Perception of nuclear safety and development of the nuclear safety trust indicator

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1. Introduction

Public interest in safety is increasing, and the demand for a higher level of safety is getting stronger. Nuclear safety is at its core. The boundary between perception of safety and risk is ambiguous, and it is true that there are controversies over the numbers elaborately calculated in scientific and technological terms. However, trying to unconditionally meet diverse safety demands from various directions with ambiguous principles may rather endanger safety. Accordingly, it is very meaningful to secure the standards for mediating emotional or ideological disputes that destroy healthy disputes by developing a nuclear safety trust indicator that the society can relate to. Also, as the minimum mechanism for controlling the social side effects of handling the nuclear safety issue politically, the nuclear safety trust indicator can play its part.

2. Methods and Results

2.1 Research Methodology

To understand the public perception of nuclear safety, a survey was conducted The population was male and female adults living across the country who are 19 years of age and older, and the Hankook Research access panel (about 400,000 as of November 2017) was the sampling frame. The quota sampling by region, gender and age was used to receive responses to the survey from 1,023 people. The online survey through e-mail was conducted for 4 days from November 21, 2017 till November 24, 2017, and the sampling error is ±3.1%p (95% confidence level).

2.2 Analysis of nuclear safety perception

People have considerable interests in nuclear safety. When they hear nuclear power generation or nuclear safety, they are reminded of ‘risk’ and automatically link it to ‘accident.’ They attribute the risk to radioactivity. They define nuclear safety as a scientific, technological and specialized issue, but have a strong tendency to think of it emotionally rather than logically and rationally. For this reason, it is meaningful to educate people by providing information and knowledge of nuclear safety, but it is very important to secure trust on nuclear safety. There is a precondition. It is essential to secure nuclear safety close to perfection in terms of technology and engineering, and to be able to not only minimize negative damages just in case, but also recover from it.

Many people believe in limited perseverance, i.e. as nuclear power generation involves a critical risk, it must be used restrictively used under strict control, but gradually reduced. Of course, this tendency did not come into being recently all of a sudden. It has continued to appear since the Fukushima accident. Ironically, compared to 2016, however, the tendency to refuse nuclear power generation weakened a little in 2017. It can be attributed to the fact that as the government declared an end to nuclear power generation, the issue of denuclearization, which used to be only in the head, became a realistic issue among many individuals. The Korean society agrees on the necessity of reducing the use of nuclear power generation. At the same time, people also agree on the necessity of nuclear power generation. Therefore, the most important thing is to prevent risks, that is, how to secure nuclear safety, and how far the trust on nuclear safety can be spread in the society.

2.3 Operational definition of the nuclear safety trust indicator

The concept of trust can be interpreted multi-dimensionally depending on targets, and diverse viewpoints can be verified with regard to components. Information, influence and control are presented as components of trust [1], and consideration, respect, risk calculation and control ability, a sense of calling, ability and the order of the civil society are presented as components of trust [2]. Also, some scholars conceptualizes trust with focus on responsibility, trustworthiness and ability [3]. Similarly, ability, openness, consideration and consistency are presented as the basic concepts of trust [4]. Some argue that the risk concept must be explicitly included in the concept of trust [5]. It means that trust is also subjective and judgmental like risk.

Viewed in this context, trust on nuclear safety is differentiated from the targets of trust that were handled previously. That is, ‘nuclear safety,’ the target of trust, can hardly be specific as a target. Accordingly, it is necessary to specify the target as the main agent that judges nuclear safety with authority. This study attempts to conceptualize trust on nuclear safety as giving a positive value to nuclear safety in the relationship with the main agent that judges nuclear safety with authority

although it cannot fully understand nuclear safety rationally.

2.4 Development and analysis of the nuclear safety trust indicator

In order to develop the nuclear safety trust indicator, a factor analysis was conducted. The result of this factor analysis confirmed that the composition of the nuclear safety trust indicator is justifiable. Based on this result, the first criterion for judging the trust on nuclear safety can be stated as risk perception(eigenvalue 9.635). In other words, it means that trust on nuclear safety can differ depending on how bad influence nuclear power generation has on health, natural environment, future generations, the ecosystem and greenhouse gas emissions, and how risky nuclear power generation is even though no accident occurs. Honesty(eigenvalue 3.527) turned out to be the second criterion for judging trust on nuclear safety. In other words, how immoral the government, business operators, regulatory agencies, nuclear power experts and nuclear waste management institutions are in relation to nuclear safety, government can be the criterion for judging trust on nuclear safety. The third criterion for judging trust on nuclear safety was responsibility(eigenvalue 2.487). It means that it is possible to judge trust on nuclear safety depending on how responsibly the government, business operators, regulatory agencies, nuclear power experts and nuclear waste management institutions act to protect the citizens from nuclear risks. The fourth criterion for judgment is expertise(eigenvalue 1.344). Whether business operators, regulatory agencies, nuclear power experts and nuclear waste management institutions have the expertise necessary for making correct judgment about nuclear safety can become a criterion for judging trust on nuclear safety. The fifth criterion for judging trust on nuclear safety is the procedural justification(eigenvalue 1.120). It shows that trust on nuclear safety may vary depending on whether nuclear power policies are made according to due process of law, and whether they are made on the basis of diverse opinions of all sides.

The nuclear safety trust indicator can be composed of risk perception, honesty, responsibility, expertise and procedural justification. Out of possible 100 points, risk perception scored 64 points, honesty 41.8 points, responsibility 62 points, expertise 58.7 points and procedural justification 57.7 points respectively.

3. Conclusion

This study began because of the realization that as nuclear safety has become a powerful social issue, trust on nuclear safety is becoming increasingly important. It seems that risk and safety are regarded as scientific and technological issues, but actually depending on from which angle the numbers are derived, there are different opinions even on the same numbers. Of course, the fact that there are arguments about a certain issues based on diverse opinions indicates that the society is healthy to that extent. If such arguments lead to an excessively emotional battle or ideological dispute devoid of rationality, however, the social cost will be considerable, and the damages will be felt by citizens. Accordingly, to turn healthy arguments into the driving force behind better risk control, a safe society and the security of citizens, an indicator, which everyone can relate to, for judging trust on nuclear safety is necessary.

Based on the evaluation of the nuclear safety trust indicator alone, the confidence level of nuclear safety in Korea can be said to be negative rather than positive. Risk perception is relatively high, whereas honesty received a failing grade, and expertise and procedural justification were low under 60 points, and only responsibility barely avoided flunking. At a time when trust on nuclear safety is becoming increasingly important, this result can be interpreted as a warning to not only the main agents of nuclear safety, but also the Korean society. In other words, the starting point can be said to be the main agents of nuclear safety who have sufficient expertise. On top of that, arrangements must be made for fulfilling their responsibilities to protect the citizens from nuclear risks, and each main agent needs to improve laws and systems to thoroughly comply with moral standards for the sake of nuclear safety. Of course, what must precede all this is to recognize the value of trust on nuclear safety, and induce everyone involved, i.e. the government, regulatory agencies, operators and nuclear power experts, to understand that enhancing trust on nuclear safety is an urgent issue. In addition, nuclear power policy decision making must be accompanied by efforts to secure procedural justification. Also, correct information needs to be shared and communicated so that risk perception will not be distorted.

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