# **Analysis of Public Acceptance Influence Factors on FNA**

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# 1. Introduction

In 2011, a large-scale earthquake occurred off the coast of northeastern Japan, causing a reactor at the Fukushima Daiichi Nuclear Power Plant (FDNPP) to explode and leak a large amount of radioactive material. After the Fukushima Nuclear Accident (FNA), the Korean government controlled the import of Japanese food products and strengthened inspections. And the results have disclosed to the public through websites, etc. However, despite these measures, the public acceptance about the potential harm to the human body from radioactive materials from the FNA has not decreased, and this phenomenon has become even more severe due to the recent discharge of radioactive water generated at FDNPP site.

In order to effectively communicate to reduce negative acceptances of nuclear power, it is necessary to analyze what factors affect public acceptance. Before this, it is necessary to examine what factors the FNA, which had a significant impact on current acceptances of nuclear power.

Therefore, this study analyzed cases of surveys on acceptances in each country after the FNA.

#### 2. Materials and Methods

In this study, we analyzed the surveys on the public acceptance of nuclear energy after the FNA conducted by Nanjing University in China, Nihon University in Japan, and Ajou University in Korea [1-3]. We also analyzed the survey methods, number of respondents, factors, and survey results of these studies.

#### 3. Results and Discussion

Nanjing University conducted a study to understand the changes in acceptance of nuclear energy in China due to the FNA in 2008 and 2011. Nanjing University conducted a survey of 850 ordinary citizens in the Lianyungang, and obtained 668 valid responses. Lianyungang is the city closest to Fukushima in China, where the Tianwan NPP is located. Nanjing University investigated the changes in four influence factors: perceived risk, knowledge, benefit, and trust, before and after the FNA. Nanjing University compared the changes before and after the FNA for the four influence factors. When 1-2 points are negative, 3 points are neutral, and 4-5 points are positive, the acceptance of nuclear energy decreased sharply after the FNA (3.34 points  $\rightarrow$  2.65 points). The perceived risk factor increased significantly (2.82 points  $\rightarrow$  4.62 points), and the social and personal perceived risk increased from 'moderate' to 'serious'. The knowledge increased 2.52 points to 2.81 points, and the benefit decreased 3.27 points to 2.50 points. The trust in the government decreased (3.15 points  $\rightarrow$  2.81 points), and the acceptance was lower among women, those over 35, non-civil servants, those with low incomes, and those with college degrees or higher. The acceptance decreased more among residents of areas close to NPPs.

Nihon University conducted a study to understand the changes in acceptance of nuclear energy in Japan due to the FNA in 2013. Nihon University conducted a survey of 217 Fukushima residents who lived in temporary shelters in 2012, and obtained 210 responses. 105 lived within a 20 km radius of the NPP, and 105 lived within a 20-30 km radius. Nihon University investigated two influence factors: confidence in mass media and trust in institutions. The higher the confidence in mass media, the higher the fear of NPP accidents. The lower the trust in institutions, the more anxiety about nuclear energy. Women were found to have greater fear of nuclear energy than men. Lack of trust in the government and media coverage of NPP accidents were found to be the main factors in the public anxiety about nuclear energy.

Ajou University conducted a study to understand the changes in the acceptance of nuclear energy in Korea due to the FNA in 2013. Ajou University conducted a data survey from a sample group of 1,507 people aged 19 or older through a specialized agency. Data survey was conducted through 1:1 face-to-face interview. Ajou University investigated the effects of the FNA and its aftermath on eight factors: benefit, risk, trust, feeling, knowledge, information, characteristics of information, and demographic characteristics (gender, education, residential size, income, etc.). Risk was higher than benefit, and there was no significant relationship between benefit and acceptance of nuclear energy. Gender (women were more negative) and city size had a significant effect on acceptance of nuclear energy, while age, education, and income had no effect. All factors except knowledge (benefit, risk, trust, emotion, information, and information characteristics) were found to have a negative effect on nuclear energy acceptance. Interestingly, the higher benefit, the more negative the nuclear energy acceptance was. Information characteristics had the greatest effect on nuclear energy acceptance, followed by risk, trust, and benefit. Information characteristics had the greatest effect on nuclear energy acceptance, followed by risk, trust, and benefit. Factors that had a negative effect on the acceptance of the necessary for nuclear energy generation were city size, feeling, and information characteristics. Factors that had a negative effect on the acceptance of nuclear safety were city size, perceived risk, and information characteristics.

Table 1 shows the analysis of the cases of the survey on public acceptance of the FNA investigated in this study. Nanjing University and Nihon University conducted surveys targeting residents in the respective NPP site, and Nihon University conducted research targeting residents of the Fukushima region in particular. Ajou University conducted research targeting samples extracted from the entire Korean population. Nanjing University and Nihon University conducted research using questionnaires, while Ajou University conducted research using 1:1 face to face interview. Nanjing University directly compared the period before and after the FNA, and Nihon University and Ajou University investigated nuclear energy acceptance after the FNA. Nanjing University analyzed the changes in four factors of nuclear energy acceptance due to the FNA: knowledge, perceived risk, benefit, and trust. Nihon University analyzed two factors: trust in the media and the public regarding nuclear energy awareness. Ajou University analyzed eight factors of nuclear energy awareness among Korean public. All three studies showed that women nuclear energy awareness was lower than men. However, the level of nuclear energy acceptance by age and education level was different in all three studies. In the study of Nanjing University, acceptance was low for those over 35 years old, but in Nihon University, the younger the age, the lower the acceptance. Ajou University analyzed that age did not influence the acceptance. In the study by Nanjing University, the higher the level of education, the more negative the impact on the acceptance. In the study by Nihon University, the lower the level of education, the more negative the impact on the acceptance. Ajou University analyzed that it was not relevant. Study by Ajou University showed that the higher the benefits of nuclear energy, the lower the acceptance. In China, trust in overseas news and internet information increased more than in the government, and in Japan, the higher the trust in media, the lower the acceptance of nuclear energy. In Korea, the characteristics of information had the greatest impact on the acceptance of nuclear energy.

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Division		Nanjing	Nihon	Ajou
		Univ	Univ	Univ
Country		China	Japan	Korea
Respon dents	Counts	668	210	1,507
	Region	Lianyun	Fukushima	Nation
		gang		wide
Method		Question	Question	Face to
		naire	naire	face
Factor		- Perceived risk - Knowledge - Benefit - Trust	<ul> <li>Confidence in mass media,</li> <li>Trust in institution</li> </ul>	<ul> <li>Benefit</li> <li>Risk</li> <li>Trust</li> <li>Feeling</li> <li>Knowledge</li> <li>Information</li> <li>Characteristic of information</li> <li>Demographic characteristic</li> </ul>

Table 1: Analysis of public acceptance studies on FNA

#### 4. Conclusion

In this study, we analyzed the cases of nuclear energy awareness surveys in each country regarding the Fukushima accident. For this purpose, we analyzed research cases from Nanjing University, Nihon University, and Ajou University. Each study surveyed residents near nuclear power plants or the entire nation, and collected and analyzed respondent information such as gender, age, and region, etc. In each study, the public acceptance in nuclear energy decreased after the FNA. And it was shown that the method of information communication and trust were important. It is difficult to make a direct comparison because the study methods and the nuclear energy policies of each country are different, but it is believed that the influence factors investigated in these studies can be utilized in establishing strategies for effective nuclear power communication in the future. The results of this study can be utilized in research on improving nuclear power awareness in Korea.

## **ACKNOWLEDGMENTS**

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