

Article

Analyzing Determinants of Acceptability of High-Level Nuclear Waste Disposal Facility: Exploring Conditional Acceptance

Sohee Kim¹ and Seoyong Kim^{2*}

1. Research Center for Energy Transformation Policy, Social Science Research Institute, Ajou University, Suwon 16499, Korea. Email: jeonsh5785@naver.com

2. Department of Public Administration, Ajou University, Suwon 16499, Republic of Korea.

* **corresponding author**= Email: seoyongkim@ajou.ac.kr; Tel.: +82-31-219-2742

Abstract: This study addresses the problem of building high-level radioactive waste facilities worldwide. Facilities involving radioactivity are often perceived as dangerous, resulting in low acceptance and delays in construction. In countries such as Finland and Sweden, installations have been made. However, many countries are delaying or finding alternative ways to build facilities. This study reviews previous studies that have analyzed various factors affecting the acceptability of high-level radioactive waste disposal facilities. It also analyzes several social contexts and ideologies. Based on the existing research on the difference between general and Regional acceptance, the two types of acceptance are compared. The results show that there is a significant difference between the mean values of general and Regional acceptance, and that the knowledge variable has a strong influence on general acceptance. In addition, the trust variable had a significant effect on Regional acceptance. The implication of this study is that it is necessary to understand the factors that affect both general and Regional acceptance and design strategies to strengthen them.

Keywords: High-level radioactive waste, Nuclear, Conflict, General Acceptability, Regional Acceptability

1. Introduction

Worldwide, the issue of construction of high-level radioactive waste facilities is causing social conflict. Due to the high-risk perception of radioactive plants, the acceptance of them is low, so the construction of the facilities is being delayed. Installations are taking place in a handful of countries, such as Finland and Sweden, but many have delayed installations or are seeking other means. In the case of Korea, too, since social conflicts over the installation of radioactive waste facilities are high, construction is being delayed.

2. Theoretical Background

2.1. Acceptability of high-level nuclear waste disposal facilities

General acceptance and local acceptance are two concepts that are often used to measure the public's attitudes towards certain technologies, policies, or projects. General acceptance refers to the overall support or approval of a technology, policy, or project by the public, regardless of its location or impact on them personally (Emmerich et al, 2020, Wicki & Kaufmann, 2022). Local acceptance refers to the specific support or approval of a technology, policy, or project by the residents who are directly affected by its implementation or operation. General acceptance and local acceptance can differ significantly depending on various factors, such as the type and design of the policy or project, the perceived benefits and costs, the level of trust and involvement of the stakeholders, and the characteristics and preferences of the local community.

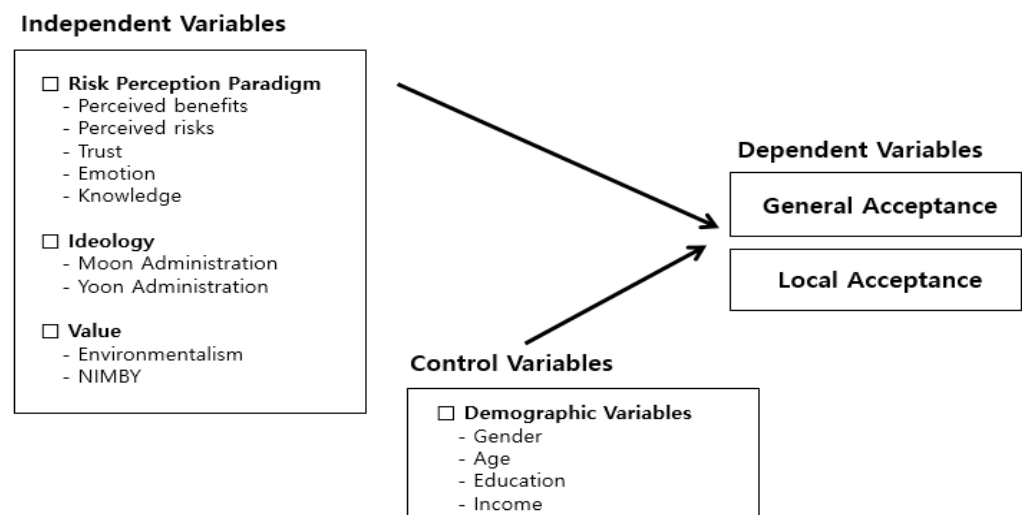
2.2. Determinants of acceptability of high-level nuclear waste disposal facilities

One of the challenges of implementing new policies or projects is to overcome the gap between general acceptance and local acceptance. This gap is often referred to as the "not in my backyard" (NIMBY) phenomenon, which describes the situation where people support a policy in general but oppose it when it is proposed near their own residence (Wicki & Kaufmann, 2022).

Previous studies show different factors affecting the acceptability of high-level radioactive waste disposal facilities. Based on the literature review, we hypothesized that the perceived risks, benefits, trust, appraisal, and knowledge of existing nuclear power would affect the acceptability of high-level radioactive waste disposal facilities. And we focused on the effect of nimby phenomenon and ideology.

3. Methods and Research framework

3.1. Research framework

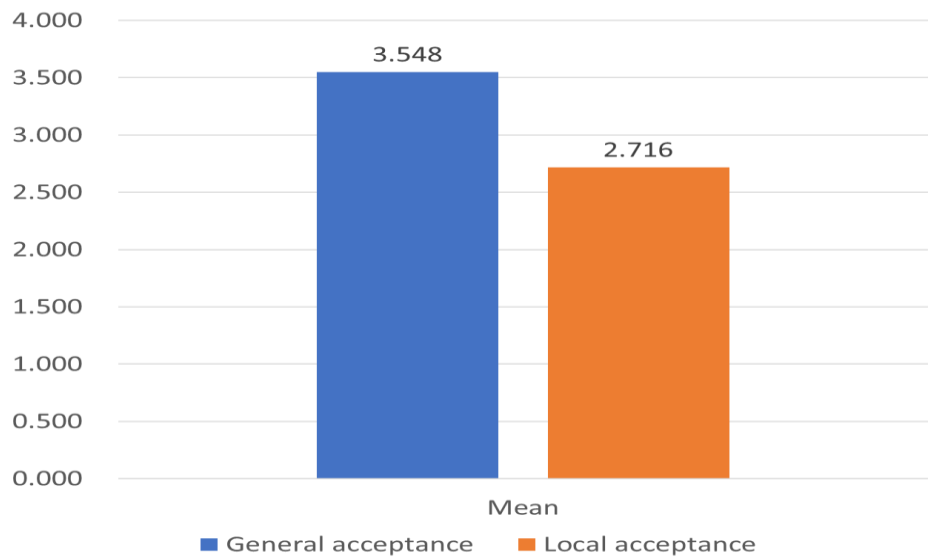


3.2. Method

A web survey was conducted among 1,552 South Korean citizens with proportional sampling by region, gender, and age. (margin of sampling error ± 2.5 percentage points at 95% confidence level)

4. Results

4.1. Acceptance for high-level nuclear waste disposal facility



The mean values of the general acceptability level and local acceptability level were 3.548 and 2.716 respectively. The mean value of general acceptance was higher than the local acceptance mean, and this result was statistically significant.

4.2. Analyze the Determinants of high-level nuclear waste disposal facility acceptance

Category		General acceptance			Local Acceptance		
		B	SE	Beta	B	SE	Beta
Demographic variables	(Constant)	1.915***	.215		2.384***	.259	
	Gender(Female)	-.103**	.039	-.065	-.307***	.047	-.151
	Age	.000	.001	-.001	-.005**	.002	-.073
	Education(College graduate)	.043	.040	.027	-.078	.049	-.088
	Income	.042**	.020	.051	-.011	.025	-.010
Ideology	Moon Administration	.053**	.018	.082	-.027	.022	-.033
	Yoon Administration	.062**	.019	.096	.086***	.023	.105
Risk Perception paradigm	Perceived benefits	.087**	.038	.077	-.055	.046	-.038
	Perceived risks	.240***	.036	.215	-.069	.043	-.048
	Trust	.000	.027	.000	.399***	.033	.323
	Emotion	-.074**	.030	-.071	.094**	.037	.070
Value	Knowledge	.117***	.027	.123	.122***	.033	.099
	Environmentalism	.010	.023	.011	-.049*	.028	-.041
	NIMBY	-.091***	.022	-.101	-.182***	.027	-.156
F-Value		16.816***			35.869***		
R ²		.125			.233		
Adjusted R ²		.117			.227		

General Acceptance: Perceived risks (+)> Knowledge (+)> Gender (-)> NIMBY (-)> Perceived benefits (+)> Emotion (-) > Yoon Adm. (+)> Moon Adm. (+)> Income (+)

Local Acceptance: Trust (+) > Gender (-) > NIMBY (-) > Knowledge (+) > Emotion (+) > Yoon Administration (+) > Environmentalism (-) > Age (-)

5. Conclusion

This research analyzed the acceptability of high-level nuclear waste disposal facilities. Based on the previous studies about the gap between general acceptance and local acceptance, we tried to compare the two types of acceptance. As a result, the mean values

of the general acceptance and local acceptance were significantly different. And the NIMBY was negatively effective on both kinds of acceptance. Also, NIMBY effect on local acceptance was much higher than on general acceptance. The most influential variable to general acceptance of high-level nuclear waste disposal facilities was knowledge, whereas the most influential variable to local acceptance was trust. The more supportive for Yoon's administration, the more acceptable in high-level nuclear waste disposal facilities.

6. Implications and applications

It is important to understand the factors that influence both general and local acceptance and to design strategies that can enhance them. Except for risk perception paradigm, NIMBY and public support for the government were statistically significant variables. This means that strategies to enhance acceptance for high-level nuclear waste disposal facilities include considering local opposition. Also, trust and public support in government is important factors to enhance local acceptance of high-level nuclear waste disposal facilities.

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