspection

Before expanding the Volume-based Waste Fee System nationwide, the Volume-based Waste Fee System was assessed and finally inspected. A meeting of related local institutions was held so that an interim assessment of the Volume-based Waste Fee System can be conducted by local governments (November 7, 1994). In addition, to assess the preparation status of local governments, the headquarters and situation room of the Volume-based Waste Fee System were installed. They were directly connected to 260 local governments, and the preparation status was checked daily to establish cooperative systems; resolutions were then for any and all problems identified in the interim assessment (December. 7, 1995). The resolutions consisted of basic measures to dispose of local recyclable materials that are expected to increase sharply, emergent year-end transportation period to dispose of massive wastes that will be discharged before the Volume-based Waste Fee System is implemented, and methods to supplement human resources for the Volume-based Waste Fee System.

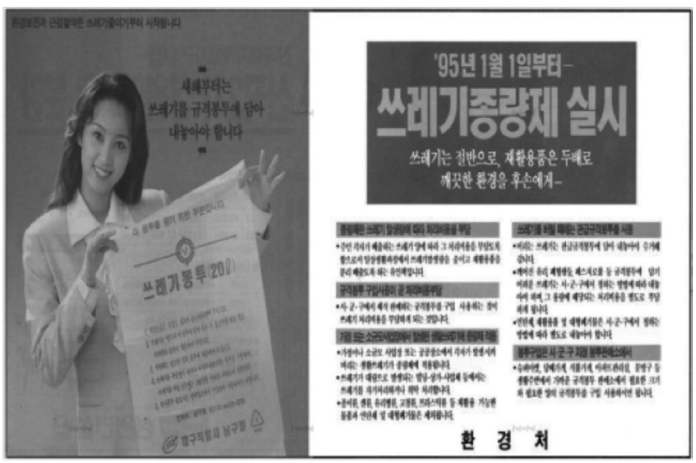
Before the enforcement on January 1, 1995, public promotions such as amendment of related ordinances, manufacture and management of waste bag, and designation of waste bag seller were completed. On December 20-23, 1994, 1 week earlier than the nationwide enforcement, joint inspection was performed by the relevant members in the government and Ministry of Home Affairs to check the preparation status of local governments and to resolve the problems, if any.

1.3.3 Public Promotion

The complaints of residents can be summed up as “Why should we pay to dump our garbage?” To change the old awareness of residents, the most important thing was a well-planned public promotion. Public promotion through the production and airing of TV advertisements, newspaper advertisements, and TV discussions were carried out, and

promotional materials including VTR tapes, brochures, and posters were manufactured and distributed. Extensive promotion before the nationwide implementation of the Volume-based Waste Fee System was inevitable at that time. The government started extensive promotion using the most popular celebrities, and assessments, public hearings, workshops of the relevant civil servants, seminars, and symposiums were held continuously.

Figure 3-1 | Promotion in Newspaper



Translation of Figure 3-1

Nature conservation and frugality starts from reducing waste!

"From 95.1.1. Volume-based Waste Fee System will start!"

From coming new year, waste should be disposed in waste bag

Waste will be half, and recycling will be doubled!

Clean environment to our descendent!

Volume-based Waste Fee System, the more you produce, the more you will pay.

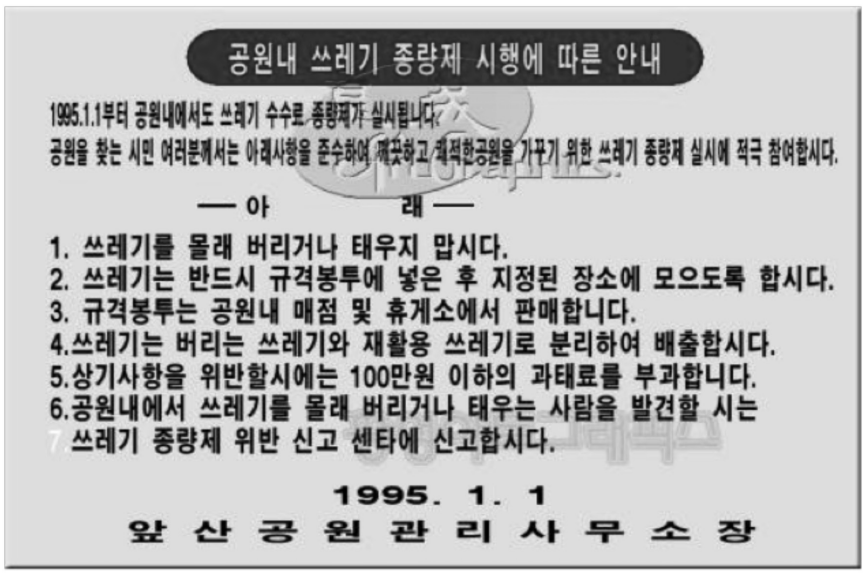
Buying waste bag is paying waste treatment fee.

Waste-bag should be used when you discard waste.

Waste-bag is on-sale in designated stores near you.

Environmental Agency

Figure 3-2 | Volume-based Waste Fee System Guideline in Park


공원내 쓰레기 종량제 시행에 따른 안내

1995.1.1부터 공원내에서도 쓰레기 수수료 종량제가 실시됩니다.
공원을 찾는 시민 여러분께서는 아래사항을 준수하여 깨끗하고 쾌적한공원을 가꾸기 위한 쓰레기 종량제 실시에 적극 참여합시다.

— 아 래 —

1. 쓰레기를 몰래 버리거나 태우지 맙시다.
2. 쓰레기는 반드시 규격봉투에 넣은 후 지정된 장소에 모으도록 합시다.
3. 규격봉투는 공원내 매점 및 휴게소에서 판매합니다.
4.쓰레기는 버리는 쓰레기와 재활용 쓰레기로 분리하여 배출합시다.
5.상기사항을 위반할시에는 100만원 이하의 과태료를 부과합니다.
6.공원내에서 쓰레기를 몰래 버리거나 태우는 사람을 발견할 시는
7.쓰레기 종량제 위반 신고 센타에 신고합시다.

1995. 1. 1

앞 산 공 원 관 리 사 무 소 장

Translation of Figure 3-2

Guideline on conducting Volume-based Waste Fee System in park

Volume-based Waste Fee System will be in effect from 1995.1.1.

Thanks for the cooperation.

1. Do not throw away or burn waste illegally.
2. Waste should be put in the waste bag and gathered in designated area.
3. Waste bag is on-sale in cafeteria inside the park.
4. Recyclable waste should be separated.
5. There will be a fine under KRW 1,000,000 (about USD 1,000) on violators.
6. Please inform if you find offender who are against the rulse above.

1995. 1.1

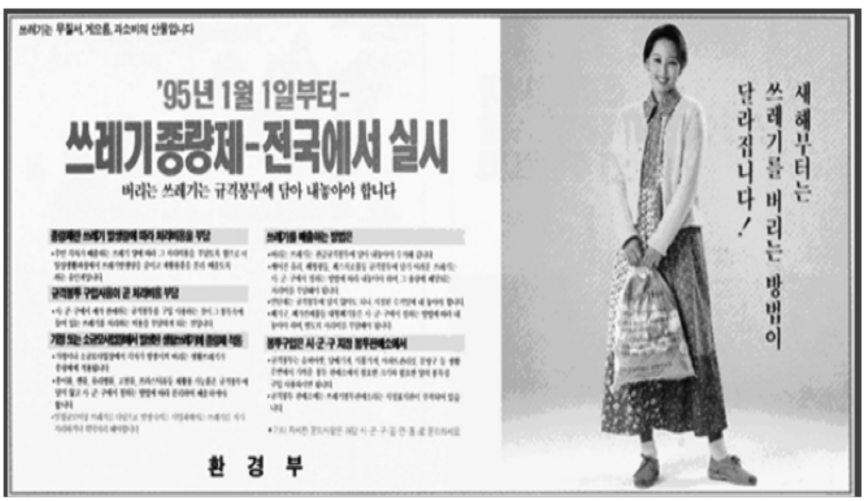
Chief manager

2. Introduction Stage

2.1 Nationwide Implementation of the VBWF System on January 1, 1995

On January 1, 1995, the Volume-based Waste Fee System was applied to all over the country; it was the first nationwide Volume-based Waste Fee System in the world. Germany, Switzerland, and Japan implemented the Volume-based Waste Fee System earlier, but it was not expended to all over the country. With the Volume-based Waste Fee System, the existing waste collection fee was substituted with the paid waste bag; the use of waste bag was limited to the location indicated on the bag. General waste should be put in a waste bag purchased from the designated seller. The bag should be filled up to the dotted line, tied, and placed in front of the house. Recyclable materials should be divided into papers, bottles, cans, and plastics. To dispose of bulky wastes such as refrigerator and closet, the user should report his/her address, name, type and size of the waste to an administrative agency and telephone in advance; then, a civil servant visits to collect the waste and issues a bill.

Figure 3-3 | Newspaper Promotion in Starting Day of New System



Translation of Figure 3-3

Waste is result of disorder, laziness and over consumption!

From 95.1.1 VBWF System will be on action in all part of Korea.

In VBWF System, the more you produce, the more you will pay.

Buying waste bag is paying treatment fee.

Waste-bag should be used when you discard waste.

Waste-bag is on-sale in designated stores near you.

Ministry of Environment

Every system has some problems in its early stage, and the Volume-based Waste Fee System was no exception. In particular, local governments did not have enough time for preparation because ordinances related to waste fee were passed simultaneously a few days before the implementation of the Volume-based Waste Fee System, and it was implemented during the holidays in the beginning of the year when human resources to manage the System were definitely in shortage. The most important problem was the absence of civil consciousness. Before the implementation of the Volume-based Waste Fee System, people dumped waste to dispose of as much waste as possible including bulky wastes such as closet and refrigerator; as a result, public's confusion intensified (See Figure 3-4, Figure 3-5).

Figure 3-4 | Newspaper (1994.12.29)


제 신 론 사회 1 1994년12월29일 (목요일)

종량제 실시전에 내다버리자

쓰레기 홍수…收去 초비상

공터·야산엔 냉장고등 덩치큰 물건 쌓여

대도시 주택가

특별

Translation of Figure 3-4

Emergency! Waste is flooding.

Huge amount of waste is discarded before the starting point of Volume-based Waste Fee System. Especially, Big size electronic waste like refrigerator is stacked up in nearby hill and vacant lot.

Figure 3-5 | Newspaper (1995.1.6)

東亞日報 1995年1月6日 金曜日

쓰레기종량제 "몰라서 못지킨다"

홍보 소홀-시행차질 현장

「큰 생활변화」 제대로 안알려

규격봉투 質·크기등도 문제

쓰레기종량제가 실시된지 5일이 지났으나 사전홍보부족및 규격봉투등의 문제점 때문에 국민들이 큰 혼란과 불편을 겪고 있다.

Translation of Figure 3-5

Volume-based Waste Fee System need to be informed!

Though Volume-based Waste Fee System is big change in everyday life of citizens, many people are still in confusion due to lack of promotion and education

Also, There are problems in quality of waste bag and its size.

Figure 3-6 | Prime Minster Visiting VBWF System Headquarter (1995.1.14)

2.2 Assessment of the 100 days of the VBWF System (April 1995)

The conference on the 100 days of the Volume-based Waste Fee System held on Apr. 20, 1995 was a forum wherein the Ministry of Environment reported the results and civic groups and experts evaluated them. Many residents cooperated, and a stable nationwide reduction trend of the average of 37% (53,546 tons/day→33,841 tons) was recorded. The largest reduction rate was recorded in big cities, followed by small and medium-sized cities and rural areas.

According to the survey, among 1,000 housewives in various cities 2 months after the implementation of the Volume-based Waste Fee System, 98.6% said they observed the Volume-based Waste Fee System thoroughly. The most popular standard waste bag is 10l, followed by 5l and 20l. They suggested more thorough separate collection and promotion of recyclable materials and cited the need for more separate collection baskets to institutionalize the system.

The improvement of the waste bag's standards, establishment of detailed guidelines of the Volume-based Waste Fee System for public spaces, establishment of waste management system for sea villages, recycling mark indication system, measures to collect recyclable materials at the right time and prevent mixing with waste, reinforcement of prevention of over packing of disposable products, establishment of cleaning system for public spaces, thorough application of the Volume-based Waste Fee System in public offices, establishment of guidelines to charge penalty, construction and supplementation of the recycling network, proper price of waste bag, connection with related institutions including charge and deposit systems, provision of information on the Volume-based Waste Fee System, and revitalization of public promotion were suggested as solutions.

2.3 Workshop of the Relevant Civil Servants (November 1995)

In Nov. 1995, a workshop for civil servants related to the Volume-based Waste Fee System was held to collect their opinions and give commendation to good workers to encourage and motivate them. In the workshop, various specific guidelines were given based on thorough advance preparations.

- List of recyclable materials and how to send them out
- Guidelines for the Volume-based Waste Fee System for public spaces
- Guidelines for the Volume-based Waste Fee System for sea villages
- Cases of penalty charge
- Inspection and instruction on workplaces that discharge or treat massive general wastes
- Thorough management plan for food waste
- Instruction to reduce synthetic resins in the cushioning materials used to pack home appliances
- Guidelines for works related to the restriction of disposable products
- Considerations when reporting waste recycling (embankment and soil covering)
- Introduction of the plan to designate waste styrofoam as a recyclable material.

Table 3-1 | Record of Resolution Made in Public Officer's Workshop

Our resolution
From 1.1 this year, Volume-based Waste Fee System which was conducted to solve the waste pollution was successfully conducted with cooperation and active support from citizens. The result showed dramatic impacts on reducing the wastes disposed of and increasing the recycling rate. As public officers who are in charge of implement this system, we want to improve and develop this system which brought big change in Korean waste management policy to be one of successful and exemplary case. 1. As we are aware that Volume-based Waste Fee System is a fundamental way to solve waste pollution in Korea, we will do our best to settle this system as soon as possible. 2. We will be the first to practice Volume-based Waste Fee System knowing the purpose of this system is to minimize waste generation and maximize recycling. 3. We will disseminate this system as a national lifestyle transformation project that saves resources. 1995. 11. 9 **On behalf of waste management officers**

3. Institutionalization Stage

3.1 Analysis on the First Year of the VBWF System (1996)

The analysis on the first year of the Volume-based Waste Fee System showed that the total amount of waste decreased by 27%, and that recyclable materials increased by 35%. Thanks to the reduced waste and increased recyclable materials, it was possible to save KRW 300 billion as well as save landfills as much as 661,157 m^2. The foreign press complimented Volume-based Waste Fee System, with the Japanese media even headlining it. The 1-year performance of the Volume-based Waste Fee System can be summarized as follows:

3.1.1 Positive Assessment

The implementation of the Volume-based Waste Fee System was an opportunity to improve people's awareness of the environment and enabled the environment-friendlier production, distribution, and consumption of products. Consumers preferred products that generate less waste and refill products, and companies tried to change their manufacturing system to produce less waste. As a result, the market share of the recycling industry increased. In addition, sanitation improved because mice and harmful insects such as roach were minimized when food wastes are discharged in waste bag.

3.1.2 Negative Assessment

There was a comment that the willingness to observe the Volume-based Waste Fee System decreased 1 year after its implementation. At the early stage last year, all people, major media, and private groups participated actively. After 1 year, however, their passion decreased and discharge of wastes increased again since the fourth quarter.

Secondly, even though people cooperated and participated actively, the support of the public sector was insufficient, and the recycling infrastructure was inadequate. The problem of food waste disposal was not resolved due to insufficient technologies to reduce food waste and process them as animal feed or fertilizer, there was no practical measures to dispose of workplace waste, which increases more than 10% annually, and recycling treatment was not good due to inadequate plastic recycling facilities. Moreover, some said that waste bag sharply increased the use of plastic bag compared to last year and caused secondary environmental pollution. Plastics used in waste bag should be burned in the incineration plant or buried in the landfill. When burned, they will cause air pollution; when buried, however, they will not decay and consequently cause secondary pollution. Other issues were measures to prevent illegal trash dumping and incineration and insufficient collection system for harmful municipal waste such as fluorescent light and battery.

On May 7, 1996, the "Conference on the institutionalization of the Volume-based Waste Fee System" was held in the Grand Theater of the Sejong Center for the Performing Arts to

analyze its performance for the first year and discuss improvements. With the sponsorship of 7 civil groups, experts in the government and civil groups gave presentations, and all interested parties had a heated discussion.

3.1.3 Supplementary Measures and Improvements

To increase awareness of the Volume-based Waste Fee System, the nationwide assessment of the first year of the Volume-based Waste Fee System based on private groups, open performance assessment by the central and local Volume-based Waste Fee System councils, development of measures and technologies to reduce food waste, nationwide movement to reduce food waste with religious and private groups, measures to reduce workplace waste (increase in workplace wastes that should be disposed of by the Volume-based Waste Fee System, etc.), rationalization of price by increasing the price of waste bag, and intensive crackdown on illegal waste dumping including ordering the workplace that discharges harmful wastes more than the standard to set the reduction goal were suggested as supplementary measures.

In addition, the installation of 9 recycling facilities including facilities to select and crush plastics in 1996 with KRW 23.1 billion to establish infrastructure of the Volume-based Waste Fee System, reinforcement of financial support for private recycling companies, development of decomposable plastic to improve the structure and quality of waste bag, and collection system for harmful wastes such as fluorescent light and battery were suggested, too.

3.2 Analysis on the Second Years of the VBWF System (1997)

With the Volume-based Waste Fee System, generated waste decreased by 30% and discharged recyclable materials increased sharply. As a result, it was possible to save KRW 450 billion and landfills of 826,446 m^2 annually. In the OECD Environmental Performance Evaluation held in Paris in Apr. 1997, Korea's Volume-based Waste Fee System had gained positive attentions and evaluations from various world leaders.

3.2.1 Positive Assessment

The analysis on the 2nd years of the Volume-based Waste Fee System showed that generated municipal waste decreased by 29.4% and discharged recyclable materials increased by 28.5%. Just after 2nd years of the Volume-based Waste Fee System, our generated waste per person reached the same level as that of advanced countries. The ratio of recycling and incineration increased, and reclaimed wastes decreased. Other features did not change greatly compared to the first year. The implementation of the Volume-based Waste Fee System caused many positive environmental changes in recycling industries such as the introduction of the reverse path collection system for packing materials of large products (home appliances and furniture) manufacturers, replacement of cushioning materials

with environment-friendly materials, increased production of slim-type diapers by diaper manufacturers, use of single packing by baking companies, increased use of environment-friendly materials by packed lunch companies, reduction of food waste by hotels and large restaurants, recommendation of shopping basket by department stores, and increased free gifts for non-packing products.

3.2.2 Negative Assessment

Similar problems in the first year were cited. Some said that, due to the Volume-based Waste Fee System, no one cleans alleys and neighbor's houses. Moreover, in 1996, the waste reduction ratio decreased compared to 1995, the first year of the Volume-based Waste Fee System.

Table 3-2 | Change in Waste Generation 1994-1996

	1994	1995	1996
Total (ton/day)	58,118	47,774	46,194
Recycled (ton/day)	8,927	11,306	11,468
Discarded (ton/day)	49,191	36,468	34,726
Per capita generation (kg/person. day)	1.3	1.05	1.01

3.2.3 Supplementary Measures and Improvements

The supplementary measures and improvements emphasized in the second year were measures to prevent illegal waste dumping in vulnerable areas such as deteriorated housing area, hillside housing area, and roadside of shopping district, proper management measures for harmful municipal wastes such as medicines and fluorescent light, and improvement of ineffective cleaning affairs of local governments. One municipal waste collector collected 0.96 tons daily and transported 4.5 tons with 1 truck; hence the need to supplement resident services. Furthermore, the continuous development of technologies to reduce food wastes and process them as resources such as feed of earthworm was suggested.

Chapter 4

Contents of the Volume-based Waste Fee System

Contents of the Volume-based Waste Fee System

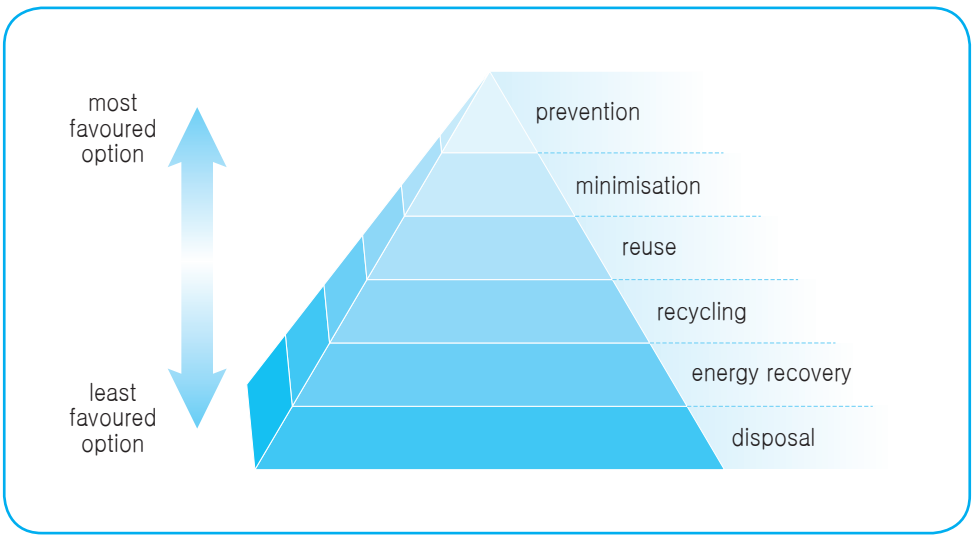
1. Outline of the Volume-based Waste Fee System

1.1 Theoretical Background and Principles

Solid waste management plan is devised emphasizing the 3R principle of reduce, reuse and recycle across the life cycle of waste streams and aim to go up the waste hierarchy. Volume-based Waste Fee System is designed to prevent and minimize generation of waste which is most favored option in waste hierarchy using economic instrument. In the past, waste collection fee was charged on a fixed rate through property tax or monthly fee regardless of the amount disposed. However, with the introduction of VBWF System, households and small sized commercial sectors are required to purchase specified bags to throw away their garbage, thus waste collection fee is charged in proportion to the amount thrown away. Furthermore, by providing free collection service for recyclable waste, incentive is given for households to separate recyclable items from other solid waste.

Economic instruments make use of market mechanisms and provide important approach to environmental challenge. They encompass a broad array of policy tools, ranging from pollution taxes and marketable permits to deposit-refund systems and performance bonds. Economic instruments are applied across a similarly wide-ranging set of policy sectors, including land, water and air management, and control or reduction of pollutants. They either drive up the cost of environmentally harmful activities or increase the returns from sustainable approaches, thereby creating economic incentives to behave in a more environmentally responsible and sustainable manner.

Figure 4-1 | The Waste Hierarchy



Source : http://en.wikipedia.org/wiki/Image:Waste-hierarchy.phg

The principles which support Volume-based Waste Fee System are as follow.

1.1.1 "Polluter pays" Principle

The "Polluter pays" principle means polluters should compensate for the damages caused by their destruction of the environment or pollution. As the first environmental principle of OECD (organization of advanced countries), it is adopted by various countries. OECD's recommendation and the Rio Declaration in 1991 stressed that the costs of pollution should be included in the "polluter pays" principle.

1.1.2. "User pays" Principle

Users who obtain profits from a resource should pay the cost for the loss of resource and use of such resource and related services.

1.1.3 Principle of Economic Incentive

Charge, fees, and tax are the most popular economic incentives based on the quantity and quality of discharged waste. The deposit-refund system (receives costs of Waste Fee in advance and return when collecting wastes) and subsidies are also used.

1.1.4 Precautionary Principles

Precautionary Principles (PP) imply that precaution has precedence over healing. With respect to the Volume-based Waste Fee System, it changes the existing supply-based waste policy into waste policy based on demand management.

1.2 Operation of the Volume-based Waste Fee System

1.2.1 Target Waste and Method of Discharge

Table 4-1 | The Waste Sources and Target of VBWF System

Sources		Types of Waste	Use of VBWF bag	Cost born by source	Note
Household &Small Commercial Sector	Urban Area	Household waste	Yes	Yes	
		Recyclable Waste	No	No	Paper, etc.
		Bulky Waste	No	Yes	Furniture, etc.
		Construction/ Demolition Debris	No	Yes	
		Food Waste	No	Yes	
	Rural Village	Agricultural Waste	No	Yes	Village-level VBWF
Large Commercial Sector/Small Business		Manufacture Solid Waste type	No	Yes	300Kg/day

*Note : 1) Although coal ash discarded from households is collected for free, fees are levied for coal ash collection from business activities at some floriculture and farming houses etc. that still continue to use briquettes

2) Agriculture and fishing villages, other than “eup” and “myeon” located in county areas, are villages with low population densities.

3) For large-scale retailers etc. that produce more than 300kg of waste per day, worksites are not subject to obligatory use of the Volume-based Waste Fee System of waste bags. However, application of the Volume-based Waste Fee System is recommended even for sites that produce more than 300kg per day for waste that is similar to municipal waste.

On January 1, 1995, the Volume-based Waste Fee System that charges fees for Residential waste and business waste of small workplace amounting to less than 300kg was expanded to all over the country. For wastes from work sites with similar characteristics to household Wastes; the same Volume-based standards and methods used in collecting, transporting, storing, and processing household waste can also be applied. Note, however, that coal briquette ashes, bulky wastes, and recyclable materials are excluded.

Under the Volume-based Waste Fee System, wastes should be discharged using a standard waste bag manufactured and sold by local governments; other wastes should be disposed of by a third party or manually. Coal briquette ashes should be collected on the designated regular collection day or based on the ordinances of local governments. Wastes that cannot be put in a waste bag such as broken glass and styrofoam and wastes discharged plentifully at once such as construction waste should follow the regulations on the collection, transport, and disposal of large waste stipulated by local governments.

Waste collection time is set by the local municipality who takes into consideration their unique conditions. For aesthetic reasons, most municipalities set waste discharging time after sunset (after 8 p.m) in the evening prior to the day of the waste pick-up. Residents living in apartments discard their wastes in a collection container within their apartment complex and regular household residents discard their wastes in front of their home to be collected by garbage trucks. The discarded wastes are generally picked up between 3 a.m. and 5 a.m.

Figure 4-2 | Discharging Household Waste

For recyclable waste, residents separate the recyclable waste into recyclable item disposal bins and it is collected regularly at a designated time. With bulky waste such as home appliances and furniture, residents are required to discard the waste by attaching appropriate stickers and these stickers can be purchased from local administrative office or a hauler who collects bulky wastes. For food wastes, apartment residents discard them in food waste-only container bins and regular household residents discard them in food waste-only bags. Discarded food wastes are collected by a hauler either everyday or every other day depending upon municipality's capability.

1.2.2 Discharge of Recyclable Materials

Waste that can be disposed of without waste bags includes recyclables, large-size waste, and small-scale construction waste etc. Recyclables are separated into 4-5 varieties, including newspaper and publications etc., separate designated receptacles. Food waste was formerly disposed of with the general waste, but is now also collected in special receptacles or special bags, to be composted or otherwise reused.

Figure 4-3 | Separating Recyclable from Householdwaste

Figure 4-4 | Separation Mark for Recycling

(from top-left: paper, carton, glass, metal, aluminum)

In principle, recyclable materials should be collected without cost to reduce generated waste and revitalize the separation and discharge of recyclable materials. Based on the equipment and human resources for waste collection in each location, the collection day of recyclable materials should be set with the independent collection system for recyclable materials to prevent mixing with municipal waste. In principle, recyclable materials should be divided into paper, can, bottle, scrap iron, and plastic. If it is difficult due to insufficient equipment and human resources, they may be divided into 2~3 items. Separated and discharged recyclable materials should not be mixed with other wastes during transport. If a private company collects them, the local government should supervise to prevent the avoidance of uneconomical items.

Table 4-2 | List of Recyclable waste

Categories	Items
1. Paper	- Newspaper
	- Book, note, paper bag, calendar, packing paper
	- Paper cup, pack
	- Box (snacks, packaging, others)
2. Cans	- Steel can, aluminum can (drink, food)
	- Other cans (butane gas, pesticide container)
3. Bottles	- Drinking water bottle, the other bottles
4. Metal	- Scrap iron (engineering utensil, wire, nail, iron board etc)
	- Nonferrous metal (nickel silver, styrene, electric wire)
5. Plastics - Extended Polystyrene	- Fruit box, etc.
- PETE (1)	- Drink bottle(coke, soda, juice), water bottle, soy sauce bottle, oil bottle
- HDPE (2)	- Water bottle, shampoo and detergent container, white rice wine bottle
- LDPE (4)	- Milk bottle, rice wine bottle
- PP (5)	- Boxes (beer, coke, soju), garbage can, dustpan, water gourd dipper
- PS (6)	- Yogurt bottle, shawa bottle
6. Textiles	- Cotton
	- Other clothes
7. Waste from farming village	- Pesticide bottle
	- Waste vinyl for farming
8. Others	- Recyclable items depend upon regional situation

Separate procedural guideline is set for collecting and treating recyclable waste.

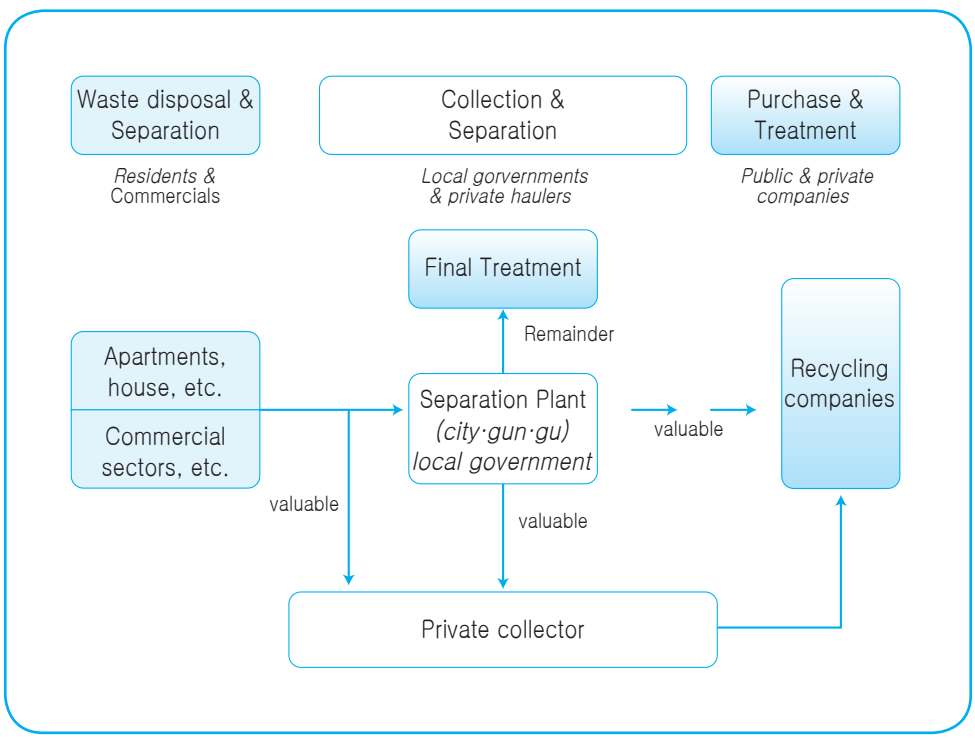
a. Waste Separation

Apartments and other communal residential areas separate recyclable wastes into 5 types, while typical residential areas separate them into 2-3 types, mainly paper and other recyclable items. Communal areas are required to designate collection sites and place separate collection bins for recyclable items in their neighborhood. Residential areas, where placing collection bins are inconvenient, recyclable waste are collected on a door-to-door basis.

b. Waste Collection

As mentioned above, recyclable wastes are collected either by door-to-door, through collection bins or at designated areas on a certain date, or by face to face depending upon the characteristics of the neighborhood and local government's circumstances. When an amount of recyclable waste increases, number of collection is adjusted. In communal areas, 5 types of separated recyclable waste are picked up as it is, and in residential areas, it is collected in 2-3 types of in mixed status.

Figure 4-5 | Collection Systems for Recyclable Waste



1.2.3 Volume-based Waste Fee System for bulky wastes

Bulky wastes mean wastes that can be weighed and identified separately such as home appliances, furniture, and household items discharged from households and workplace, including wastes that cannot be put in the waste bag as designated by the head of the local government. Recyclable bulky waste should be reported to the recycling center operated by the local government and collected without cost for recycling. Other bulky wastes should be discharged with a sticker sold by sellers designated by local governments or reported to the private waste collection company, which charges fees when collecting and transporting wastes. Nowadays, they are disposed of by the heads of local governments considering the conditions of the region and convenience of residents. For example, some local governments announce the discharge of bulky wastes in their homepage, and residents pay fees for waste collection.

Generated bulky wastes should be collected and transported to storage or a specific place and stored temporarily. Recyclable materials should be sent to the recycling center or private recycling agency for repair and recycling. When scrapping, direct landfill should be avoided as much as possible. They should be disassembled or crushed to reuse recyclable materials. Other materials should be minimized using various methods including incineration and burying. Fees for refrigerator, TV set, washing machine, air conditioner, gas oven, spin-dryer, air cleaner, chest, sofa, desk, table, and piano were determined based on size when the Volume-based Waste Fee System was introduced. Fees for other bulky wastes are determined by the heads of local governments considering their type and size.

Figure 4-6 | Bulky Waste Collection

Figure 4-7 | Signboard for Waste Bag Sales Shop Disposal

Figure 4-8 | Sticker for Bulky Waste

< 5,000원권 >

Figure 4-9 | Types of Bulky Waste (Furniture and Electronics)

1.2.4 Specifications of VBWF Bags

Korea has adapted to using bags over containers for several reasons. In Korea, population density is high and large number of the population live in apartments and condominiums. Even regular houses are in close proximity with their neighbors and are adjacent to the road; thus it is difficult to place large garbage bins in front of the house.

Types of waste collection containers to base rate and billing system are generally cans, prepaid bags, prepaid tags or stickers. Each system has specific advantages and disadvantages such as providing economic incentive for waste reduction, assuring stable revenue for waste agencies simplicity of billing, easy collection of waste, sanitation and budgetary constraints. For container system, authorities need to set up an inventory and distribution system, which are expensive to install, and its billing system is more complex. Prepaid bags are more advantageous since they are relatively inexpensive to implement because residents pay for the collection and treatment of wastes by purchasing bags and no billing is required. Less hassle is involved for pre-paid bags because public pays directly for the purchase of the bag and no billing is required.

Considering Korea-specific housing conditions, budgetary constraints and facilitation of implementation, Volume-based prepaid bags, instead of containers have been chosen for the Volume-based Waste Fee System in Korea.

Each municipality can choose the appropriate type, color and materials of the designated VBWF bags, taking into consideration of their unique situation e.g. treatment facilities capability, convenience for the residents, environmental suitability, etc. The composition of VBWF bags are PE (polyethylene), PE with more than 30 per cent of biodegradable resin, or PE with more than 30 per cent of calcium carbonate. Tension, strength and other specific standards are set for each bag with different composition. The bag containing calcium carbonate is primarily used for incineration treatment and biodegradable resin bag is used

for food waste compost. The color of the bag for household use should be translucent or obscure to protect personal privacy. Bags for public use (street cleaning, etc.) are light blue colored and are not used interchangeably with other VBWF bags. The bags for food waste disposal should be transparent to avoid mixture of different substances.

Table 4-3 | Composition of VBWF Bags

Composition		Primary Usage	Note
PE	HDPE	Bags for general use	
	LDPE	Bags for general use	
AP+starch+LDPE (biodegradable)		Bags for food waste compost-use only	Aliphatic polyester
AP+starch+HDPE (biodegradable)		Bags for food waste compost-use only	
$CaCO_3$+HDPE (LDPE)		Bags for incinerator-use	Contains more than 30% of Calcium Carbonate ($CaCO_3$)

notes : There are different quality standards on each composition type, and bags are made in accordance with the standards.

1.2.5 Price of Standard Waste Bag and Way of Buying

Payment system of the Volume-based Waste Fee in Korea is a direct payment system, where residents pay for solid waste services by purchasing the standard bags. The cost for waste treatment is recovered from the sales of VBWF bags. Therefore, the price of a VBWF bag includes collection, transport, and treatment cost as well as production costs of making the bag. In principle, the full cost of collection, transport, and treatment should be included in the price of the VBWF bag. However, the price of bags is gradually increased because a sudden increase in the waste treatment cost might cause negative side effects. Therefore, each municipality sets a different rate of burden (resident's share of the full cost) for the public depending upon its financial circumstances and treatment cost.

For waste that is difficult to be contained in VBWF bags (i.e. small quantity of demolition waste debris, bulky wastes, other wastes from business sector), the total treatment cost is levied on the generator.

The price of waste bag was determined by local councils based on the ordinances considering the cost of waste disposal, financial status of the local government, and residents' standard of living. In 1995 when the Volume-based Waste Fee System was introduced, the burden of residents with regard to waste disposal was 30~40%, which was calculated by dividing the sales of waste bag by the costs of collection, transport, and disposal of

residents' waste. The price of waste bag was calculated by multiplying the waste disposal cost perl by the capacity of bag and burden of residents, and then adding the production cost and sales charge of waste bag. The sales charge was calculated by multiplying the waste disposal cost perl by the capacity of bag and burden of residents, adding the production cost of waste bag, and then multiplying by the ratio of sales charge. Generally, it is around 9%.

Table 4-4 | Calculation of Burden of Residents, Price of Waste Bag and Sale Charge

※ Burden of residents (%)=income from sales of waste bag÷collection, transportation and treatment cost x100

※ Price of waste bag=waste disposal cost perl by the capacity of bagxburden of residents+production cost of waste bag+sales charge

※ Sales charge=(waste disposal cost perl by the capacity of bag)xburden of residents+production cost of waste bag)xratio of sales charge÷(1-ratio of sales charge)

Waste bag are sold at convenient places designated by local governments such as management office of apartment and supermarket, with a designation sign installed in those places. Waste bag is divided into normal bag for households/workplace and public bag for wastes on roadside streets and alleys. The capacity of a normal bag is divided into 10l, 20l, 50l, and 100l, and that of a public bag, into 50l and 100l. The type of waste bag diversified later as <table 4-4> .

Table 4-5 | Diversification of Waste Bag in 2003

Usage	Capacity
General use	2l, 5l, 10l, 20l, 30l, 50l, 75l, 100l
Public use	30l, 50l, 100l
For Food waste	1l, 2l, 3l, 5l
For plastic bag	3l, 5l

Table 4-6 | Trend in VBWF Bag Prices by Cities (20 Liter Bag Comparison)

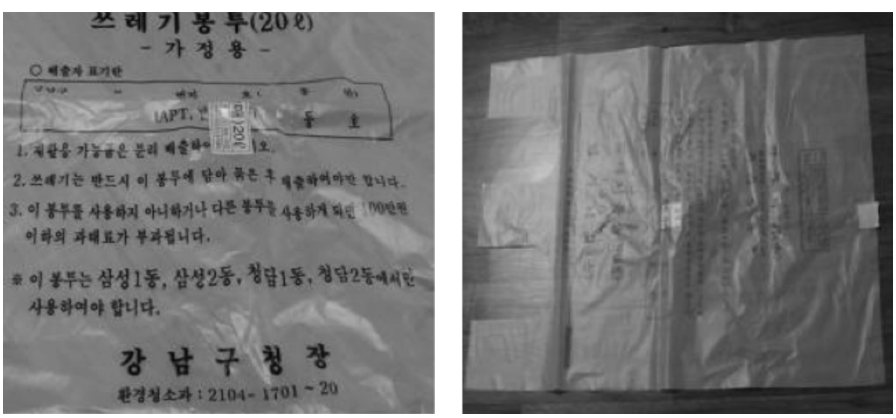
(Unit : US$/sheet, %)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	95-2004
Seoul	0.27	0.29	0.33	0.34	0.34	0.34	0.34	0.34	0.37	0.35	31.32
Busan	0.28	0.33	0.40	0.58	0.62	0.69	0.75	0.77	0.79	0.81	188.53

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	95-2004
Daegu	0.21	0.31	0.37	0.37	0.42	0.43	0.43	0.43	0.43	0.43	104.76
Inchon	0.21	0.27	0.36	0.37	0.42	0.45	0.58	0.58	0.58	0.58	170.09
Gwangju	0.20	0.24	0.33	0.33	0.33	0.47	0.47	0.47	0.47	0.47	135.00
Daejeon	0.21	0.24	0.30	0.30	0.38	0.44	0.44	0.44	0.44	0.44	105.61
Ulsan	0.25	0.25	0.37	0.37	0.37	0.37	0.37	0.37	0.43	0.43	72.22
Gyeonggi do	0.26	0.29	0.31	0.33	0.33	0.37	0.38	0.38	0.41	0.42	63.67
Gangwon do	0.19	0.22	0.23	0.22	0.26	0.26	0.28	0.29	0.30	0.30	63.44
ChungCheong buk do	0.25	0.26	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.29	13.83
ChungCheong nam do	0.19	0.19	0.20	0.20	0.21	0.26	0.31	0.31	0.31	0.31	67.02
Jeolla buk do	0.18	0.19	0.20	0.20	0.20	0.21	0.21	0.22	0.25	0.26	40.66
Jeolla nam do	0.15	0.16	0.19	0.20	0.22	0.23	0.25	0.25	0.26	0.27	72.08
Gyeongsang buk do	0.16	0.17	0.19	0.19	0.20	0.23	0.24	0.25	0.25	0.25	57.50
Gyeongsang nam do	0.27	0.28	0.31	0.32	0.34	0.38	0.40	0.40	0.41	0.43	56.04
Jeju do	0.26	0.26	0.28	0.28	0.28	0.28	0.28	0.28	0.32	0.40	54.90

Note : changes are calculated as a percentage change from 1995 to 2004

Figure 4-10 | Waste bag (Front and Back)



1.2.6 Separate Collection of Food Waste

At the time of VBWF System introduction in 1995, food waste was disposed with other solid wastes through VBWF bags. However, since most food waste is soggy, they create foul odor, spawns a great amount of leachate in landfills and decreases incineration efficiency. Since food wastes contain a high degree of organic matters and nutrients, one of the best solutions is to recycle them in order to obtain value from these organic resources. Now, food waste is separated in food waste-only collection bins or food waste-only bags, and collected by municipalities or haulers. Starting in 2005, direct land-filling of food waste generated in urban areas is completely banned.

Separate collection and recycling obligations for food waste has been enforced since 1997 mainly for large-scale food waste generators such as restaurants and group-meal facilities in the beginning. However, the system has now been expanded to small-scale generator and regular households.

Figure 4-11 | Food Waste Bag

Figure 4-12 | Collected Food Waste Unladed to the Treatment Facility

1.2.7 Financial Independence

The financial independence of the cleaning budget is calculated by dividing the total profits from the sales of waste bag and recyclable materials, fees for the disposal of bulky waste, and penalties by the annual waste disposal cost as shown in the following formula.

Table 4-7 | Calculation of Financial Independence

The financial independence	=	profits from the sales of waste bag	+	profits from the recyclable materials	+	fees for the disposal of large waste	+	etc(penalty)
	the annual waste disposal cost							

Generally, total profits such as sales of waste bag and recyclable materials and fees for the disposal of bulky waste are smaller than the annual waste disposal cost. In addition, the price of the public waste bag used when cleaning roads and parks as well as the free waste bag for the low-income group was paid by local governments with tax. Therefore, the expenditure exceeds profits, and local governments used tax to cover the shortage such as cost of carrying into the final disposal facilities. As a result, the financial independence of the cleaning administration was relatively low owing to the fixed fees and commissions lower than the actual cost of collection. Though the government invested a considerable budget annually, this problem should be studied and improved continuously.

1.2.8 Crackdown for the VBWF System

a. Preventing Illegal Dumping

In cases when designated VBWF bags are not used and wastes are disposed indiscriminately in inappropriate places (i.e remote hill areas) or illegally incinerated, a maximum fine of 1 million won (USD 900) is imposed on the violator. Compulsory education for the violator and delayed collection of waste are also enforcement tools. In order to monitor illegal behavior, members of local environmental group and citizen's movement are designated as monitoring personnel. Supervision-specialists are also employed for longer period monitoring. Municipalities operate pollution report centers, too.

Crackdown is executed in 2 ways. A surveillant hid in a vulnerable place where non-standard waste bag is dumped frequently (behind the telephone pole, wall, empty land, etc.) to find violators and charge penalties (First offense: KRW 10,000, Second offense: KRW 20,000, Third offense: KRW 50,000). With this method, however, the surveillant should wait for a long time because it is hard to anticipate when the violator would dump waste.

The other way is to leave non-standard waste bags during a certain period and then form squads (2~3 people in 1 squad) to check waste and find the violator. This method caused some problems including the displeasure of civil servants when searching waste and conflicts with the violator when charging the penalty.

Figure 4-13 | Public Officers Checking the Content of Waste Bags

Figure 4-14 | Illegal Dumping

Figure 4-15 | Illegal Dumping Captured in Security Camera

Those who dumped garbage illegally were tracked down and penalized according to the law in order to support the legality of garbage discharge system. All employees in district and sub- districts were assigned to the morning shift, afternoon shift, and nighttime shift, so that illegal dumping or disposal of garbage could be detected any time.

The crackdown on illegal dumping of garbage became even more effective as the footage from a security camera (See Figure 4-15), capable of monitoring illegal dumping activity

even during vulnerable hours, was used as evidence. Furthermore, the words about the positive effect of surveillance camera operation spread to the surrounding regions.

b. Rewards for Reporting Illegal Waste Dumping

Anyone found throwing away garbage without using VBWF bags or illegally burning waste is imposed with maximum of 1 million won (US$ 1,000) of negligence fine in accordance with the Waste Management Act.

Since imposition of fines for unlawful activities has its limitations in effectively preventing such behaviors, the reward system for reporting unlawful activities was introduced in 2000. Anyone who reports unlawful activities is paid as much as 80 per cent of the fine charged to the violator. This system contributed to expanding the social awareness on preventing the indiscriminate dumping of wastes.

Members of citizen's groups and environmental NGOs are appointed as the voluntary monitoring group for unlawful dumping. Unlawful activities can be reported through environmental pollution report center or through the internet.

c. VBWF System for Public Areas

Unlike residential areas, public areas such as public parks, amusement parks, tourist resorts, mountain paths, stadiums and beaches do not generate waste on a regular basis, and for this reason, a system different from that of residential areas is needed.

If the entrance fee to the location does not include waste treatment cost, visitors are required to directly purchase VBWF bags and if the cost for waste treatment is included in the entrance fee, then VBWF bags can be handed out to visitors or have the garbage cleaned by the manager of the facility. In particular, for mountain paths and amusement parks, large waste container bins and recyclable item containers are installed in easily accessible areas.

In public areas where VBWF is not administered, mayors or heads of local governments can require the visitors to take back the garbage they have generated or, in an inevitable case, place collection containers for recyclable and regular waste at a convenient location where it is easily accessible.

d. Incentives for Reducing Waste

Various incentives are provided to the municipalities to further promote separation of recyclable wastes and reduction in waste generation, because recyclables are often found in regular trash bags from household and commercial sector. By measuring the changes in the quantity of wastes transported to landfill/treatment facilities, one can measure the performance of local municipalities in reducing waste and promoting recycling. The measurements are usually done by comparing the amount of the waste transported to the landfill in the current period with data from past periods (i.e, quarterly, half year, annually), while taking into consideration the changes in the population, occurrence of natural disasters, etc.

Incentive schemes are usually overseen by managers of municipal landfills and incinerators in large municipalities. Rewards include reduction in tipping fee, commendation or other personnel and career benefit for the local municipality as a whole or the specific official or the citizen.

e. Appointment and education of honorary Volume-based Waste Fee System squads and public awareness program

Problems in the settlement of the Volume-based Waste Fee System include the noncooperation of residents (using non-standard waste bag) and limitation of crackdown by civil servants. As a result, some local governments organized the honorary Volume-based Waste Fee System squads to make residents supervise illegal waste dumping by themselves. They had education for 90 minutes daily for 21 days, and borough offices prepared slides as education materials. These slides contained 130-minute long video showing neglected wastes, waste collection in front of doors, collection of recyclable materials, and waste landfill. Local governments also produced and distributed cleaning pamphlets and invited the head and 5 members of an environmental movement organization. These efforts received positive responses by giving the honorary squad a rare opportunity to experience environmental education and have a good opportunity to improve their environmental awareness.

Figure 4-16 | Landfill Field Trip and One-day Experience on Waste Separation

2. Legal Base and Related Policies

2.1 Waste Management Act

According to Article 13 of the Waste Management Act, matters related to municipal waste should follow the ordinances of local governments. Therefore, legislation and amendment were not needed when introducing the Volume-based Waste Fee System. Instead, the government established a waste management manual containing the details of the Volume-based Waste Fee System and used it as a standard to enact ordinances of local governments.

2.2 Waste Management Guideline (1994)

In 1994, the Ministry of Environment distributed guidelines for waste fees in the Volume-based Waste Fee System to help local governments in their legal, administrative, and financial preparations before the implementation of the nationwide Volume-based Waste Fee System. The manual describes methods to discharge wastes that should be disposed of by the Volume-based Waste Fee System, type and size of waste bag, manufacture and management of waste bag, price of waste bag, application of the Volume-based Waste Fee System in public spaces, reduction of fees for the low-income group, and matters related to illegal waste dumping. Matters that should be prepared by local governments before the introduction of the Volume-based Waste Fee System include the establishment of exclusive organization, procurement of budget, measures to collect recyclable materials, establishment of ordinances, manufacture of waste bag, education for civil servants, public promotion, and operation of the self-initiated surveillance squad (Refer Appendix for main content).

2.3 Supporting Policies of Volume-based Waste Fee System

Table 4-8 | Resource Circulation Policy in 1990s

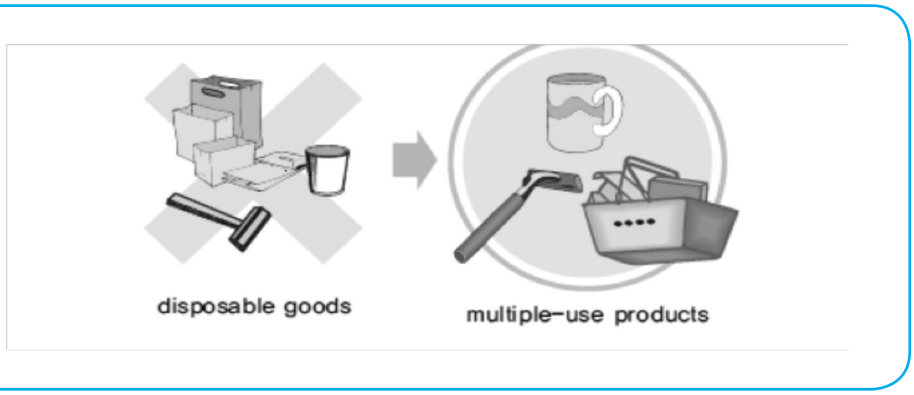
Classification	Policy
Reduce	- Reducing package - Volume-base waste fee system - Purchase of disposable plastic bag - Disposable product restriction
Reuse	- Use of recycled material
Recycle	- Waste Deposit System - Waste charge system - Extended Producers Responsibility System

Source : Korea Foam-styrene Recycling Association

As stated before, VBWF policy aims at reducing waste at the source, promoting waste separation and recycling of waste that are inevitably generated. Thanks to VBWF System, generation of waste decreased and recycled waste increased. However it is better to say 3R policy of government in 1990 as a whole contributed to this decrease in waste (Table 4-8). The Volume-based Waste Fee System was implemented in connection with other recycling policies. Separate collection, a prerequisite to the Volume-based Waste Fee System, became compulsory in 1991. Other waste policies implemented in the 1990s to support the Volume-based Waste Fee System were as follows.

2.3.1 Control over the use of disposable products (1994)

Figure 4-17 | Control Over Disposable Goods



The control over use of disposable products was carried out in accordance with Article 10 of Act on the Promotion of Saving and Recycling of Resources. Restriction on the use of disposable items is a policy that promotes the use of re-usable and environment-friendly materials. This scheme bans the use of disposable knife, spoon and chopsticks, toothbrush, and containers at specific businesses or locations, and restricts the free distribution of vinyl bags and disposable cheering tools. Especially, banning free distribution of disposable vinyl bag is effective in curving the rapid growth in the use of vinyl bags in markets. Currently, disposable vinyl bags are sold in markets at 20-50 won (US$ 0.02-0.04) per sheet in order to reduce its use and to promote the use of re-usable grocery basket. It charges a deposit to the disposable plastic bag that used to be supplied without cost, and customers can get back the deposit by returning the plastic bag.

2.3.2 Operation of recycling centers (1995)

As a private group organized by the owners of recycling centers, the Korea Life Resources Recycling Association was founded in Mar. 1995. The Association collects electronic products used in households and offices (TV, refrigerator, washing machine,

electric fan, etc.), furniture (electronic products, sofa, bed, desk, etc.) and sporting goods without cost, repairs and sells them as secondhand goods, or donates them to orphanages or nursing homes.

2.3.3 Preferred purchase of recycling products by public institutions (1992)

To revitalize the reduction of wastes and facilitate recycling by revitalizing the purchase of recycling products, the preferred purchase of recycling products by public institutions was enforced in accordance with Article 32 of the Act on the Promotion of Saving and Recycling of Resources. According to this act, public institutions should preferentially purchase the recycling products announced by the Ministry of Environment.

2.3.4 Financial support for recycling industry (1993)

To establish infrastructure for poor recycling companies, resolve difficulties in securing recycling facilities, and revitalize the recycling industry, Korea Environment and Resources Corporation (now Korea Environment Corporation) has provided long-term, low-interest loans to revitalize the recycling industry to support the installation of recycling facilities, technical development, and stable management.

2.3.5 Reduction of food waste (1994)

A nation-wide campaign for 'Food Table with Less Waste' was introduced in 1992, and a mandatory eduction quota has been imposed on restaurants since 1994. It has become obligatory to build facilities for food waste resourcification in residential areas and tourist sites since December 1997. Beginning from January 2005, direct landfill of food waste has been banned in all cities.

Figure 4-18 | Food Waste Reduction Promotion Poster

2.3.6 Recycling of packing materials (1993)

Article 10 of the Regulations on the Standard for Methods and Materials of Product Packing stipulated the products that should use refill containers as part of packing. Manufacturers of those products should use refill containers according to the specified ratio. Policy on restricting excessive packaging not only prevents unnecessary waste from being generated through the reduction in packaging layers but also promotes the gradual phase-out of polyvinyl packaging and the replacement with paper materials.

3. Administrative structure and sharing roles of government

3.1 Role of the central government (Ministry of Environment)

3.1.1 History of the Ministry of Environment and waste-related departments

As environmental problems worsened, the Ministry of Environment was spun off from the Environmental Office in 1980. At that time, waste works were performed by the waste department in the Water Quality Management Bureau. On December 29, 1986, to resolve the problem of Waste Fee, which was aggravated by the increase in various wastes, the Department of Waste Disposal was expanded and reorganized as the Office of Waste Management with 3 sub-departments. In 1990 when the Environmental Office was upgraded as the Environment Agency, the Office of Waste Management was expanded and reorganized as Institutional Waste Department, General Waste Department, Specific Waste Department, Department of Waste Recycling, Harmful Materials Management Department, and Soil Conservation Department. In addition, to facilitate the recycling of discarded resources and conservation of the natural environment, Korea Resource Recycling Corporation was founded on September 11, 1980. in accordance with Article 5 of the Compound Waste Treatment Corporation Act. Environmental works were performed by related departments. In particular, the utilization of discarded resources was carried out by the Ministry for Energy and Resources, with the collection/disposal of general waste in the special cleaning area and installation/management of public toilet performed by the Ministry of Home Affairs. The management of organs extracted in hospitals was done by the Minister of Health and Social Affairs, and the transport/treatment/disposal of nuclear materials and radioactive waste, by the Ministry of Science and Technology. In Dec. 1994, the Environment Agency was upgraded as the Ministry of Environment. At the same time, the Office of Waste Management was renamed Department of Wastes and Resources consisting of the Department of Waste Policy, Department of Waste Management, Department of Waste Facilities, and Department of Waste Recycling (See Table 4-9).

3.1.2 Implementation of the Volume-based Waste Fee System and role of the Ministry of Environment

The role of the Ministry of Environment in the implementation of the Volume-based Waste Fee System was to implement the Volume-based Waste Fee System in cooperation with local governments. For this reason, the Ministry of Environment cooperated with the Ministry of Home Affairs, which carries out the collection/disposal of general waste, and local governments cooperated.

A. Creation and distribution of guidelines for the Volume-based Waste Fee System

B. Regular inspection of executive agencies
- Report the amount of generated waste.
- Inspect and report illegal waste dumping.
- Operate an exclusive department to inspect the status of the Volume-based Waste Fee System.

C. Award exemplary cases and provide financial support.

D. Evaluate and analyze policies and summarize solutions.

Table 4-9 | Waste Related Departments in MOE in 1995

Dept.	Functions
Waste policy	Establish basic plan for wasteMake policy on waste prevention from it's source and reductionOperation of waste treatment charge system
Waste management	Establish basic plan for waste treatment Waste treatment standard and method Waste transportation and treatment between countries.
Waste facility	Establish basic plan for building waste treatment facilitiesBuilding and managing public waste treatment facility and Conducting EIA around waste treatment facility areas and establishing support policy for local people
Waste recycling	Establish waste recycling planSupport waste recycling industry Support developing recycling technology and building recycling facilities

3.2 Role of Local Governments

As in other countries, waste management in Korea is a matter for local governments. Before the enactment of the Wastes Control Act in 1986, local governments independently handled waste management, i.e. waste collection according to the "Wastes Cleaning Act." However, when the local autonomy system was introduced in the early 1990s, waste management, waste reduction and recycling became more difficult and complex.

Prior to the introduction of the local autonomy system, the central government was to some degree able to mediate when regional disputes arose regarding issues like the construction of wastes processing plants through its hiring authority over local governments. However, after the local autonomy system took effect the central government's authority declined significantly, and conflicts between central and local governments and among local governments expanded rapidly. The introduction of the local autonomy system provided an opportunity for local governments to engage in disputes with both local residents and each other regarding the installation and operation of environmental infrastructures like waste treatment plants. The number of disputes thus rapidly increased.

Around the time of the introduction of the local autonomy system, the budget for waste management increased dramatically. This was to respond to greatly increased demand for sanitary waste treatment facilities. At the time, demand for fundamental improvements on the existing waste treatment facilities was overwhelming. Up to 1994, local governments had operated only 536 landfills. However, most of these were small operations, and the sanitary landfill rate was less than 60%. There were only 11 sanitary landfills with leachate processing facilities, or 2% out of the nation's total. After conducting Volume-based Waste Fee System, officers who are in charge of waste management became very active on their work.

The revival of the local autonomy system along with budget increases marked a change in waste management policy in Korea. In fact, it is no exaggeration to say that the core of current waste management policies of Korea was formulated from 1991 to 1995 owing to the introduction of the local autonomy system. The Ministry of Environment without cabinet seat was upgraded to the Ministry with cabinet seat in 1994, and the former "Waste Management Bureau" was reorganized into the "Wastes &Resources Bureau."

In fact, the duty which deals with waste were not very popular among public officers but the VBWF System gave officers self-esteem on working. Also, local government became more sensitive about the needs of local residents and this brought improvement on waste management administration. The specific work descriptions of local government are as follows.

3.2.1 Devise Measure to Collect and Dispose of Recyclable Materials

For the effective disposal of recyclable materials, which are expected to increase sharply, the selection and gathering place, human resources, and equipment should be reinforced;

there is also a need to cooperate closely with the recycling companies of Korea Resource Recycling Corporation (now Korea Environment Corporation).

3.2.2 Organize an Exclusive Department for the Volume-based Waste Fee System

Human resources to perform works related to the Volume-based Waste Fee System such as the manufacture/management of waste bag should be increased. Organize an exclusive department to manage recyclable materials, which are expected to increase sharply due to the Volume-based Waste Fee System

3.2.3 Secure Budget

Include the budget for the Volume-based Waste Fee System in the revised supplementary budget to execute it effectively. The required expenses are the costs to manufacture the standard bag, environment calendar, guide sign, and promotion materials and cost to secure cleaning facilities and equipment, install selection and gathering places, and visit pilot areas.

3.2.4 Enact Ordinances

Enact ordinances as soon as possible considering the period to announce legislation and explain the purpose of the system to local residents and members of the local council and the promotional period based on the standard to enact ordinances on the discharge of general waste and charge of fees.

3.2.5 Manufacture and Distribute Waste Bags

Local government is responsible for manufacture and distributes waste bags.

3.3 Role of Civic Group

The most important factor for successful implementation of this system was cooperation of public. And NGO-YMCA, YWCA, Korean Federation for Environmental Movement, Citizen Society for Solving Waste Problems etc.-has played important part to raise awareness about VBWF System and its implementation. The key point was ownership of pubic about VBWF System.

To ensure maximum cooperation of civic groups in enforcing the Volume-based Waste Fee System, it was vital to induce them to take initiatives.

Civic groups must partake in the process from the designing process of the Volume-based Waste Fee System to embrace the ideas from various fields and be involved in the

designing and scheduling process of the enforcement plans (preliminary and preparatory steps, action plans for each step, decision on methods, etc).

Regional managers at civil groups need to be induced to grasp regional characteristics (behavioral characteristics of residents, characteristics of residence, waste discharge practice, etc) and report on the methods for implementing the Volume-based Waste Fee System suited to the realities facing respective regions. The government needs to be induced to adopt the methods suitable for specific situations of regions and provide support for all necessary preparations (type of discharged waste, method for the discharge, installation of garbage containers, entity responsible for waste collection, frequency (cycle) of collection, method for collection, etc).

As a preparatory step, roles need to be assigned for the promotional drive to raise awareness, which upon the implementation must be followed by the deployment of monitoring personnel responsible for observing and reporting on the roles that public servants of local governments are playing and their attitude, pattern of residents' waste disposal, compliance with the requirements under the garbage separation and collection system, involvement and cooperation, and complaints and others.

Above all, the government must not play the leading role, and most importantly, the Volume-based Waste Fee System must be accomplished by civic groups, and the civic groups have the mandate to help make this system take root.

〈Interview〉 National, strategic partnership between civic group and government is key for successful environmental policy

Kim, Mi-hwa

(NGO activist, Citizen Society for Solving Waste Problems in 1995)

Q: How NGOs joined government policy when VBWF System was introduced?

A: In 1990, politically, Korean democracy movement was in full bloom and people started to speak out on social issues. At that time, Korea was suffering from serious pollution and there was strong criticism on government environmental policy. Economic development was the first priority of nation and NGOs and Mass media was in one accord to point out its negative effect. The 1990s was the time civic group movement was activated as ever before and had influence on formation of public opinion. When VBWF System was first introduced, NGOs joined to evaluate the feasibility of VBWF System by request from government. Since civic group was usually against government side, it was very rare to find these two groups working together.

Q. What part did NGO play in implementing VBWF System?

A: Before 1990, civic group movement was in small scale in each local community. However, when big environmental issue became a matter of common interest, there was need for organizing and networking local civic group to speak out. And the problems of local community could hardly reach the central government and the central government could not take action to solve the problem from lack of information. The networking of NGO nation-wide started and this was why government wanted to work with NGOs to utilize this network to promote and evaluate VBWF System.

Q. What was the difficulty you experienced during that time?

A: VBWF System was central government policy and local government officers were indifferent about it. It was troublesome task to add more work to them. Convincing the public was tough job. Promotion, education and awareness survey was keep conducted to inform and notify new policy.

Q. What were the keys for success of VBWF System?

A: Citizens were cooperative to new policy. Survey result showed people were ready to live with discomfort caused by VBWF System. Using nation wide network for promotion can be one of the reasons. And above all, partnership between government and civic group was the key for success. This unusual relationship made mass media to focus on new policy which naturally lead to effective promotion.

Chapter 5

Performance and Improvement of Volume-based Waste Fee System

Performance and improvement of Volume-based Waste Fee System

1. Decrease in Generated Waste

After the implementation of VBWF in 1995, the generation of municipal solid waste (MSW) has declined dramatically. The quantity of MSW generated fell from 58,118 ton/day in 1994 to 47,774 ton/day in 1995 showing 17.8 percent reduction. Quantity of waste was dropped by 4.1 percent in 1997 and 6.9 percent in 1998. During the period of 1994~2001, waste generated decreased by 16.6 percent total and 2.4 percent annually. The waste generation decreased more in the first three-year period of the VBWF enforcement than the latter three-year period. Waste generation per person per day was 1.30kg in 1994; 1.06kg in 1995; 1.10kg in 1996; 0.96 kg in 1998; 0.98kg in 2000.

Table 5-1 | Waste Generation 1994-2000

(Unit: ton/day)

	1994	1995	1996	1997	1998	1999	2000
Total	58,118	47,774	49,925	47,895	44,583	45,614	46,438
Recycle	8,927	11,306	13.085	13,907	15,566	17,394	19,167
Final treatment	49,191	36,468	36,840	33,988	29,017	28,220	27,271
Generation per capita	1.33	1.07	1.11	1.05	0.96	0.97	0.98

Source : Korea Environmental Policy Bulletin, Volume-based Waste Fee System (2003)

Figure 5-1 | MSW Generation Per Capita

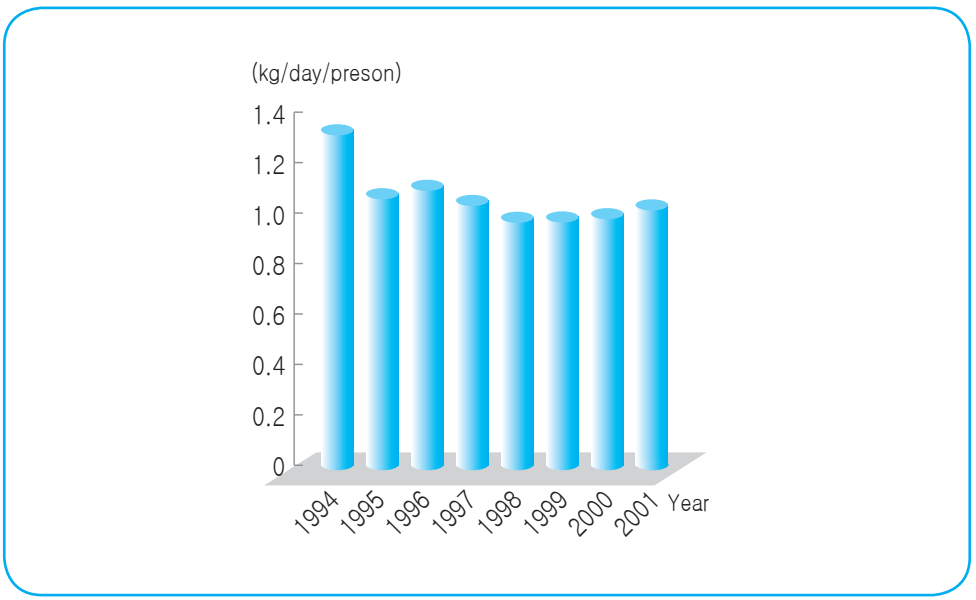
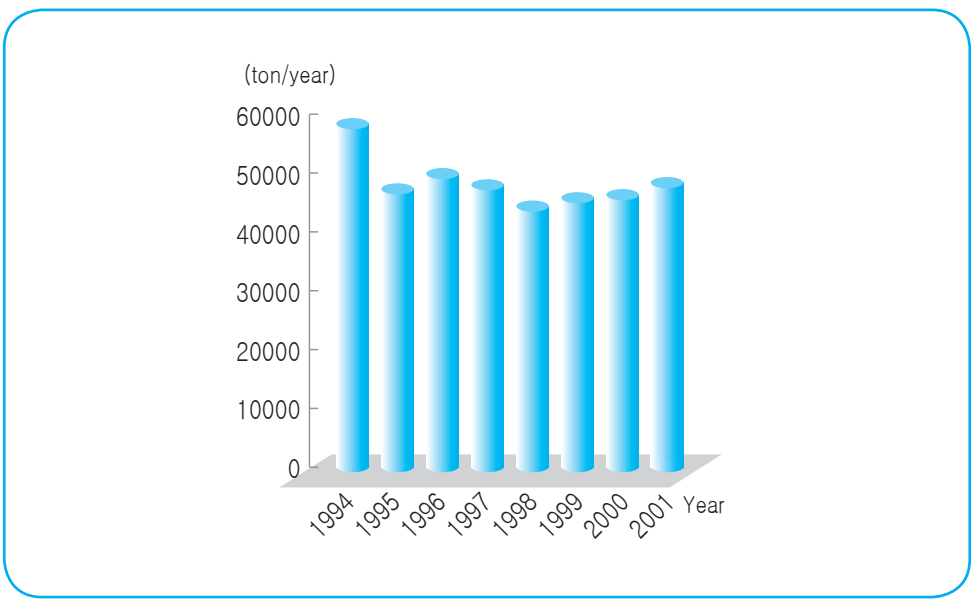


Figure 5-2 | MSW Generation Total

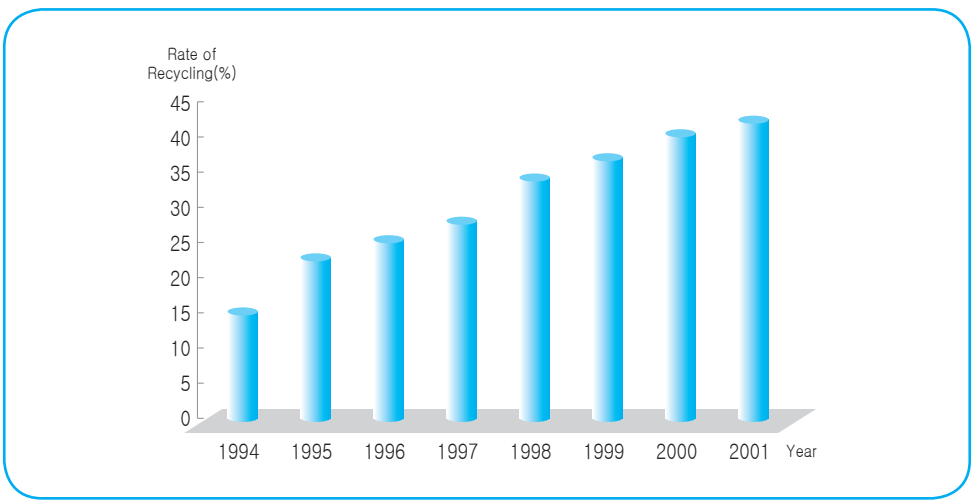


Source : Korea Environmental Policy Bulletin, Volume-based Waste Fee System(2003)

Discharged municipal waste decreased sharply after 1995 when the Volume-based Waste Fee System was implemented. For 6 years until 2000, the Volume-based Waste Fee System realized a decrease in generated waste by 37,720,000 tons (6,290,000 tons/year) and increase in discharged recyclable materials by 13,460,000 tons. Compared to the past (1994), generated waste decreased by 44.6%, recyclable materials increased by 114.7%, and generated waste per person decreased to 0.98kg day/person (See Table 5-1). The largest waste reduction was recorded in big cities, followed by small and medium-sized cities and rural areas.

1.1 Increase in Generated Waste and Increase in Recyclable Materials

Figure 5-3 | Trend of Recycling Rate by Year



Source : Korea Environmental Policy Bulletin, Volume-based Waste Fee System (2003)

Recycling ratios increased from 15.4 to 41.3% due to the increased recycling of food waste, etc., and landfill decreased drastically (See Figure 5-3). Quantity of recyclable waste was 8,927 ton/day in 1994 and increased to 11,306 ton/day in 1995 (27% increase). Recycling rate was 15.4 percent in 1994 and 23.7 percent in 1995. The quantity of recyclable waste generated has increased as much as 11,995 ton/day (134%) during the past 7 years. Food waste recycling has increased from 9.8 percent in 1997 to 56.8 percent in 2001 since the implementation of food waste separation requirement in 1997. The number of households that dump food waste into collection bins or plastic bags grew to 8.7 million (57%) in 2001. Recycling facilities were also expanded to process 5,347 tons of food waste per day.

1.2 Expansion of the Environmental Industry and Improvement of Public Awareness of the Environment

With the quantity of recyclables increasing drastically, and remaining stable thereafter, development of industries and technologies for recycling became increasingly visible. Collection of recyclable waste, including paper, cans, and plastic increased; and with this stable supply of recyclable resources, recycling businesses and better technologies grew and developed. The competitiveness of the recycling industry also improved. The development of hi-tech materials such as decomposable bag was realized, and there was a trend in manufacturers and distributors to change their production and sales systems to reduce wastes such as decrease of excessive packing.

1.3 Improvement of Public Awareness of the Environment

With the Volume-based Waste Fee System, people tried to reduce waste in their own life. A lifestyle to reduce waste was adopted, such as using shopping basket, reducing food waste, removing packing materials when purchasing, and reducing disposable materials. In addition, the repair of large furniture and home appliances and exchange of children's toys were revitalized.

The consciousness of consumers and producers alike, which had previously been economy focused, shifted to the reduction of wastes at sources. Consumers, by gaining the economic perception that throwing out wastes were like throwing out money, began to prefer products with less packaging, including "refill" products. When purchasing products, consumers increasingly eschewed packaging like styrofoam, and housewives increasingly used shopping baskets instead of vynil bags. Producers also greatly increased their production of refill products that reduced waste output, and made strong efforts to reduce volume in their packaging materials.

1.4 Other Effects

The financial independence of the cleaning administration increased from 14% in 1994 to 29.6% in 2000. As a result, it was possible to improve the cleaning service for people and secure funds to dispose of waste sanitarily. Civil servants related to cleaning works became enthusiastic and waste management administration was advanced thanks to the improvement of institutions for each local government to resolve the complaints of residents and enhance cleaning services.

Waste collection services, i.e. clean up administration, also showed improvements. The introduction of a Volume-based Waste Fee System changed the system from the previous resident unloading method to a door front system, resulting in enhanced convenience for residents. In particular, collection cycles of waste were diversified, while waste management administration was upgraded and modernized through diverse systemic improvements appropriate to the local governments, reducing resident inconvenience, and improving cleanup administration services.

Sights of community activities such as cleaning the neighborhood area, sweeping snow during the winter season, and picking up garbage in public parks and other community areas were slowly disappearing. Although there are many reasons behind the disappearance of such community activities, difficulty in throwing away garbage could have contributed. Therefore, in order to promote community activities in cleaning up their neighborhood, local governments can distribute VBWF bags at free of charge when cleaning public areas or plowing away snow at community areas.

2. Improvements

2.1 Bio-degradable Bags

Use of biodegradable bags is recommended to reduce adverse environmental impacts of the non-degradable polyvinyl bag. It is also recommended to use biodegradable vinyl in various packaging materials to reduce quantity of non-degradable polyvinyl wastes. A program to discount tipping fee for landfill to the municipalities, which use biodegradable VBWF bags is under consideration in order to expand the use of biodegradable bags.

2.2 Responsibility for Maintaining Cleanliness

Deserted garbage is often found in vacant lots in urban areas after introduction of the Volume-based Waste Fee System. In order to prevent the piling-up or throwing out of wastes in the neighborhoods of housing areas, responsibility for maintaining cleanliness was introduced in each city or town. Cases of piled up wastes left for a long period of time harm the atmosphere of a city, and ruin its sanitary conditions.

Under this scheme, mayor or the head of provincial and local government can issue an order to the owner of the land or premise to clean-up deserted waste or incinerated (burnt) waste. If the order is not complied within a month of issuance, the owner of the land can be fined for act of negligence.

This scheme was introduced through the article 7 of the Waste Management Act in 1999. The Act emphasizes the need for cleanliness of buildings and lands and mandates necessary actions to be undertaken if cleanliness is not maintained. After the enforcement of this scheme, many exemplary cases of improvement of vacant lots has been on the rise through such activities as growing of flowers or turning the vacant lot into a parking space.

2.3 Re-usable Bags

Even though free distribution of disposable vinyl bags at grocery stores has been restricted since 1999, about 15 billion sheets of vinyl bags are still being used every year. In order to further reduce the use of vinyl bags, re-usable VBWF bags were introduced in July 2002. Re-usable VBWF bags can be purchased at the grocery stores to carry the purchased

goods and later use it as regular VBWF bags when disposing garbage. The use of vinyl bag to carry purchased goods can thus be reduced. The re-usable VBWF bags are designed pleasantly with convenient hand straps for easy carrying (See Figure 5-4).

2.4 Separate Collection for Disposable Vinyl Bags

Disposable vinyl bags are being used in excessive amount and 5-15 sheets of vinyl bag are founded in a 20-liter size VBWF bag disposed by households. Since such over-use of vinyl bags harms stability of the landfill sites, a system has been established for separate collection of disposable vinyl bags. Vinyl bags are collected separately either for free of charge or for charge according to each community's circumstances.

Figure 5-4 | Introduction of Reusable Bag[18]

18 〈Translation of figure 53〉 Do you know reusable bag? You did not bring shopping basket? Then I recommend reusable bag instead! After shopping you can use bag as waste bag at your home!

3. Model Cases of Volume-based Waste Fee System

3.1 [Case 1] Dobong-gu, Seoul

Basically, the waste collection from apartment complexes made independently by residents while those living in ordinary residential area require district office to be actively involved in the collection and disposal of garbage.

3.1.1 Professional Collection System

Garbage collection team was organized in respective sub-districts, and 1 cleaning personnel and 1 driver were assigned for the duty of collecting recyclable waste on the road. The person in charge of waste management from office also joined them. In addition, they entered into a business relationship with recycling shops. Professional team members brought necessary equipment and collected recyclable materials nimbly and sold the recovered materials to the shops. The profitability was maximized and residents' involvement increased.

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3.1.2 Compensation for Recyclable Materials

The Volume-based Waste Fee System is a very inconvenient system from the perspective of residents although the system represents a right way of waste separation and collection. It does not make any sense if the recyclable materials-- which residents separated from trash with much effort and focus-- are to be offered free of charge while they are asked to bear inconvenience arising from the system. In Dobong-gu, separated waste could be exchanged for free toilet paper.

3.1.3 Separation of 5 types of Recyclable Waste

Recyclable waste is separated into 5 types (newspapers, scrap paper, milk cartons, bottles, metals). Collected waste could be sold at the recycling shops immediately upon collection by the authorities while increasing the convenience of residents at the same time.

3.1.4 Daily Collection Drive in One Single Zone

Not pursuing the one-size-fits-all approach to the waste collection based on sub-districts, flexibility was added to the collection process to ensure adjustment of collection methods and schedules, etc. In other words, they divided the entire sub-district into 5 zones and focused on the promotional drive and waste collection in 1 zone a day, not covering the whole zones at a time. They led the personnel not to collect improperly discharged garbage at the door and induced the residents to load the garbage bags onto the truck when they hear the logo music

3.1.5 Collection and Selling on the Same Day

As the recyclable materials were collected in the morning and sold in the afternoon, the recyclable waste selection yard became no longer necessary. The recovered recyclable materials are sold directly to the private recycling shops, not the public recycling companies, etc; hence, the profit were maximized and returned to the residents.

3.1.6 Implication

The key driver for the success was the active involvement of residents who were encouraged to do what they had to, high proceeds from the sale of recovered recyclable materials (by related administrative authorities), return of the proceeds to the residents, and effort to motivate residents' participation. The focus of promotional campaign to raise awareness of the public shifted from the perfunctory committee gathering toward the face-to-face encounter between public servants and housewives and intensive educational session hosted by the head of district office.

3.2 [Case 2] Namdong-gu, Incheon

3.2.1 Promotional Campaign to Raise Awareness of Residents

The Volume-based Waste Fee System Center was established to rectify the activities that fundamentally challenged the VBWF System and encourage spontaneous involvement of all residents in the district. To announce the direction for the operation of Volume-based Waste Fee System and encourage the involvement of residents, informative notices and letters were sent to all companies and entertainment-related business places within the district boundary. For promotion and education, a one-day school was offered to the residents to select recyclable materials in a yard heaped with recyclable waste. Additionally, middle school and high school students were invited to share the experience of discharging, collecting, and assorting the recyclable materials as part of voluntary service activities. Moreover, public servants, housewives, company workers, etc, also joined to build related experience.

3.2.2 Honorary Agent Appointment and Cracking Down on Illegal Dumping and Reward for Residents

Under the honorary agent system, honorary agents were appointed and teamed up with regular personnel cracking down on illegal dumping. This system reflects the understanding that illegal dumping cannot be irradiated by the effort of public servants alone, without the spontaneous involvement of residents in the monitoring process.

Honorary agents, who join in the endeavor to crack down illegal dumping of garbage, represent people from all walks of life, including those representing sub-districts, women's

society, senior citizens' organization, commercial districts, apartment residents, garbage plastic bag sellers. This honorary agent system has been instrumental in accomplishing successful results, like helping residents create and operate spontaneous monitoring system to curb illegal dumping. Along with that, illegal dumping report system was introduced. Civic complaints accepted at the Report Center were resolved after verifying the site, and KRW 30 million was given to the reporter as reward.

3.2.3 On-site Meeting

The on-site meeting was held to discuss problematic points, involving residents, administrative authorities, cleaning companies. The event reflected the understanding that simply removing illegally dumped garbage resulted in more areas being prone to illegal dumping. The meeting provided unique platform for exploring solutions to the problems that they were tackling based on the clear definition of roles and responsibilities among residents, administrative authorities and cleaning companies.

3.2.4 Illegal Dumping Caught by Unmanned Surveillance Camera

Particularly, unmanned surveillance cameras installed to observe beyond the limits of the human eyes were operated after 22:00, the time of the day that illegal discharge and collection of garbage occurred frequently and went unnoticed by the patrolling personnel.

The surveillance cameras were alternately installed over the period of 5 to 7 days at several areas prone to illegal dumping of garbage, and the recorded tapes were analyzed on the following day to identify illegal dumpers.

Besides, those in the surrounding neighborhood put up the sign saying "Unmanned surveillance cameras are watching you." Surprisingly, the vulnerable areas which had turned into garbage dumping ground began to restore to a clean state overnight. Our office was inundated with incoming phone calls from many parts of the country after our successful crackdown on illegal dumping was televised.

However, some residents filed complaint against us for reason that their privacy was infringed upon, and consequently, we had to deploy the personnel wholly assigned to the function of installing and operating the unmanned surveillance cameras. Now the camera set-up process is ruled by private information protection law and administration procedure law. As the cameras were installed at different location each time, there were some problems such as the inconvenience of having to transport the whole unit, time taken to analyze the video footage, leakage of the camera-related secrets which resulted in the cameras being vandalized by some residents.

The surveillance cameras were deployed to one more site and 20 more sub-districts in 1997 as the trial operation over the last 3 to 4 months were successful. These cameras are

state-of-art equipment providing the capability of infrared ray detection and featuring the time wrap function, sensors that are activated at the appearance of moving object.

Figure 5-5 | Surveillance Camera

Chapter 6

Suggestion for Developing Country for Introduction of VBWF System

1. Suggestion for Developing Country
2. Policies that Support VBWF System in Developing Countries

Suggestion for Developing Country for Introduction of VBWF System

After introduction of the VBWF System, Korea experienced improvement of collection service (door-to-door) and dramatic increase of recycling rate. However, there are some drawbacks too such as increase of administration cost and inconvenience of residents. Overall evaluation of the system is satisfactory until now. And VBWF is still in the process of development.

Even the best policies will fail if they are not properly implemented. In modern society, many policies are introduced to achieve a specific goal; however, they often fail in the implementation stage. To attain successful implementation of policy, the most important factors are rational policy and abundant resources for enforcement, as well as monitoring and supervision of the targets of the policy. Here are some suggestions for developing countries for successful implementation of VBWF System.

1. Suggestion for Developing Country

1.1 For Preparation

1.1.1 Careful Field Investigation

Collection of baseline data on waste management as a whole is important: waste characterization and quantification and to analyze future trends Identification of issues of concerns of Target: the stakeholders – financial, social, technical and environmental – which they consider as very important to be addressed while designing the VBWF System.

1.1.2 Fair Design for VBWF Implementation

There should be supplementary policy when implementing VBWF System as there can be many side effects. For this reason there should be a careful plan for implementation. For

example, waste separation should be at least 2 years ahead of time and public awareness program should be 1 or 2 years ahead of VBWF System implementation. First, the process should alter wide area local government for the sake of the cohesiveness of citizen's opinion. Second the government must use the schemes such as a public meeting to collect sufficient information and to take advantage of mass media, public contacts for citizens' participation and stakeholders. Communication is important in order to reflect citizens' opinion in site policy. Preliminary assessment should be reasonable in the favor of familiarity with technology, public health. It is also recommended to set up an arbitration organization responsible for actually coordinating the policy conflict between the citizens and the government.

1.1.3 Public-Private Progress Committee

Public ownership is the key of successful implementation. Participation of citizens in every step will enhance acceptance of the new system. Establishing public-private progress committee is one of good examples. The participation should go on after introduction to follow up the needs of local residence and modify the system in better way.

1.1.4 Operation of Related Environmental Policy Simultaneously

For example, supporting recycling industry, establishing harmful waste collection system, establishing community recycling center, Extended-Producer's Responsibility (EPR) system can enhance waste management quality as a whole.

1.1.5 Renovating Culture of Consumption

Waste generation is a matter of lifestyle and culture. Lavish spending became a social problem and waste problem is one of its effects. Making sound consumption culture and changing spending habit are necessary to solve the waste problem. The Modern trend-Competition and Emulation—should put more value on simple and spirit of sharing.

1.2 Necessary Element for Early-Stage of Implementation

1.2.1 Promotion and Monitoring

There should be promotion task force team and monitoring man power. This is a huge job so it cannot be wholly controlled by the central government. Like Korean experience, using NGO is a good idea.

1.2.2 Waste Separation System

Separate collection of waste is basic condition for implementing VBWF System. Separating recyclable material minimizes generation of waste itself from its source. Local

community should make their regulation and rules on separation items, operation guideline, making and distributing public awareness material, collector, collection method, collection period and so on. Preparing collection box and manpower for waste collection is also needed. The most important of all, there should be a supply and demand flow in recycled product market. At first it should be supported by government. Local government should figure out status of waste recycling companies (collection company, separation company, and recycling company). There should be administrative plan for waste collection, treatment and recycling and reporting responsibility preferably required by law. Waste separation system should be introduced at least one or two years ahead of Volume-based Waste Fee System.

For the active operation, separation mark system is helpful. For the packaging material Korea first introduced 12 kinds (aluminum, metal, glass, cartons, paper, HDPE, LDPE, PET, PP, PS, PVC, others). Later, Ministry of Environment simplified the 12 kinds into 5 kinds to support active participation of citizens. Aluminum and metal merged as "can," 7 kinds of synthetic material combined as "plastics".

1.2.3 Public Awareness Education

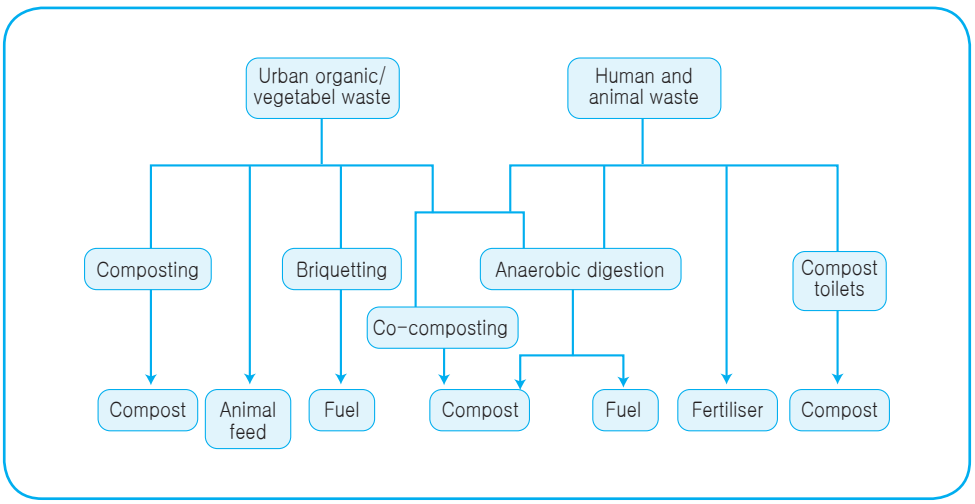
The key area for education is as follows;

- Fact on waste generation, transportation and treatment
- Government budget for waste management
- Positive effect of VBWF System
- Object, content, implementation of VBWF System
- Waste separation guideline
- Importance of cooperation of local residents

2. Policies that Support VBWF System in Developing Countries

Developing country has some characteristics such as high population of rural area, high portion of organic waste. Usually these countries lack proper waste treatment system. In Korea, rural area has small population and generate small amount of waste compare to city. For this reason, pile-up period and collection cycle are very long. And there is strong antipathy on purchasing waste-bag not only for economical reason but also because they can easily throw away waste or burn them without being seen. However, rural areas of developing country may not have the same problem if they have more population. Here we suggest policies for implementing and supporting successful VBWF System introduction and settlement in developing countries;

Figure 6-1 | Processes and Products from Organic Waste[19]



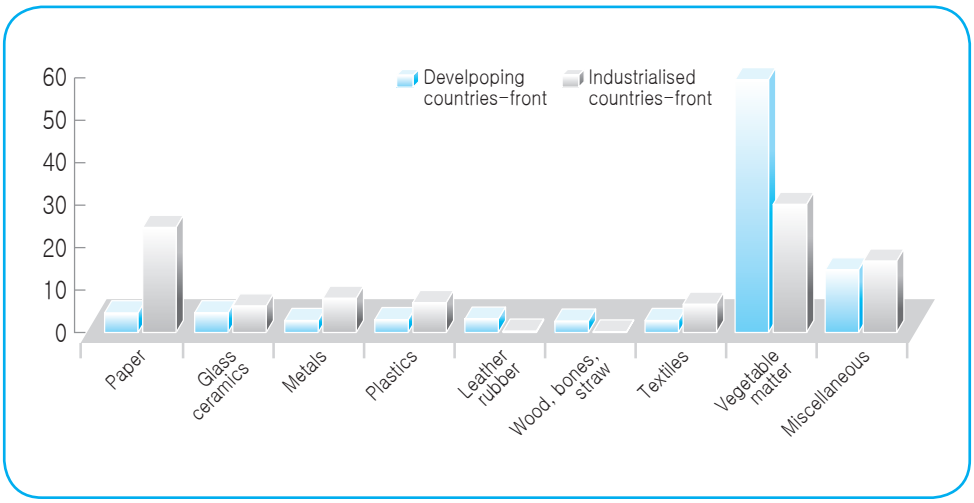
Organic waste is biodegradable and includes food waste that will smell foul if allowed to decay in the household, manure from livestock farms, and sewage sludge from the sewage treatment process. Organic waste can be used as animal feed, compost and bio-energy (See Figure 6-2). For instance, Conventional composting materials were mainly livestock waste, food processing waste, fishery waste, sawdust, and night soil. Garbage and sledge have been composted recently.[20]

Usually, organic waste occupies large portion in total waste generation in developing countries (See Figure 6-4). Therefore, when introduce VBWF System, it is important to take organic waste into consideration. Traditionally, in many developing countries there exists a whole sector of recyclers, scavengers and collectors, whose business is to salvage 'waste' material and reclaim it for further use. However, this tradition can be easily broken through fast urbanization, industrialization and increase of income. Where large quantities of waste are created, usually in the major cities, there are inadequate facilities for dealing with it, and much of this waste is either left to rot in the streets, or is collected and dumped on open land near the city limits. Thus, for the developing countries, differing levels of processing are required utilize organic waste as well as encouraging good current practice. [Figure 6-2] above shows some of the options in the form of a flow diagram.

19 Recycling organic waste, ttp://practicalaction.org

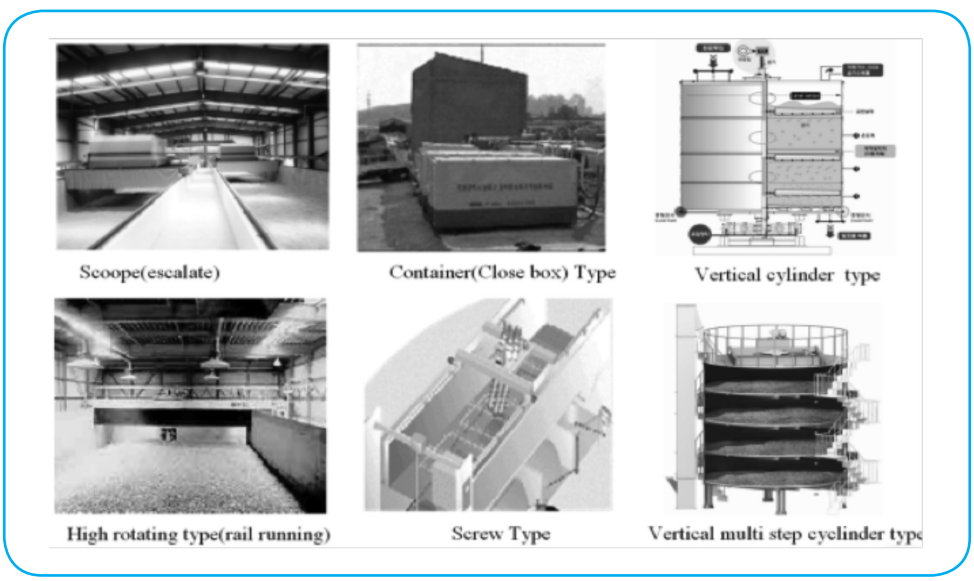
20 Hang-Sik Shin et al(1998), State and Prospects of Organic Waste Composting in Korea, Journal of KOWREC Vol.6 No.2

Figure 6-2 | Composition of Municipal Waste in a Typical Developing and industrialized Country



Source : Practicalaction.org

Figure 6-3 | Composting Facilities



To utilize organic waste, it should first be separated from its source. Waste collection and disposal is often seen as being the responsibility of the government or municipality. In many countries, collection and separation of waste is considered too time consuming because of the content of the waste, often a mixture of organic and non-organic substances, such as

plastic film. For better recycle practice, it has been noted that it is of great help if the organic and non-organic waste is separated at source. Many successful schemes are only successful because of community participation in the activities on a day-to-day basis.

Secondly, organic waste to energy technology should reflect a country's own circumstances. In Korea, with a view to promote food waste-to-energy systems, 144.8 billion won was provided to 248 places to install food waste-to-energy facilities and purchasing automobiles by the end of 2008. In addition, among recycling industry promotion fund, 731 billion won had been offered to 2,013 places for developing waste-to-energy technology and installing facilities [Figure 6-3]. However, for developing country, in many cases, the municipality is unable to build and maintain facility due to financial constraints, lack of will or lack of organizational skills. And without proper technology, it could be a loss of energy and even produce second-hand contamination. Therefore, different levels of approaches are required to utilize organic waste according to circumstance. On one side, localized technology for organic waste should be developed and on the other side, organic waste recycling should go on to match the situation. For example, a pilot project being implemented by the Colombo Municipal Council uses organic waste from local city vegetable markets to produce bio-gas and compost. In Bangladeshi, NGO Dushtha Shasthya Kendra (DSK; it means Social Welfare Organization) introduced barrel composting to Vasantek, Dhaka's biggest slum.[21]

Figure 6-4 | Compost from Organic Waste

21 http://www.fyse.org/2009/04/garbage-turns-into-gold-in-bangladesh/

2.2 Village-level VBWF System for Rural Areas

2.2.1 Waste Collection in Farming Region

In rural areas, houses are scattered and thus burning or disposing waste without using the trash bags is often found. Village-level Volume-Based Waste Fee System was introduced in July 2002 to effectively deal with waste management and to prevent illegal behavior in rural areas. The main purpose of this system is to prevent illegal burning and dumping in rural areas where it is difficult to monitor. However, Village-level Volume-based Waste Fee System must apply to the least possible number of farming villages to avoid undermining the principle of current Volume-based Waste Fee System. Waste vinyl, waste agricultural chemical containers, etc, which are generated in farming communities, besides municipal wastes continue to be subject to the regulation requiring the separation and collection of waste and recyclable materials to be undertaken by private sector firms under the contract entered into with Korea Environment Corporation.

2.2.2 Volume-based Waste Fee System based on Village

a. Guideline

Village-level Volume-based Waste Fee System refers to the system that levies the disposal expenses of aggregate waste according to their volumes in farming or fishing village-where garbage is not discharged and collected separately-- instead of purchasing standard VBWF bags.

Table 6-1 | Village level VBWF System progress

〈 Local residents 〉		〈 Local government 〉		
Site selection	Promotion	Collection container	Collection transportation	Waste fee collection

b. System and procedure for implementation

Implementation of Village-level Volume-based Waste Fee System starts from organizing a committee that consists of village leaders, such as head of village, chairwoman of women's society, chairman of youth group. Such committee must provide a platform for discussing a wide range of matters, including the selection of location for placing waste receptacles (approval for the use of land), appointment of acting manager (village leader, the person in charge of managing the village fund), frequency of collection, procedure and method for charging for the collection, transport, treatment of waste etc.

In order to prevent illegal dumping, supervisors for waste collection need to be designated and self-monitoring system should be operated. The committee must appoint the manager

who will carry out various duties, like informing the residents of the designated disposal location, method of garbage discharge, requesting the residents for cooperation, helping residents be acquainted with the method of discharging garbage by means of printed materials or on-air announcements. In addition, the committee must organize independent monitoring team responsible for clamping down on illegal burning or disposal of garbage.

c. Establishment of system for collecting municipal waste and recyclables

Local residents group select site for the waste collection and promote the system. Local government collects and transport waste and impose waste fee (Table 23). The location of waste receptacles must be determined in view of the population, waste discharge amount, type of garbage collection vehicle, installation place, storage type. Basically, 4 different types of recycling containers (for cans, scrap metals, plastics, glass bottles, paper) must be placed at the disposal site.

In selecting the recycling containers, various types, such as plastic container type, net type, hanging type garbage bag must be compared with one another, and it must be easy to maintain and convenient for garbage collection. The frequency of collecting and transporting the garbage and recyclable waste must be determined by considering the waste generation amount, type of containers, number of cars owned by villagers, and other factors. Garbage collection must be made more than twice a month while the collection of recyclable waste must be made at least once a month (See Table 22). Large-sized waste must be disposed of as prescribed in the enforcement regulations of autonomous governments or based on the fee.

Table 6-2 | Collection system of Village-level VBWF System

Waste separation	Collection box	Collection and transportation	Waste fee payment
Waste	Waste Box	2 times per month	Fee payment
Recyclable	Separation container for each items	1 times per month	Profit from sales and subsidy

It is desirable that garbage and recyclable waste collection under the village-level Volume-based Waste Fee System should be directly carried out by local governments in villages that have inadequate infrastructure for collecting large amount of garbage (broad area, poor road condition). The waste collection can be entrusted to a third party in the regions where the cleaning works are currently undertaken by private sector firms or the regions in which the collection works cannot be contracted out to private sector companies due to regional circumstances.

d. Imposition of fee for the collection, transport, treatment of garbage

The charge for the collection, transport, and treatment of garbage under the Village-level Volume-based Waste Fee System must be determined by taking the following measures into comparison and consideration:

First, variable rate can be levied by estimating the cost per ton based on amount of the garbage collected. Second, a fixed rate can be charged to each village based on the estimated amount of garbage per person. The variable rate based on the garbage collected is computed using the same standard as the one used for estimating the price of plastic bags stipulated under the current Volume-based Waste Fee System. The fixed rate based on the garbage per person is computed by this formula;

[garbage per person (kg) X number of household X number of household members in village X fee amount / kg)].

The charge for the collection, transport, and treatment of garbage is collected by the following methods:

First, the total amount of fee can be charged to the representative of village (the manager of village fund) and disbursed directly from village fund; or Second, the total amount of fee is made chargeable to and payable by the representative of village who is later reimbursed from the residents; or Third, local government divides the total fee by the number of household in village based on the garbage collection amount, so that the fee can be paid by respective household upon receipt of bill. The Ministry of Environment suggests in the guideline that the first option above should be effective in light of the correlation between the cost of garbage treatment and the payment of the proceeds from the sale of recyclable waste. The waste fee is levied on the whole community and the payment is made through the village fund. Later, each household is charged on an average rate. Profit from sales of recyclables can be deposited to village fund to be used for the waste treatment fee. If necessary, government subsidy can support the system.

2.2.3 Enforcement and Appropriate Measures to Manage Waste in Farming/Fishing Villages

To ensure effective collection of garbage in rural communities, the focus must be placed on presenting the methods, which are easy for residents to learn and apply, based on the operation of appropriate collection site, dissemination of knowledge related to the garbage discharge, use of collection calendar, etc, in view of the realities facing the fast aging rural communities. Specifically, displaying the methods for garbage discharge and collection calendar, etc, at the collection site will help increase awareness and perception toward garbage collection, rather than handing out the leaflets once. As the collection cannot be performed daily, it is necessary to check the amount of garbage and diversify the collection cycle in such a way suited to the specific realities of local governments.

Kim, Duk-young (2010), 「Research on household waste management policy improvement」, Administration graduate school of Jeon-nam Univ

Kim, Kwang-yim, "Effect of Waste Price on Waste Generation and Policy Recommendation", 「Environment forum」, Korea Environment Institute, 2002

Park, June-Woo (2007), 3R policies of korea

Huh, Suk (2007), A Study on the Citizen's Opposition to Public Policy Making : A Case Analysis on the Waste Treatment Facilities in Korea, Kon-kuk Univ

Seoul Development institute(1994), conptual Framwork for solid waste management planning in Seoul with emphasis on the quantity based charge

Korea Environment Institute(1998), 「Evaluation and Enhancement of Volume-based Waste Fee System」

Ministry of Environment, 「2001 National Survey on Waste Statistics」, 2000~2004.

Ministry of Environment, 「Environmental White Book」, 1995~2004.

Ministry of Environment, 「Fifty years of Korean environment」, 1996

Ministry of Environment, 「Some success strories of Korean Environmental policies, Waste reduction and recycling」, 1995~2004.

Ministry of Environment(1995), 「Volume-based Waste Fee System evaluation for 100 days」, 1995~2004.

Ministry of Environment(1995) 0, 「Volume-based Waste Fee System discussion」

Ministry of Environment(1995), Environmental white book

Ministry of Environment(1995), 「Statistics on Volume-based Waste Fee System」

Ministry of Environment, 「The first year performance of VBWF System」

Ministry of Environment, Some success stories of Korean Environmental Policies Waste Reduction and Recycling

Ministry of Environment (2005), Korea's 3R policy

Website

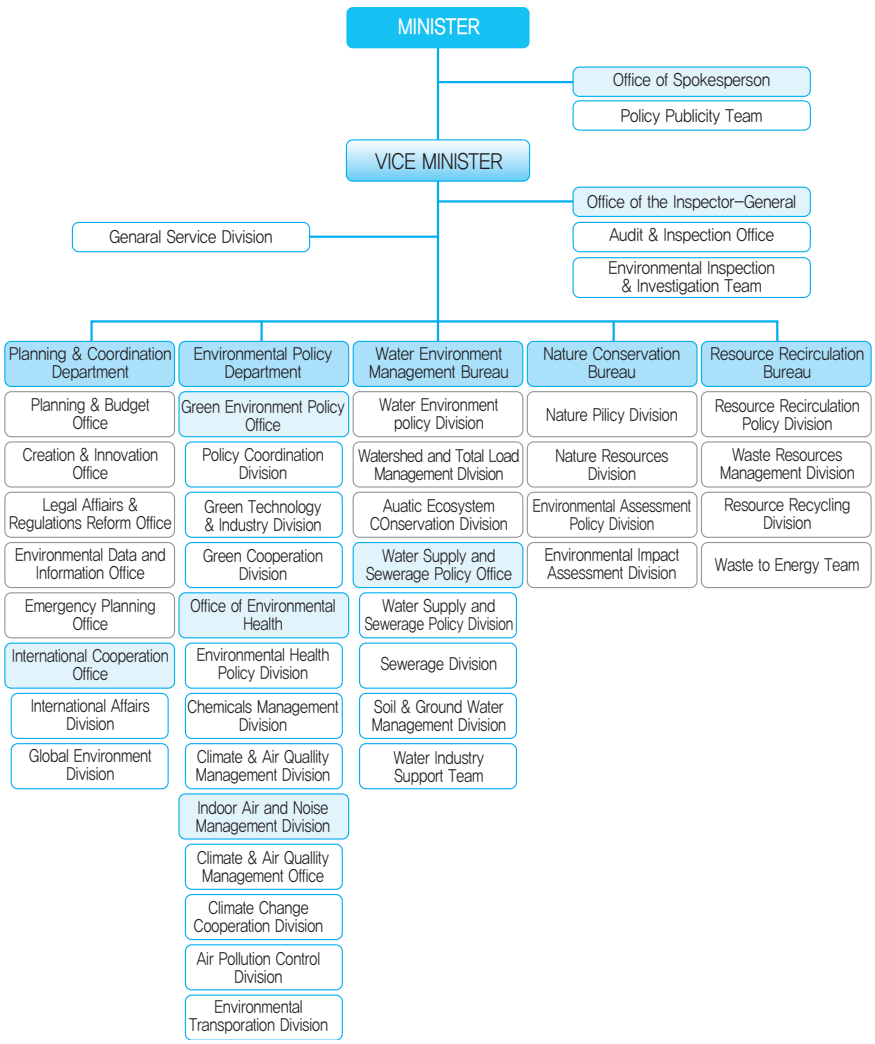
www.koica.go.kr ODA&KOICA, history

http://eng.me.go.kr/content.do?method=moveContent&menuCode=pol_rec&categoryCode=05 Major Policy-Waste&Recycling

1. Modification of Environment Law

1960 (6 Acts)	1970~1980 (9 Acts)	1990~2008 (46 Acts)		
		Current Status	Enacted Date	Revised Date
Waste Cleaning Act (enacted on Dec. 30, 1961)	Waste Control Act	Wastes Control Act	Dec. 31, 1986	Apr. 11, 2007
		Act on the Disposal of Sewage, Excreta&Livestock Wastewater (annulled on Sep. 28, 2007)	Mar. 8, 1991	-
		Act on the Management and Use of Livestock Manure (jointly enacted)	Sep. 27, 2006	Sept. 28, 2007 (Effective Date)
		Act on the Promotion of Saving and Recycling of Resources	Dec. 8, 1992	May 11. 2007
		Act on Resource Recycling of Electrical and Electronic Equipment and Vehicles (jointly enacted)	Apr. 27, 2007	Jan. 1, 2008 (Effective Date)
		Act on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal	Dec. 8, 1992	May 17. 2007
		Act on the Promotion of Construction Waste Recycling	Dec. 31, 2003	Dec. 28, 2006
		Promotion of Installation of Waste Disposal Facilities and Assistance, etc. to Adjacent Areas Act	Jan. 5, 1995	Jan. 3, 2007
		Sudokwon Landfill Site Management Corporation Act	Jan. 21, 2000	Jan. 21, 2000
	Compound Waste Treatment Corporation Act (enacted on Dec. 28, 1979)	Korea Environment&Resources Corporation Act	Dec. 27, 1993	Dec. 30, 2003

2. Ministry of Environment in Korea



3. Main Contents of VBWF System Guideline (2003)

1) Waste bag

① Types of waste bag:

- General type: 3, 5, 10, 20, 30, 50,75,100 liter.
- Public type: 20, 50, 100 liter.
- Food waste bag: 1,2,3,5 liter.
- Disposable plastic bag : 3, 5 liter.

① Material and standard of waste bag

- Select types of waste bag in consideration of kind of waste treatment facility, convenience of residents
- Decide standard size and type to maintain environmental suitability

① Biodegradable waste bag

- Introduce at the municipality where separates disposable plastic bag and film type packaging according to EPR.
- Use this bag for compostable food waste bag, non-sanitary landfill
- Should use this bag with environmental mark.

① Color of waste bag

- Differentiate color of general waste bag and color of public waste bag in order to prevent misuse of those bags. General waste bag – white color, public bag – light blue color. Color of public waste bag should be the same nationwide.

□ Make food waste bag transparent so that identify mix of un-recyclable food waste and to induce less generation of food waste.

1) Matters on waste fee

① Principle

- Charge waste collection, transportation and treatment cost on waste discharger considering characteristics of discharger, collection and treatment system of municipality.
- Charge collection and treatment cost of construction site waste, large size waste on its generator.
- Charge collection and transportation cost only excluding treatment cost on the waste electronics (EPR), which manufacturer pays treatment cost.
- Collection cost includes labor cost, operating cost, general management cost.
- Treatment cost include Landfill fee, consignment fee.

② Ratio of burden that resident bears

- Prepare calculation standard on the level of fee that resident bears – rate of fee
- Ratio of fee burden (%) = (waste bag sales revenue/ total cost of coll. Tran.& treatment) x 100
- Total cost includes real expenditure that was paid to coll. Trans. and treat waste using waste bag only; exclude cost related to public waste bag, recyclable waste.
- Sales price of waste bag = total cost per liter x volume of waste bag (liter) x ratio of resident burden

③ Increase self-support ratio of cleaning budget and waste bag price

- Municipality should evaluate self-support ratio of cleaning budget
- Higher local government should receive evaluation result and advise improvement in case of unsatisfactory result.

1) Manufacture and quality control of waste bag

① Printing on waste bag

- Minimize wordings printed on waste bag and make it simple
- Print the name of municipality, volume and material, usage of bag and how to use bag

① Examination of waste bag

- Clearly state on the matter about prohibiting illegal outflow of waste bag from the private manufacturer on the contract.
- Retrieve (bring) original printing plate of waste bag
- Examine size and quantity of waste bag and request citified institution accurate analysis when purchase the waste bag.
- For detailed information about method of examination, see “standard on selection and decision of waste bag for examination.

③ Quality control of waste bag

- Collect and examine waste bag that is on sale at store in order to monitor quality
- Request analysis of waste bag on sale to certified institution when there is a lot of civil appeal and problem with material.

① Supply and Sale of waste bag

- Supply of waste bag can be direct sale by municipality directly, consignment sale by banking agency, cleaning business and private store.
- Monitor municipality officer not to handle cash directly.
- Designate waste bag sale store for resident to buy easily.
- Refund unused waste bag cash when resident moves to other city.
- Restrain use of disposable vinyl bag

1) Reduction of fee to low income family

- Provide free 60 liter waste bags /month/person to the low income citizens.
- Possible to reduce fee for poor merchant at traditional market

1) Matters on discharging waste

① Waste that Volume-based Waste Fee System applies: discharge in a waste bag; food waste should be discharged in a way of promoting recycling

① Waste that Volume-based Waste Fee System does not apply:

- Coal briquette should be discharged at specified site and regular collection date for free.
- Recyclable waste should be discharged according to the guideline that is decided by municipality ordinance.

① Waste that is hard to fill into waste bag

- Should be discharged using separate PP sack or gunny bag
- Classify into large waste and put sticker on to the large size waste

① Discharging time

- Discharging time is decided by municipality according to its condition. Recommend to discharge waste after sunset – before sunrise as possible.

① Waste that is hard to fill into waste bag

- Should be discharged using separate PP sack or gunny bag
- Classify into large waste and put sticker on to the large size waste

① Discharging time

- Discharging time is decided by municipality according to its condition. Recommend to discharge waste after sunset – before sunrise as possible.

② Waste at farming and fishing villages

① Village level collective waste collection system

- Collect waste collectively in a whole village and divide total cost according to quantity of waste collected.
- Introduction of this system should be confined to the county that is vulnerable to waste collection.
- As for agricultural waste vinyl, pesticide waste bottle and recyclables, municipality should establish separate collection system.
- Waste lubricating oil from farm machinery should be collected separately and transported to farm machinery repairing center, or recycling center.
- Designate 1st Saturday of month as cleaning date,
- Provide free collection service to the area which is difficult to enforce village level system.

4. Sales of VBWF Bags [Sales trend nationwide]

(unit : 1000 sheets)

Region \ Year	1995	1996	1997	1998	1999	2000	2001	Change (%)
Seoul	434,816	325,634	293,670	244,478	249,352	270,881	278,980	-35.8
Busan	131,226	97,360	91,235	66,583	60,166	64,668	60,571	-51.6
Daegu	87,865	68,875	67,691	41,422	47,748	45,108	43,464	-50.5
Incheon	96,806	70,411	60,739	45,529	48,650	50,785	47,707	-50.7
Gwangju	46,222	40,096	31,685	25,328	25,055	26,206	24,155	-47.7
Daejeon	55,769	39,285	36,076	29,224	38,239	28,782	30,239	-45.8
Ulsan	-	-	24,716	21,506	23,291	24,099	25,329	-
Gyeonggi-do	283,715	221,387	223,890	204,673	201,202	217,234	211,335	-25.5
Gangwon-do	47,845	35,909	28,478	24,163	25,987	25,752	28,858	-39.7
Chugcheong buk-do	33,699	26,652	26,701	23,283	24,352	24,699	24,658	-26.8
Chungcheong man-do	37,385	28,950	28,778	24,047	29,987	30,494	29,194	-21.9
Jeolla buk-do	51,115	32,083	31,366	25,726	27,613	21,933	30,074	-41.2
Jeolla nam-do	52,251	38,559	34,516	29,235	29,507	33,516	31,113	-40.5
Gueongsang buk-do	81,299	59,968	50,298	43,461	48,226	43,359	46,758	-42.5
Gueongsang nam-do	114,872	97,022	65,945	55,557	56,274	63,620	59,870	-47.9
Jeju-do	35,079	9,579	10,056	9,129	9,832	10,349	11,466	-67.3
Total	1589964	1192770	1095841	913,344	945,481	981,485	988,770	-37.8

Source : Korea Environmental Policy Bulletin(2003) Volume-based Waste Fee System

[Large and small size VBWF Bag Sales in Major cities of Korea (2001)]

	5ℓ (a)	10ℓ (b)	20ℓ (c)	50ℓ (d)	100ℓ (e)	Small size bag, %	large size bag, %
Seoul	11,976	76,772	105,159	30,689	28,885	76.5	23.5
Busan	8,333	26,509	14,912	3,180	767	92.7	7.3
Daegu	1,667	14,783	15,250	4,255	1,952	83.6	16.4
Incheon	1,517	15,830	21,319	5,733	2,123	83.1	16.9
Gwangju	1,244	8,483	8,482	3,005	1,360	80.7	19.3
Daejeon	2,660	10,186	12,414	5,070	3,160	75.4	24.6
Ulsan	888	7,545	7,658	3,551	1,450	76.3	23.7
National Total	68,475	297,419	375,502	125,987	98,988	76.7	23.3

Source : Korea Environmental Policy Bulletin(2003) Volume-based Waste Fee System

5. Recyclable Waste Items and Disposal Guidelines

Classification	Items	Guide for disposal
1. Paper	- Newspaper	- dry newspaper (wet paper not accepted) - unfold straight, pile up neatly and tie it with string - avoid being mixed with advertisement pamphlets with vinyl coating, vinyl bags and other objects
	- book, note, paper shopping bag, calendar, packaging	- remove cover page with vinyl coating, springs for notebooks - avoid being mixed with plastic packages
	- paper cups and containers	- empty the cup, wash in water and press and tie together
	- box (cookies, packaging, others)	- remove vinyl coating - remove tape, staple attached to the box, press and tie for easy transport.
2. Cans	- steel can, aluminum can (drink, food)	- empty and wash with water, press if possible - remove plastic cap or plastics attached - dispose in bags (vinyl bags accepted)
	- other can (butan gas, pesticide container)	- remove contents by making a hole in the container
3. Bottles	- potable water bottle, other bottle	- remove cap and empty, wash - not acceptable if other substances such as cigarette butts are contained - beer and soju (korean spirit) bottle can be sold at grocery stores
4. Metal	- nonferrous metal (nickel silver, styrene, electric wire)	- same as above
5. Plastics	Extended Polyestyrene	- remove other substances, detach labels completely and dispose in clear plastic bags - for fruit and fish box, empty remainder and wash it with water - according to the MoE directive on reducing styro-foams for electronic products packaging (1995), producers have the responsibility to reduce and recover these materials

Classification	Items	Guide for disposal
PETE	1	- Drink bottle (coke, soda, juice), water bottle, soy sauce bottle, oil bottle
HDPE	2	- Water bottle, shampoo and detergent container, white rice wine bottle
V	3	- mainly used in industries, very few found among household waste
LDPE	4	- milk bottle, rice wine bottle
PP	5	- boxes (beer, coke, soju), garbage can, dustpan, water basket
PS	6	- yogurt bottle, shawa bottle

6. Organic waste in Korea (2006)

classification	type		volume	Sources (year)
Organic wastes	Total		75,499,006	
	Food wastes		4,736,496	Municipal waste data, MOE (2006)
	Sewage sludge		2,560,959	Sewage data, MOE (2006)
	Wastewater sludge		4,198,303	Disposal data, MOE (2006)
	Human excreta	Excreta	1,454.2	Sewage, excreta and livestock wastewater treatment data, MOE (2000~2003) Sewage data (2004, 2005)
		Septage	16,246.5	
		Subtotal	17,700.7	
	Livestock excreta	Feces	20,620,460	Sewage&livestock wastewater treatment data (1999~2002)
		Urine	13,447,728	
		Wash water	16,140,034	
		Subtotal	50,208,222	
	Plant&animal remnant		908,558	Industrial general waste data, MOE (2006)
Waste wood	Forest site waste wood		354,051	Forestry Administration
	Disposed waste wood		2,666,727	MOE data

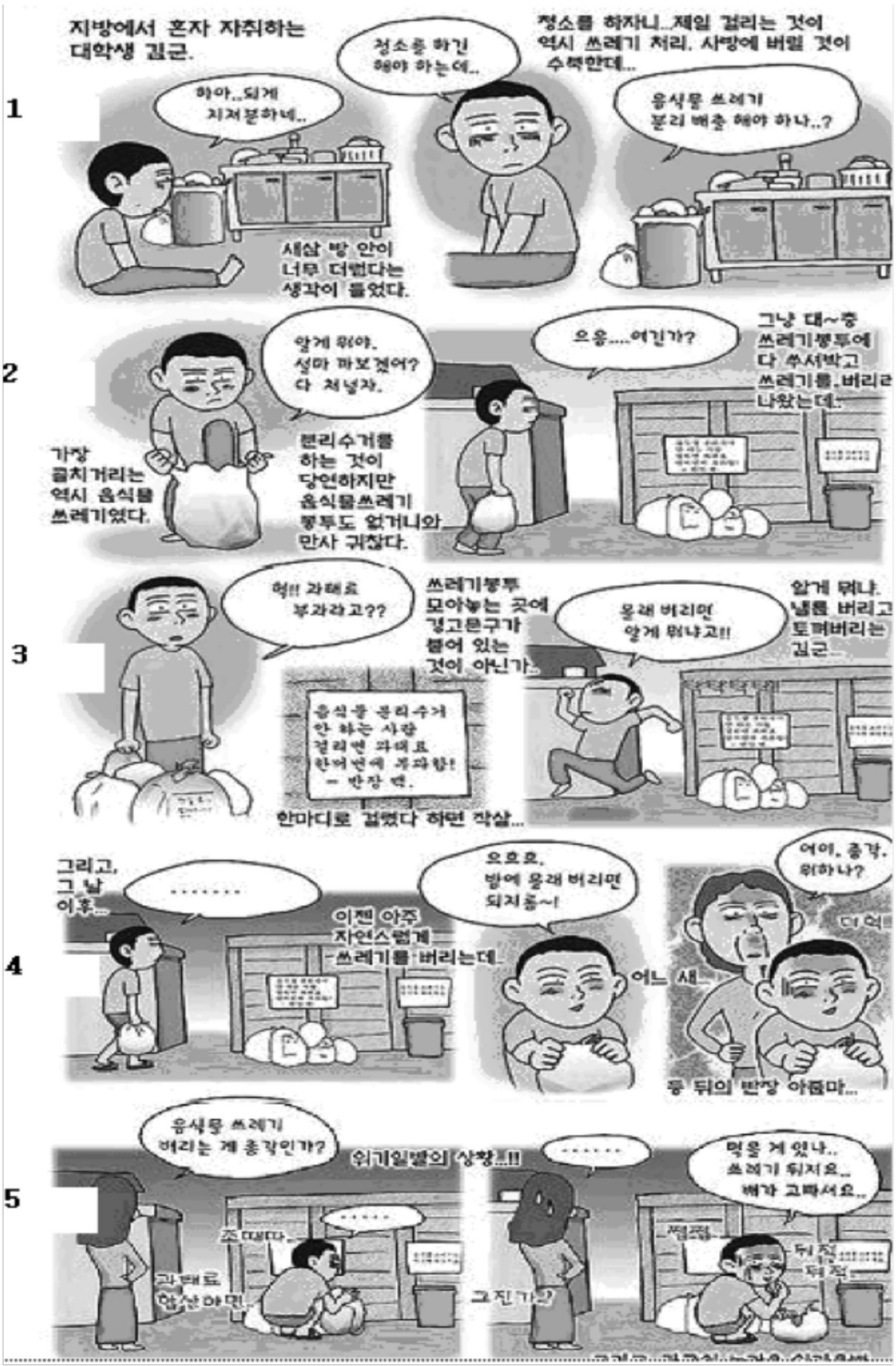
7. Korean Administrative Units

Larger Administration Unit	Lower Administration Units
Metropolitan Cities (Seoul, Busan, etc.)	gu→dong
Provinces (Gyeonggi, Gangwon, etc.)	city→gu→dong gun→myun/eup→li

Note : There are 16 larger administration units or districts in Korea. (7 metropolitan cities including Seoul and 9 provinces)

Administrative Map of Korea

8. Education material for Waste separation (Comic)



<Translation> A: student B: neighborhood association leader.

1.

K is college student who live alone apart from his family.

K: 'Ha…The room is messy'
He suddenly feels that his room is too dirty.

K: I need to clean up.
He tries to clean the room and discarding waste is the first thing he should do.

K: Food waste..Do I have to separate?

2.

The most annoying thing is food waste.

K: Who will know? And who will rummage my waste bag. Let's put it together'
He knows he should separate the waste but he is out of food waste bag anyway.

K: It this is the place?
He put all the waste together in the bag and goes outside to discard the bag.

3.

K: Huh? a fine?
He found notice that the person who will not separate the food waste will be fined.

K: Who will know if I discard it in secret!

K quickly makes a run after he discard his waste bag

4.

And one day...

Now his is used to discard the waste without separation.

K: Shhh. Since it is night time, nobody will know!

B: What are you doing young man?
There he found representative of his district behinds his back.

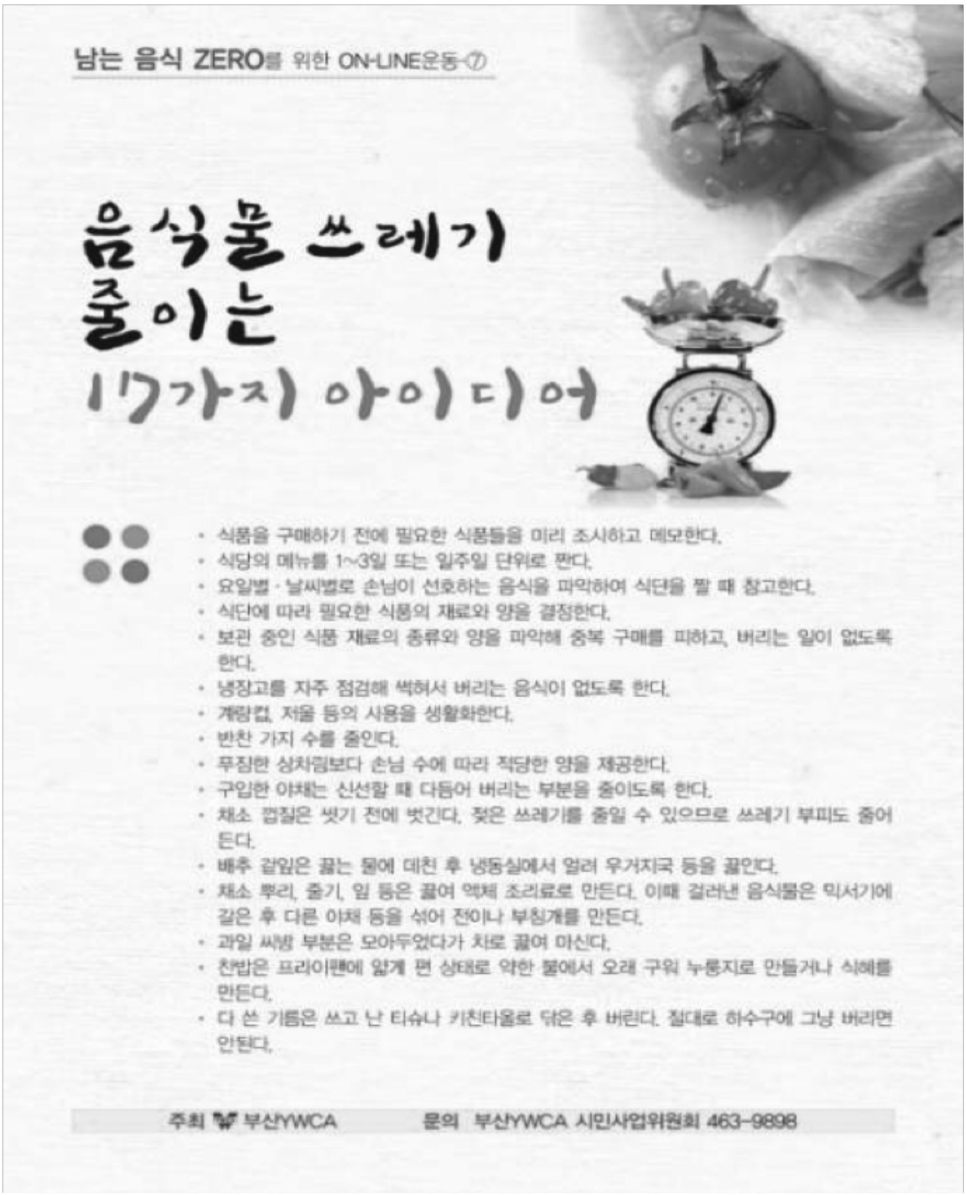
5.

B: Was it you who always throw away food waste in here?
Critical moment! The fine will be enormous when added up.

K: I was rummaging waste to search something to eat. I was hungry.

B think K is probably beggar. (K is pretended to be a beggar to avoid fine that he has to pay)

9. Promotion for Reducing Food Waste



<Translation>

The ideas of reduce Food waste

Make a list before you purchase food.

Make menu in 1-3 days or 1 week term.

Make a reference of menu according to preference and weather etc.

Make a decision ahead about what to buy and how much you buy before purchase.

Check remaining food before you purchase before it goes bad.

Regularly check refrigerator.

Make use of scale and measuring cups.

Reduce the number of side dish.

Avoid prepare too much food.

(Traditionally Korean prepare abundant food to treat guest)

Cut or chop vegetable as soon as possible in order to reduce waste.

Peel the vegetable before you wash in order to prevent wet waste.

Make use of outer part of Chinese cabbage as frozen preserved food in traditional way.

Make liquid vegetable seasoning by boiling leftover vegetable.

Make tea using ovary of fruit.

Make food with leftover of cooked rice such as sik-hye (Korean traditional sweet drink made with fermented rice).

Never discard used oil to drainage directly. Always using paper towel to clean used oil.

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