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A Study of Risk Communication Under Energy Transition Government

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1. Introduction

In Korea, the public acceptance for nuclear power plants (NPPs) became worse after Fukushima accident. Furthermore, the anti-nuclear (or energy transition) policy of Korean new government (President Moon) has smashed the Korean nuclear energy industry and nuclear energy R&D since 2017, and thus, the Korean nuclear industry has been rooting out. Thus, proponents of nuclear energy argue that fine dust and other pollution problems stem partly from the anti-nuclear policy, and that the construction of the Shin Hanul 3 and 4 reactors should be resumed.

However, since the presidential election pledge of President Moon was anti-nuclear and the anti-nuclear policy has been strongly performed since the birth of the Moon's government, it seems that the current anti-nuclear policy will not be changed.

In the harsh period, the pro-nuclear group has been resisting through the media and the opposition party. However, the problem of the fine dust become more serious, and the base of Korean nuclear energy industry which has been well established during 40 years is being dangerously shaken. In addition, a lot of government money is being wasted through the energy transition.

In this paper, we discuss what will be the best risk communication for the nation under this energy transition, not for the current government, or not for a specific group.

2. Methods

2.1 Risk Perception

For a good risk communication, we should understand the public's risk perception. Fig. 1 is an example of the risk aversion experiment given in Ref. [1]. In the experiment shown in Fig. 1, the assumption is that you have been given $1,000 for joining the experiment, first of all, and you should choose A or B, and then, you should take a marble out from a bowl containing 50 red and 50 blue marbles. If a blue marble is taken out, you receive 0 or $500 (in addition to the $1,000) depending on whether you chose row A or row B respectively. If a red marble is taken out, you receive $1,000 or $500 (in addition to the $1,000) depending on whether you chose row A or row B respectively.

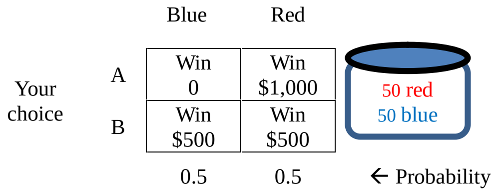

Fig. 1. Risk aversion for positive prospects

Fig. 2 is another example of the risk seeking experiment given in Ref. [1]. In the experiment, the assumption is that you have been given $2,000 for joining the experiment at first, and you should choose row C or D, and then, you should take a marble out from a bowl containing 50 red and 50 blue marbles. If a blue marble is taken out, you will lose $1,000 or lose $500 depending on whether you chose row C or D, respectively. If you select row D, you lose $500 regardless of what color marble is drawn from the bowl.

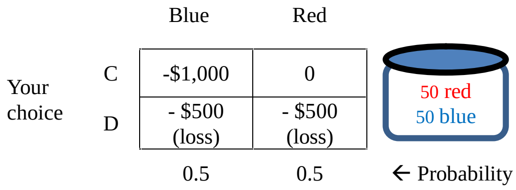

Fig. 2. Risk seeking for negative prospects

Total 70 people participate in each experiment, and 16% chose row A and 84% chose row B in the first experiment. 69% chose row C and 31% chose row D in the 2nd experiment of Fig. 2. Even though the expected utilities of A, B, C and D are the same, people's selection was clearly different. People seemed to avoid the risk when there was a sure gain of $500 as shown in Fig. 1, and seemed to favor taking a risk to avoid a sure loss of $500 in row D of Fig. 2.

In another experiment [2], Tversky and Kahneman showed similar results. That is, as shown in Fig. 3, 22 % people selected row C and 78% chose row D when 150 people participated in the experiment. In addition, the importance of representation in the risk perception was mentioned [2].

		State 1	State 2
Alternatives	C	400 people die	400 people die
	D	0 people saved	600 people saved
		1/3	2/3 ← Probability

Fig. 3. Another example of risk seeking for negative prospects

The lessons from these experiments are;

- The public do not understand jargon and expected value [3].
- While experts obsess about numbers but the public do not.
- Representation is important for the public acceptance.
- The public favor taking a risk to avoid a sure loss.

Thus, as discussed above, since the public's risk perception is risk seeking for negative prospects, the risk perception shown in Fig. 4 could be emphasized to the public in the pro-nuclear point of view. That is, in Fig.4, row A and row B could be energy transition and pro-nuclear policy, respectively. Because the public feel that the fine dust pollution and the ruin of mountain forest become more severe nowadays, and understand that these are due to the energy transition policy.

		State 1	State 2
Choice	A	fine dust forest loss	fine dust forest loss
	B	radiation	clean air
		0.0001	0.9999 ← Prob.

Fig. 4 Risk communication using risk seeking for negative prospects

2.2 Prisoner's Dilemma

The prisoners' dilemma [4] is a game theory in social science. It helps us understand what governs the balance between cooperation and competition in business, in politics, and social conflicts.

The traditional prisoners' dilemma can be explained in Fig. 5. Without cooperation between prisoner A and B, they eventually arrive at Nash equilibrium [5] where both prisoners confess.

Under the energy transition policy of Korean government, Korean nuclear energy industry, nuclear energy R&D, and nuclear engineering school have been strongly shaken for two years. If this energy transition goes further, the root of nuclear energy industry, the base of nuclear energy R&D, and students of nuclear engineering will disappear within two years in Korea, even though the nuclear engineering technology and manpower have been raised for 40 years in Korea.

Of course, everyone knows the energy transition policy will be discarded, and instead, an enhanced pro-nuclear energy policy will be carried out if the current opposition party would come to power. However, it would be too late to revive the nuclear energy industry two or three years later.

		Prisoner B keep quiet	**Prisoner B** confess
Prisoner A	keep quiet	A: 1 yr in jail B: 1 yr in jail	A: 15 yr in jail B: free
	confess	A: free B: 15 yr in jail	A: 5 yr in jail B: 5 yr in jail

Fig. 5. An example of traditional prisoners' dilemma

Thus, it is the time to cooperate between anti-nuclear group and pro-nuclear group to make a new energy transition plan which would not root out the nuclear energy industry, and would be acceptable by the public. If a new energy transition plan is cooperatively prepared, it should be also kept in the next new government.

The current energy transition showed many problems such as fine dust pollution, and a lot of money loss of KHNP, etc. Thus, Moon's government would like to control the speed of the energy transition. Thus, the new energy transition plan could be used as an exit strategy of Moon's government.

One of the successful examples for solving the prisoner's dilemma is the world fair trade with WTO (World Trade Organization) [6]. Although all nations want to raise their tariff to protect their industry like the prisoner's dilemma, each nation cooperates with others since the cooperation is the best strategy. Because the cooperation becomes the new Nash equilibrium since WTO solve the problems caused by the conflicts among nations.

If a new energy transition plan is prepared, the plan would be monitored by the public who can judge the defected side through the election of president or of national assembly members.

One of the typical examples for not solving the prisoner's dilemma is the Afghanistan problem [7]. If Afghanistan government, Taliban, and USA had cooperated, they could solve the prisoner's dilemma of Afghanistan problem with a peaceful negotiation. One of the failed results in solving the prisoner's dilemma is the tragic demolition of the giant statues of Buddha at Bamiyan in Afghanistan as shown in Fig. 6.

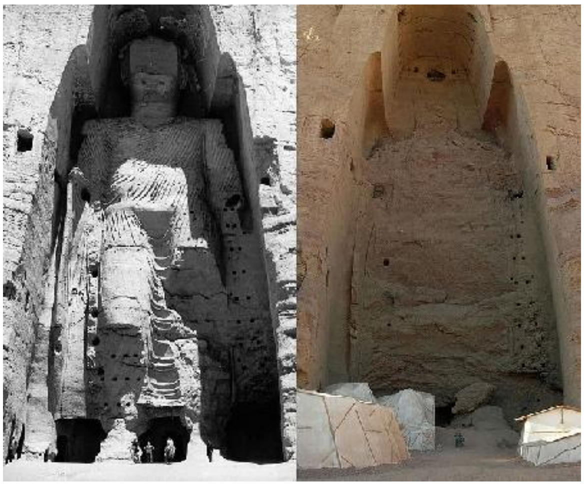

Fig. 6. Bamiyan Buddha in 1963 and in 2008 after destruction by Taliban

3. Results and Conclusions

Since the public's risk perception is risk seeking for negative prospects, the framed risk perception shown in Fig. 4 should be emphasized to the public.

It is the time for anti-nuclear and pro-nuclear group to cooperatively prepare a new energy transition plan to solve the prisoner's dilemma in Korea. If it fails, then the base of nuclear energy industry could be ruined as the destruction of giant statues of Bamiyan Buddha. Also, it could be used as an exit strategy to modify the current controversial energy transition policy of anti-nuclear group.

Acknowledgement

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