



A Study on the Quantitative Evaluation Method of Small-Scale Environmental Impact Assessment

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Abstract

Purpose: The small-scale environmental impact assessment system in Korea was introduced and implemented in August 2000, but it has a problem that it cannot guarantee implementation due to the large proportion of qualitative reduction measures for each evaluation item. Therefore, when preparing a small-scale environmental impact assessment, research was conducted on how to improve the existing simple listing-type reduction measures and qualitative evaluation standards to quantitative reduction measures and evaluation standards reflecting regional characteristics. **Research design, data and methodology:** The small-scale environmental impact assessment system in Korea was introduced and implemented in August 2000, but it has a problem that it cannot guarantee implementation due to the large proportion of qualitative reduction measures for each evaluation item. Therefore, when preparing a small-scale environmental impact assessment, research was conducted on how to improve the existing simple listing-type reduction measures and qualitative evaluation standards to quantitative reduction measures and evaluation standards reflecting regional characteristics. **Results:** As a result of the analysis of qualitative and quantitative factors, the arithmetic sum of the qualitative factors of the total six projects is 160, accounting for 80% of the total number of reduction measures, and the quantitative factors are 40, accounting for 20%. Among them, the number of qualitative reduction measures reached 97.4% for animal and plant items, and more than 90% for air quality, noise and vibration, and eco-friendly resource circulation items. **Conclusions:** Therefore, it is necessary to avoid establishing qualitative reduction measures and set quantitative measures as the basis, but to specify the specifications, size, and installation location related to the reduction measures, and to calculate the numerical reduction efficiency.

Keywords : Small-scale environmental impact assessment, Qualitative reduction measures, Quantitative reduction measures

JEL Classification Codes : I30, I31, I38

1. Introduction

The small-scale environmental impact assessment system implemented in Korea was first introduced in August 2000 as a preliminary environmental review in the

Framework Act on Environmental Policy. Since then, as it was unified into the Environmental Impact Assessment Act in 2012, the preliminary environmental review of the development project was renamed as a small environmental impact assessment.

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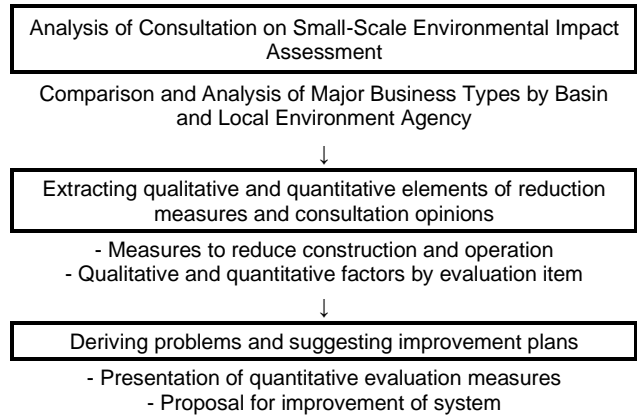
On the other hand, in the process of reviewing and consulting small-scale environmental impact assessments, the consultation standards are ambiguous, so each person in charge of the consultation agency often gives different consultation opinions on the same issue. In the establishment of reduction measures in the evaluation report, a report is being prepared by listing matters that are naturally stipulated to be implemented by individual laws or presenting related standards.

In addition, there is a problem that it does not meet the purpose of the environmental impact assessment system to preserve the natural and living environment by establishing uniform reduction measures that do not reflect business types or regional characteristics and presenting consultative opinions.

Therefore, when preparing a small-scale environmental impact assessment, research was conducted on how to improve the existing simple listing-type reduction measures and qualitative evaluation standards to quantitative reduction measures and evaluation standards reflecting regional characteristics.

Third, problems are analyzed based on the derived results and quantitative evaluation measures and system improvement plans are presented during small-scale environmental impact assessment.

Table 1: Process of Small-Scale Environmental Impact Assessment



2. Research Methodology

This study is limited to small-scale environmental impact assessments that require opinions from related agencies and local residents during the consultation process, and that are difficult to apply to strategic environmental impact assessments and environmental impact assessments.

First, the research method collects projects recently completed by type in EIASS and analyzes the reduction measures presented in the evaluation.

Second, based on the analysis results, each evaluation item is classified into qualitative and quantitative reduction measures and organized into a table.

3. Research Results

3.1. Results of Small-scale Environmental Impact Assessment Consultation Case Extraction

For this study, six projects with factory types were randomly selected for each basin and local environmental agency among the cases of small-scale environmental impact assessment consultations in 2020 by the Environmental Impact Assessment Information Support System (<https://www.eiass.go.kr/>).

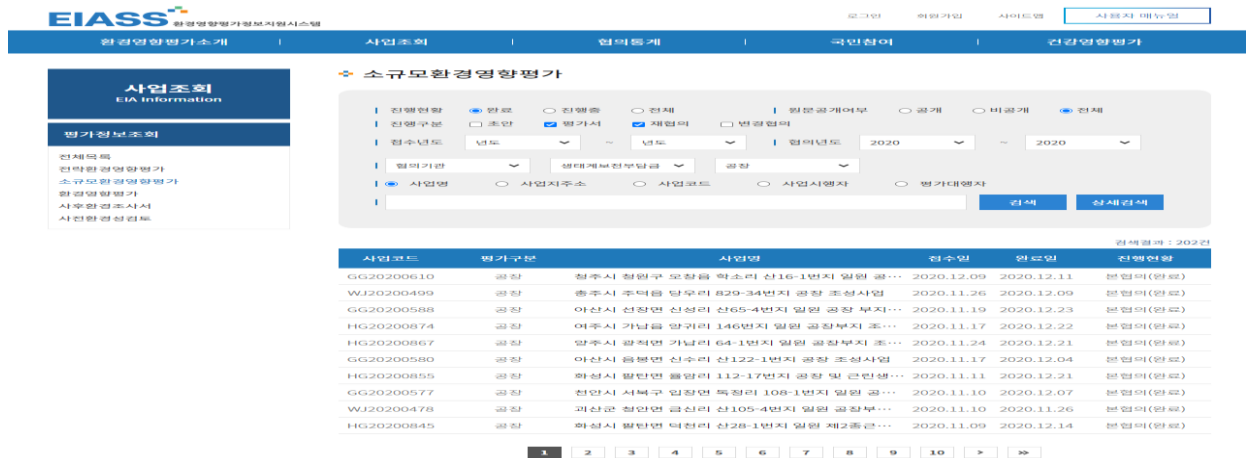


Figure 1: EIASS Site Business Inquiry

Table 2: Results of Small-scale Environmental Impact Assessment Consultation with Factory Type

Sortation	Business name	note
1	Geumgang River Basin Environment Agency 2020_Cheonan City_Dokjeong-ri_Factory	
2	Geumgang River Basin Environment Agency 2020_Munseong-ri_Factory in Chungju	
3	Nakdong River Basin Environment Agency 2020_hhl_Complex Industry_Factory	
4	Nakdong River Basin Environment Agency 2020_Changnyeong-gun_Dongjeong-ri_Factory	
5	Daegu Regional Environment Agency 2020_Sangchon-ri_Factory, Sangju-si	
6	Daegu Regional Environment Agency 2020_Yeongcheon City_Aeryun-ri_Factory	

3.2. Qualitative and Quantitative Review Results by Evaluation Item

Seven evaluation items were selected and analyzed to review the qualitative and quantitative factors of small-scale environmental impact assessment projects conducted in 2020.

Considering that the target project is a factory establishment permit, five items were selected in the natural environment sector: animal and plant, topography and geology, and air quality, water quality, noise and vibration, eco-friendly resource circulation, and landscape.

The main contents judged by the qualitative evaluation are simple listing, presenting only related standards and regulations, not presenting specific design data, and presenting basic directions, and the main contents judged by the quantitative evaluation are specific design specifications, standards, installation location, quantity, etc.

As for the number of qualitative and quantitative factors, one item classified according to the classification table on each evaluation report was applied.

As a result of the analysis of qualitative and quantitative factors, the arithmetic sum of the qualitative factors of the total six projects is 160, accounting for 80% of the total number of reduction measures, and the quantitative factors are 40, accounting for 20%.

Among them, the number of qualitative reduction measures for animal and plant items reached 97.4%, and more than 90% of the establishment of qualitative reduction measures for air quality, noise and vibration, and eco-friendly resource circulation.

Based on these results, many of the reduction measures of small-scale environmental impact assessments currently being carried out remain simple lists of general reduction measures and presentation of related standards, which is believed to have limitations in establishing effective and effective reduction measures.

Table 3: Qualitative and Quantitative Factor Extraction Results

Sortation	Business name	Evaluation items	a qualitative element	a quantitative element	note
1	2020_Cheonan City_Dokjeong-ri_Factory	an animal and plant figure	8	0	
		topography and geology	2	2	
		air quality	8	1	
		water quality	0	6	
		Noise and vibration	6	1	
		Eco-friendly resource circulation	2	0	
		landscape	3	1	
2	2020_Munseong-ri_Factory in Chungju	an animal and plant figure	6	0	
		topography and geology	4	1	
		air quality	11	0	
		water quality	4	3	
		Noise and vibration	3	0	
		Eco-friendly resource circulation	5	1	
		landscape	0	1	

3	2020_hhl_Complex Industry_Factory	an animal and plant figure	3	0	
		topography and geology	1	0	
		air quality	2	0	
		water quality	5	3	
		Noise and vibration	3	0	
		Eco-friendly resource circulation	1	0	
		landscape	1	0	
4	2020_Changnyeong- gun_Dongjeong- ri_Factory	an animal and plant figure	4	1	
		topography and geology	3	3	
		air quality	8	1	
		water quality	3	4	
		Noise and vibration	4	0	
		Eco-friendly resource circulation	6	0	
		landscape	2	0	
5	2020_Sangchon- ri_Factory, Sangju-si	an animal and plant figure	7	0	
		topography and geology	2	1	
		air quality	2	1	
		water quality	4	2	
		Noise and vibration	6	0	
		Eco-friendly resource circulation	2	0	
		landscape	1	1	
6	2020_Yeongcheon City_Aeryun-ri_Factory	an animal and plant figure	9	0	
		topography and geology	2	1	
		air quality	4	0	
		water quality	4	3	
		Noise and vibration	3	1	
		Eco-friendly resource circulation	4	1	
		landscape	2	0	

Table 4: Qualitative and Quantitative Factor Analysis Results

Evaluation items	a qualitative element		a quantitative element		note
	Number	Ratio (%)	Number	Ratio (%)	
an animal and plant figure	37	97.4	1	2.6	
topography and geology	14	63.6	8	36.4	
air quality	35	92.1	3	7.9	
water quality	20	48.8	21	51.2	
Noise and vibration	25	92.6	2	7.4	
Eco-friendly resource circulation	20	90.9	2	9.1	
landscape	9	75.0	3	25.0	
Sum	160	80.0	40	20.0	

Table 5: Detailed Example of Qualitative and Quantitative Element Extraction (1 of 3)

Sortation		an animal and plant figure	topography and geology		
1	Geumgangcheong_2020_Cheonan City_Dokjeong-ri	Qualitative evaluation	1	Properly blocking the inflow of naturalized plants (simple listing)	Application of standard slope of cut slope (relevant criteria presented)
			2	Properly blocking and continuing removal of ecosystem disturbance plants (simple enumeration)	Measures for greening and reinforcement of slopes (presentation of relevant standards)
			3	Disposal of damaged trees free of charge or sale and consignment treatment of waste disposal companies (simple listing)	
			4	Step-by-step construction of mammals, prevention of illegal capture, prevention of noise vibration, speed limit of construction equipment, etc. (simple listing)	
			5	Bird step construction, noise vibration minimization, night work travel, etc. (simple row)	
			6	Construction of amphibians and reptiles is carried out for a sufficient time, and when found, it is moved to a similar habitat, and noise vibration is minimized (simple listing)	
			7	Stage construction of land insects, speed limit of construction equipment, operation of spray vehicles, installation of three-wheel side spray facilities, etc. (simple listing)	
			8	Establishment of appropriate reduction measures when finding legally protected species (simple listing)	
		Quantitative evaluation	1	-	All of the earth and stone information sharing system is taken out (presentation of export volume)
			2	-	Application of acupuncture and storage area (presentation of detailed specifications linked to water quality pieces)

Table 6: Detailed Example of Qualitative and Quantitative Element Extraction (2 of 3)

Sortation			air quality	water quality	
1	Geumgangcheong_2020_Cheonan City_Dokjeong-ri	Qualitative evaluation	1	Application of measures to reduce scattering dust by type of construction (simple listing)	-
			2	Efficient entry of equipment and avoidance of night work (simple listing)	-
			3	Prohibition of idling and regular inspection of construction vehicles (simple listing)	-
			4	Periodic training of workers (simple listing)	-
			5	Periodic spraying (simple listing)	-
			6	Speed limitation and regulation of construction vehicles (simple listing)	-
			7	Installation of three-wheeled vehicle washing facilities (simple row)	-
			8	Installation and operation of optimal prevention facilities during operation (simple listing)	-
		Quantitative evaluation	1	Installation of temporary soundproof panels and dustproof nets (present location and specifications)	Provisional drainage installation (specify detailed specifications)
			2	-	Acupuncture and reservoir (position, capacity presentation)
			3	-	Operation water supply plan (supply volume, supply source presentation)
			4	-	Sewage treatment plan during operation (specification, location presentation)
			5	-	Operation wastewater treatment plan (specification, location presentation)
			6	-	Presentation of storage installation during operation (specification, location presentation)

Table 7: Detailed Example Of Qualitative And Quantitative Element Extraction (3 of 3)

Sortation		Resource circulation	Noise and vibration	landscape		
1	Geumgangcheong_2020_Cheonan City_Dokjeong-ri	Qualitative evaluation	1	Presentation of domestic waste and manure treatment plan (presentation of relevant standards)	Compliance with relevant laws when operating construction equipment (presentation of relevant standards)	Facility layout plan (presentation of basic directions)
			2	Presentation of waste oil treatment plan (presentation of related standards)	Process management when operating construction equipment (simple listing)	Building Design (Presentation of Basic Directions)
			3	-	Application of attenuation effect by terrain (simple row)	Color planning (presentation of basic directions)
			4	-	Strengthening the cooperative system of residents in the surrounding area (simple listing)	-
			5	-	Measures to reduce vibration by operating construction equipment (simple list)	-
			6	-	Installation of soundproof windows and soundproof room facilities during operation (simple listing)	-
	Quantitative evaluation	1	-	Installation of temporary soundproof panels during construction (specification and location presentation)	Green area development plan (detailed area, planting tree and quantity presentation)	

3.3. A Study on the Improvement Plan for the Establishment of Quantitative Reduction Measures

The purpose of the small-scale environmental impact assessment system is to develop sustainable land by minimizing the impact on the natural environment and living environment in establishing development projects in areas that need conservation.

However, as can be seen from the previous analysis results, the reduction measures currently presented in the small-scale environmental impact assessment are largely focused on simple listing and presenting related standards.

Therefore, qualitative reduction measures should be avoided and quantitative measures should be established, but specific implementation measures, such as specific specifications, size, and installation locations, should be specified, and this reduction measure should be improved to calculate quantified reduction efficiency.

Follow-up research is needed to prepare guidelines for the establishment of reduction measures for each evaluation item, and the "Regulations on the Preparation of

Environmental Impact Assessment Reports, etc." is needed to improve the system.

4. Conclusions

This study was recently conducted to identify the status of establishing qualitative and quantitative reduction measures for each evaluation item of a small environmental impact assessment and to induce the transition to quantitative reduction measures by reflecting the reality that it is difficult to secure effective reduction effects.

As a result of selecting and analyzing six small environmental impact assessments conducted in 2020, the arithmetic sum of the qualitative elements of the total six projects was 160, accounting for 80% of the total number of reduction measures, and the quantitative factors were 40 and 20%.

Therefore, it is judged that there is a limit to the establishment of effective and effective reduction measures as much of the reduction measures currently being carried out remain simple lists of general reduction measures and presentation of related standards.

This study only identifies the current status of qualitative

evaluation, but through follow-up studies, we would like to derive a plan to prepare a distribution table to convert to quantitative evaluation and a plan to improve the system through actual case application.

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