Analyzing factors influencing nuclear safety regulation policy awareness

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1. Introduction

As the public's interest in nuclear safety is gradually increasing, the importance of evaluating the government's safety regulation policies and activities is also increasing. Therefore, organizations specializing in nuclear safety regulation are developing systematic evaluation indicators for various nuclear and radiation safety-related policies and activities to objectively measure and analyze their performance.

The Nuclear Safety Regulation Policy Satisfaction Index is an indicator that measures the level of public expectations of the government's nuclear safety regulation policy activities and the actual implementation of the policy, and analyses and evaluates them to understand the public's policy satisfaction. It was introduced in 2019 to quantify and identify the level of expectations and actual satisfaction with nuclear safety regulation policies, and the survey and indicators are improved every year to improve the objectivity and rationality of the indicators.

In order to investigate and analyze policy sensitivity, it is possible to ask direct questions or to calculate values using various proxy indicators. The evaluation scores measured at each stage were synthesized to measure the policy sensitivity of nuclear safety regulation, which was used as an output indicator to evaluate government performance. In this study, we conducted a correlation analysis on the evaluation factors affecting policy sensitivity through the analysis of raw data before using it in the calculation formula as an output indicator.

2. Methods and Results

2.1 Survey overview and design

The survey design is shown in the following Table 1 to measure the policy perception of local residents around the nuclear power plant. The survey was commissioned and conducted by the Korea Research Center Co., Ltd. The survey was conducted in-person during the month of October 2023[1].

Table I: Survey overview

Separation	Details
What to investigate	Residents aged 19-74 who have lived within 30 kilometers** of 5 nuclear facilities for at least 1 year * Gori/Saeul, Glory/Gochang (Hanbit), Wolseong, Uljin (Hanul), Daejeon ** In the case of Daejeon, it will be conducted for residents living within 1.5 kilometers of the reflection
Research methods	One-on-one, in-person surveys using tablets (TAPI) - Use paper questionnaires for older adults who are reluctant to use tablets
Sample size	1,000 samples (200 samples from 5 regions)
Sample assignment	Geographic/gender/age proportioning within the survey area - Based on the August '23 Ministry of the Interior and Safety resident registration statistics

The survey divided policy activities into five categories and asked about four policy perception factors (need, relevance, effectiveness, and achievement) for each policy activity. The questionnaire was organized and evaluated in the following order as shown in Figure 1.

For each policy activity, the respondents were asked how necessary they think the policy activity is (necessity), how relevant they think the policy activity is (relevance), how effective they think the policy activity is (effectiveness), and whether the policy activity can achieve the goal of safely managing nuclear power (achievement). The five policy activities are as follows.

- Activity 1: Safety management of operating nuclear facilities
- Activity 2: Nuclear safety infrastructure and future regulatory demands
- Activity 3: Radiation Exposure and Natural Radiation Safety Management
- Activity 4: Information Disclosure and public participation

- Activity 5: Responding to nuclear and radiation-related issues

The five policy activities were selected based on the NSSC's 2023 Work Plan and the Third Nuclear Safety Comprehensive Plan[2, 3].

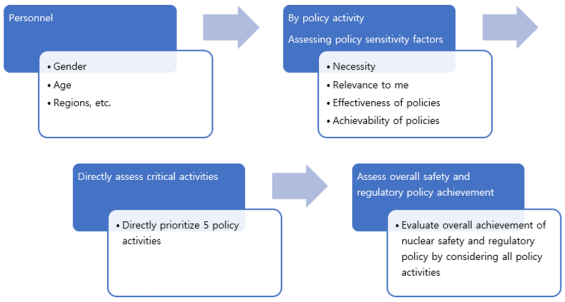

Fig. 1. Survey process for policy ownership research

The results are shown in Table 2. The overall policy satisfaction was calculated by analyzing the correlation between necessity, relevance, effectiveness, and achievability and using them as weights, but this study focused on individual evaluation factors rather than the overall policy satisfaction score. In general, the need and relevance of radiation exposure and natural radiation safety management activities that are relevant and frequently encountered in people's lives were high. In addition, the effectiveness and achievement of policies were rated highly for activities to respond to nuclear and radiation related issues.

Table II: Evaluation factor results by policy activity

Policy Number	Policy Sense Evaluation Factors			
	Need	Relevance to me	Effectiveness	Achievement
Activity 1	4.136	3.885	3.974	3.932
Activity 2	4.098	3.903	3.979	3.919
Activity 3	4.203	4.035	4.016	3.960
Activity 4	4.128	3.956	4.034	3.973
Activity 5	4.164	3.975	4.020	3.978
Overall Achievement	3.821			

2.2 Correlation analysis between policy sense evaluation factors

Correlation analysis between the need, relevance, effectiveness, and achievement of each policy activity was conducted to analyze which evaluation factors have a significant impact on achievement.

The analysis showed that the greater the effectiveness, the greater the perceived achievement. Achievement refers to the "baseline of one's own expectations and predictions" in terms of policy perceptions, so the effectiveness and relevance of a policy becomes its actual perception. In addition, since effectiveness and relevance do not affect all individuals equally, it means that variables with a high degree of attainability and relevance, i.e., samples or items with consistency and consistency of responses, have a high degree of importance.

Table III: Policy Sense Evaluation Factor-Achievement Correlation by Policy Activity

Policy Number	Need	Relevance to me	Effectiveness
Activity 1	0.391442	0.344805	0.601239
Activity 2	0.494740	0.424347	0.641512
Activity 3	0.473300	0.467894	0.651738
Activity 4	0.525330	0.479259	0.638033
Activity 5	0.461036	0.447917	0.642261

When asked to select which policy activities they considered important, they chose the safety management of operational nuclear facilities as the most important, as shown in Figure 2. However, the results of the evaluation of the achievement of each policy activity showed that the direct importance and the actual perceived evaluation tendency were somewhat different, as the need and relevance were higher for the radiation exposure and natural radiation safety management activities, the effectiveness was higher for the information disclosure and public participation, and the achievement was higher for the nuclear and radiation-related issue response activities. This can also be seen in the rather weak correlation between the policy perception factors and overall achievement in Table 4.

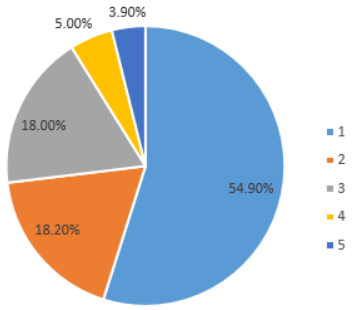

Fig. 2. Survey process for policy ownership research

Table IV: Policy Sense Evaluation Factor-Achievement Correlation by Policy Activity

Policy Number	Need	Relevance to me	Effectiveness	Achievement
Activity 1	0.088692	0.148693	0.26757	0.224133
Activity 2	0.122958	0.163227	0.254712	0.279187
Activity 3	0.088876	0.141179	0.191609	0.225293
Activity 4	0.082188	0.116011	0.184695	0.217331
Activity 5	0.090686	0.151178	0.245109	0.252072

3. Conclusions

In order to analyse policy satisfaction, it is possible to ask direct questions about satisfaction or to calculate values using various indicators. This study was conducted to analyse the relationship between evaluation factors affecting policy satisfaction. As a result of the correlation analysis between the evaluation factors for policy satisfaction, it can be seen that the tendency is somewhat different when the detailed evaluation criteria for each evaluation factor are presented compared to those that are considered to be directly important factors. Therefore, complex evaluation criteria are needed to evaluate the public's sense of policy, and it is necessary to improve the performance indicators through a clear relationship analysis.

REFERENCES

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[2] Nuclear Safety and Security Commission, The 3rd Comprehensive Plan for Nuclear Safety, 2021.
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