

The state of Act and Policy for Recycling of Construction Industry Wastes

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In Korea, because of the shortage of reclaimed lands and disposal sites and the small size of national land, A political measure for construction wastes recycling is needed. therefore we studied the current state of construction wastes recycling and the act for it. And we analyzed problems and unreasonable regulations regarding the wastes. So we suggested an alternative act to increase the construction wastes recycling.

1. Introduction

The current disposal of solid wastes, produced in construction sites, usually, has been relied on a landfill up to now. However the disposal is becoming more difficult for the shortage of the disposal sites and the enhanced disposal regulation and obstacles for building a new disposal site. Moreover the domestic construction wastes have been of illegal landfill, dumping, and incineration since both costs of the waste disposal and costs for the waste transport for the landfill are enormous. The illegal disposal causes environmental pollution.

It is assumed that the annual construction wastes amounts are approximately 20 million tons currently and will be twice of the current amounts in the future. And yet, only few amounts of the domestic construction wastes are recycled due to the lack of technology which includes the method of collection, production of recycled materials and equipments. Furthermore, as the demand of the natural aggregates for the investment of infrastructure has increased, the supply of the domestic natural aggregate has decreased.

In order to reserve our natural resources, the construction wastes have to be reused as an alternative material. For example, natural aggregate will be used up within 10 years due to the great amount of consumption in Korea.

This paper will discuss the current construction wastes recycling and acts for it, and analyze problems and unreasonable regulations regarding the wastes. This paper also will suggest an alternative act to increase the construction wastes recycling.

2. The present construction wastes recycling state and the policy

2.1 The generation of construction wastes and the present wastes recycling state

The yearly construction wastes were generated 22,711 thousand tons in 1999. Most of the wastes were composed of waste concrete (64%), waste asphalt concrete (15%), and soil and sand (8%). The rest of the wastes were waste wood (3%), waste fibrous materials (2%), waste metal (1%) and waste paper (1%). Compared to the waste fibrous materials, wood, and metals, portion of the waste concrete and asphalt concrete were radically increased.

According to the disposal method (table2) the landfill occupied 20.4% and the incineration 3.1% and recycling 76.5% in 1997. The landfill ratio is decreased 27.0% more in 1998 than in 1997 and the recycling ratio is increased 8.2% more in 1998 than in 1997. And also, the landfill ratio is increased 49.0% more in 1999 than in 1998 and the recycling ratio is increased 27.2% more in 1999 than in 1998.

Over 80% of these wastes were recycled as banking materials or covering materials and the rest of the wastes were disposed of as a filler or incinerated. Besides, recycling of the base layer of road construction and recycled concrete aggregate, which is high value added is surpassingly unsatisfied.

2.2 The current construction waste policy and regulation

In 1986, for the unitary system of the waste management, The Ministry of Environment established "Waste Management Act", which was combined with rules related to the wastes (excrement, garbage and industry waste) in Waste Clean Act and The Environment Preservation Act. After the completion of the unitary system, the established Waste Management Act was subdivided and specialized for the activation of recycling and acceleration of waste treatment facilities. However for the sake of the construction waste recycling, government has suggested an alternative plan through reestablishing the related act since 1990.

Table 1 The state of construction wastes generation

(Sources : The Ministry of Environment)

(Unit : 1000ton/year)

Const- ituent year	Total	The non-inert materials					The inert materials								
		Sub- total	Paper	Wood	Fibrous Material	etc.	Sub- Total	Construction Wastes					Metal	Glass	etc.
								Total	Soil & Sang	Concrete	Asphalt Concrete	etc.			
1996	10,375	1,092	199	388	304	200	9,283	8,606	1,443	5,468	1,240	454	427	70	181
1997	17,439	1,384	166	675	296	247	16,055	15,447	2,551	9,296	2,733	866	262	58	287
1998	17,408	1,149	127	565	239	218	16,259	15,492	1,782	10,280	2,871	559	299	46	422
1999	22,711	2,237	224	753	353	285	21,096	20,517	1,725	14,534	3,401	1,040	241	64	273

Table 2 The treatment amounts of construction wastes

(Sources : The Ministry of Environment)

(Unit : 1000ton/year)

Year	Landfill		Incineration		Recycling		Total
	Generation amount	Ratio (%)	Generation amount	Ratio (%)	Generation amount	Ratio (%)	Generation amount
1996	4,011	38.7	310	2.9	6,055	58.4	10,375
1997	3,558	20.4	532	3.1	1,335	76.5	17,439
1998	2,596	14.9	368	2.1	14,445	82.9	17,408
1999	3,869	17.0	466	2.1	18,375	80.9	22,711

Table 3 The class of construction wastes and recycling state (1998)

(Sources : The Construction Association of Korea)

(Unit : 1000m³, %)

	Total	Soil & Sand	Waste concrete & bricks	Waste asphalt concrete	etc.
Total	15,042	12,786	1,475	545	236
Banking materials	12,207 (81.2)	10,892 (85.2)	868 (58.8)	310 (56.9)	137 (58.1)
The base layer of road construction	781 (5.2)	334 (2.6)	306 (20.7)	133 (24.4)	8 (3.4)
The crushed aggregate	1341 (8.9)	982 (7.7)	273 (18.5)	66 (12.1)	20 (8.5)
etc.	713 (4.7)	578 (4.5)	28 (1.9)	36 (6.6)	71 (30.1)

1. Table 2 shows that the research is resulted from the companies (487) of which annual operation amount is over two hundred million won
2. Bracketed figures are the occupied portion.

Table 4 The target ratio of the construction wastes

(Unit : %)

Year	The target ratio of the construction waste			
	Soil & Sand	Concrete & Bricks	Asphalt concrete	Waste wood
From Jan. 1. 1998 to Dec. 31.1999	60	50	35	-
From Jan.1.2000 to Dec. 31. 2001	70	70	70	30
From Jan. 1. 2002	75	75	75	50

In 1992, government enacted "Act Relating to Promotion of Resources Saving and Reutilization." According to this enactment, constructors, whose annual amount operation is over 150 hundred million won, are decided target of priority management and ought to recycle soil and sand, concrete, asphalt concrete, bricks and wood generated in construction sites.

In January 1994, The Ministry of Environment and The Ministry of Construction and Transportation proclaimed "Guide for Reutilization of The Construction Waste Producing Company." This guide regulated specific items such as: recycling methods; a recycling planning; an owner's obligations; technique development; installation and operation of recycling equipment; the purpose of construction waste recycling; and a standard and guide for each purpose of recycling. The guide also states that owners have to observe and obey methods of the waste recycling from the planning, survey and design. In 1999, government showed its strong will toward the construction waste recycling as raising the target ratio of the construction waste recycling for constructor that are decided a target of priority management.

Since disposals of the waste were subcontracted, the processing costs were down. The Ministry of Environment directed that a public construction should have a separate order for the construction work and construction waste disposal in order to prevent unsuitable disposal of the waste in 2001. In addition, the ministry established "Detailed Criteria for Selection of The Contract Company for The Construction Waste" to support the enactment of the separate order between construction and construction waste disposal in April. This criterion is for application in tendering for the disposal of construction waste and promotes technology development by giving incentives to the industry that developed new environment technology.

3. Policy Plan

3.1 The estimation of proper cost and payment for construction wastes recycling

The over processing cost is the most important reason of the uncommon construction wastes recycling in most of domestic construction site. An enterprise of gathering, transport and intermediary processing have insisted that the proper processing cost is not assured. So proper disposal cost must be paid by various causes of construction wastes.

For proper disposal cost, items as follows must be considered: 1) the separation generation of wastes, 2) the classified cost - gathering, transport/intermediary - processing/final-processing of wastes, 3) the kind (waste concrete, wood and names are more) of wastes processing cost, 4) the separation of construction wastes, recyclable product and the value of material.

It is better for a processing company to charge the cost of treatment to a generation company or an ordering company by the manifest after specifying the different kinds of wastes, predictable volume, cost, processing place for gathering, transport/ intermediary-processing

3.2 The need of building control policy for construction wastes self-treatment in site.

Because of lacking people and equipment, most of construction site staff don't want self treatment. Practically about 90% construction site rely on the trust treatment. The self-treatment ratio is higher in demolition site than in new construction and higher in engineering construction site than in building construction site. So self-treatment in new construction site and engineering construction site is needed building control measures for quality and method of self-treatment.

And especially in demolition site, self-treatment should be forbidden like Japan for compulsory recycling.

3.3 The clearing of processing and responsible part according to separate order

In enforcement regulations of The Waste Management Act in January of 2001, "The Law of Contract for Country" when construction wastes of that construction be contracted, that contract should be separately resigned from construction companies. But in the new construction case not demolition, when the volume of wastes is very small and the trust treatment company that directly make a contract with owner did not make separation gathering and proper treatment, construction companies are responsible for that problem. It causes problems to separate the contractor from the responsible person. Though the importance of separation generation, because the economic reasons in the relationship among the owner, The separate order of contractor and disposer had better be applied to only the demolition works.

3.4 The need of education for the law and system of construction wastes

According to the result of survey, over 60% of construction sites don't have exact information to the system, law, proper treatment related to construction wastes. And over 50% of construction sites have gotten information by themselves. In Japan, there is the education course of "construction recycling" in National Construction Education Center and the policy to reward the recycling contributor by country. By supplying good information and preparing for the education program, we should lead most staffers in the construction site to make construction wastes proper treated and recycled.

3.5 The need of supply and develop the use, the standard of quality, the indicator of construction for construction wastes recycling

For using recyclable construction wastes (soil, waste concrete and as-con), the standard of quality, the tool of inspection and the indicator of construction must be enacted and technical courses are needed after confirming the safety through modeling works. So In acting the standard of quality and the indicator of construction for the various recycling materials, the relevant technics should be applied to the construction site.

3.6 The adoption of policy to differ participating in the recycling works from non-participating in the recycling works

The differential policy is needed to promote recycling of construction wastes. In domestic construction site, if good recycling work companies are given the incentive and demands for recycling products are guaranteed, over 70% companies are thinking that the promotion of recycling is possible. This is a very practical alternative as an opinion of construction companies that can use recycling materials from construction wastes. In the national viewpoint of wastes recycling, giving incentive is required like the way of giving additional point in the bid preliminary inspection and the selection of good company in the result of survey.

3.7 The adoption of the recycling of construction wastes and obligatory use in construction site

One of the recycling promotion, for recyclable construction wastes - waste concrete, wood, soil, asphalt concrete - obligatory use is considered. In Japan, regardless of the economical efficiency when there is recycling facilities like the intermediary-processing enterprise within 40Km, concrete, asphalt concrete, wood must be taken out to that facilities compulsorily. When there is another private construction site within same length, those must be used compulsorily. In the case of soil, recycling is proceeded identically as the 50Km rule. So in domestic construction site, after enacting the use, the standard of quality, and the indicator of construction for the waste soil, waste concrete, asphalt concrete and concrete, obligatory use is required. And gradational system enforcement must be used from nonstructural part to structural part.

3.8 Technology development and obligatory of separate generation in the demolition construction

In my country, construction wastes from demolition of facility and a new building and extension, must be recycled and be self-treated. So many efforts are done in the demolition site. However due to the illegal restriction of sorting, recycling of resources and reducing within the construction site, mixed wastes are often buried without proper dividing wastes. Certainly administration office leads "construction wastes should be gathered and divided in the site as possible." Generally construction wastes are produced in the mixed condition. Especially mixed wastes are produced more in demolition site. These mixed wastes are stumbling block for recycling. In the future, massive wastes will be produced by the increase of redevelopment and reconstruction. But we do not have any legal regulation of waste treatment and recycling in the site. So leading the promotion of recycling and divided wastes in the construction site, to legalization of obligatory recycling is urgent.

4. Conclusions

As the environmental problems come to the front of social issues, government as well as the construction field recognized the importance of recycling of the construction waste. Along with this atmosphere, the most important thing of the recycling of the construction waste is that revision of the related regulations and act. The construction waste should be considered as very important resources not a garbage.

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