Chapter 18
Governance and Forming Agreement for Societal Safety

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Abstract This chapter reviews problems that surround high-level radioactive waste (HLW) and discusses what the governance of societal risk is. Governing all the risks scattered throughout the society takes multidimensional evaluations of trade-offs among multiple benefits and risks, and fair decision-making is essential for reaching agreements among members of the society on risk governance.

Keywords Agreement formation · Ignorance · NIMBY · Risk governance · Risk trade-off

18.1 For Governance of Societal Risk

18.1.1 What Is Risk Governance?

One of the purposes of Societal Safety Sciences is to study how to reduce risk. For its safety and security, our society has to take on reducing risks that are present here and there within. For identifying, analyzing, evaluating countermeasures, and properly performing tasks at each stage, scientists, governments, the industrial sector, and citizens have to complete their roles. Renn (2008) reported the necessity of cooperation among public and private actors in managing risks related to them for risk governance, i.e., the society to control risks. Societal risk governance means for each stage of societal risk control, the society selects proper members to perform the tasks; therefore, it requires agreement with trust and faith on which organizations and individuals assume the role of risk control.

This book, so far, explained how the society properly performs analysis, countermeasures, and evaluation of risks based on agreements by the whole society at times. The book, however, also revealed cases when the society failed

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to share common understanding of analysis, evaluation, and control for risk governance due to reasons like uncertainty and complexity of risks themselves or conflict of interest and different sense of values among the society members. Typical examples of the latter are the problems of global warming and handling high-level radioactive waste (HLW).

18.1.2 HLW in Need of Governance

There are about 400 nuclear reactors in the world. Brunnengräber et al. (2015) pointed out that spent HLW so far sums to 270,000 tons and is increasing at a rate of 100 double-deck buses annually. Most of HLW are stored within nuclear power generation facilities or storage plants; however, proper processing of them for permanent disposition is an urgent issue to solve because of possible risks of radioactive contamination caused by terror attacks or natural disasters. It takes several tens of thousands of years for HLW to decay to safe levels. The most desirable risk control, currently, is to bury them to depths of several hundreds of meters.

Governance about deep geological HLW repositories involves a number of problems including extremely long-term risk analysis of HLW, evaluation of effect, and reliability in technologies for underground burying, checking the economic effect in estimating the cost, and dealing with uncertainty. We also have to face the ethical issue of passing down the negative legacy of HLW to the future generation in turn for gaining the convenience of nuclear energy. One of the factors that make risk governance of HLW extremely difficult is that the residents in the area to build risky facilities often develop the attitude called "not in my backyard (NIMBY)" that they think building such facilities near where they live is troublesome although they recognize the social needs for them. In fact, regions near the sites to build final underground-burying facilities have to carry the burden of direct risk and harmful rumors of HLW and other accompanying risks to the stigma. An overall social agreement is hard to reach because people would rather not have the final location of deep HLW repository near where they live, even though they acknowledge and agree to the overall argument of deep HLW repositories.

The needs for cooperative and step-by-step approaches between residents of the proposed site and the stakeholders are internationally recognized (NEA 2010) for forming an agreement of geological disposition of NIMBY-type risks. A cooperative approach here means opportunities for the residents in deciding whether to accept or deny the construction plans through early and frequent participation to hearings of the stakeholders' plans so they can ask questions and voice their opinions. A step-by-step approach means to prepare a number of stages in forming the agreement with ample time at each stage so the decisions are rational and adequate based on

thorough discussions. Among the EU countries that apply cooperative and step-by-step approaches, none have finalized agreements about deep HLW repository locations other than Sweden and Finland.

18.2 Trade-Offs About Societal Risks

18.2.1 Dilemma with Risk Governance

One of the problems to solve for governance of societal risks is to balance out the number of risks and cost. Graham and Wiener (1995) brought people's attention to the trade-off relation of reducing one risk factor that can raise another risk with the example that banning chlorine in drinking water can lower the risk of developing cancer; however, the act can raise the risks of other water-caused infectious diseases like cholera. Wolf (2011) showed that efforts in AIDS prevention saved a large number of lives; however, allocating medical staffs to AIDS prevention programs led to shortage of personnel in other medical activities causing weakening of the entire health system in Africa with higher health risks. These cases are facing the dilemma of whether to counter a specific risk or to leave it alone so other risks do not have to increase. Another common dilemma is whether to spend on a specific risk or not to spare the expense so other risks are under control.

18.2.2 Risks and Their Trade-Offs

Graham and Wiener (1995) warn about the problem of risk trade-off that has surfaced frequently. It is a problem that reducing a target risk can give rise to new risks that conflict with the target. They categorized risk trade-offs into four types depending on whether the target and the conflicting risks are of the same nature and whether the socials groups that the risks affect are the same or not. When the same risk starts to affect another social group, it is called "risk transfer." Intergenerational risk transfer is the form of risk transfer with risk reduction for the contemporary generation causing the same risk to the future generation. Problems that we face also include risk transfer from a certain social group leading to the same risk to another group.

Risk of HLW involves the problems of risk management for the whole society pushing the risk to a specific region and of transferring the cost and risk down to future generations so the contemporary generation can avoid the risk. These problems involve ethical questions of whether risk transfer is fair or what our responsibilities are against our future generations.

18.2.3 Dilemma of Distributing Cost of Diverse Risks

Risk governance also has to solve the problem of cost distribution against diverse risks when the whole society has limited resources of cost management. Solving this problem involves political judgments of putting priorities on multiple risks. Shrader-Frechette (1991) pointed out the dilemma about conflict of social costs that spending cost on one risk management led to shortage of management costs for other risks. She claimed that solving the dilemma requires controlling societal risks to levels acceptable to the whole society.

Judging the amount of cost and level of risk control takes comparing diverse risks with common metrics. There are two common metrics: one to compare the levels of social acceptance and one to estimate the necessary costs in lowering risks to acceptable levels. First, we need a scale to compare magnitudes of risks that take different forms to evaluate the levels of risk reduction acceptable to the society. In the fields of environmental risks in Europe, the USA, and Japan, risks of death caused by environmental contamination with chemical substances have targets of 1 in 1 million. If a specific risk is present today, we have to lower its level to one accepted by the society.

For comparing costs of risk reduction, we need to calculate monetary spending in saving one life from each risk event. Wolf (2011) estimated the cost for saving a single life, i.e., the value of preventing fatality, at 1.4 million pounds in the UK. Based on this value of preventing fatality, we can evaluate whether a regulation for reducing risk is a cost-effective policy or not. In any case, how to distribute cost for management of diverse risks and what evaluation standards we base the distribution on are problems that need agreement by the whole society.

18.3 Forming Agreements for Risk Governance

18.3.1 Movement of Citizen Engagement in Public Plans

Europe and the USA have formed systems to seek citizen agreement to government policies by offering stages with citizen participation to discuss scientific technologies, policies, and regulations with societal risks. For example, Denmark is organizing consensus conferences to discuss regulations on risks that accompany introduction of scientific technologies like genetic engineering to form an agreement with all its people. EU countries have also engaged citizens into policies about deep HLW repositories as part of their cooperative and step-by-step approaches. Europe and the USA have formed a variety of citizen engagement meetings for citizen participation in determining public policies that affect the environment and health because citizen or resident oppositions had turned down more public policies and the administration offices started to lose credibility among the citizens.

More citizens, not satisfied with representative democracy leaving decisions about public plans to elected officials, these days demand direct democracy that involves citizens into decision-making or deliberative democracy that allows citizen participation into thorough discussions. Public plans that involve risk cannot win social agreement unless information is made available to the citizens early on, and public opportunities are offered to involve citizens into the discussions.

Citizen engagement in forming agreement on public plans with societal risks, however, can have disagreement not only between citizens and administrations but also disagreement among civil groups from differences in their senses of value about the environment or economics, and at times social agreements are hard to reach. For example, in trying to establish a public plan with environmental risk, some affected citizens believe the value of environmental preservation cannot be traded off with economic-based monetary compensation and, at times, the society cannot reach unanimous agreements (Skitka 2002). One reason for the difficulty in forming a social agreement is for those involved, recognizing the need to make mutual concessions is sometimes unacceptable.

18.3.2 Difficulty in NIMBY-Type Risk Governance

For public plans that involve NIMBY-type risks, the administration has to look for procedures that all social members of the affected area can accept. The procedure, in fact, is one that everyone recognizes that the selection process is fair without discrepancies and acknowledges decisions made through such procedures are reasonable results that everyone has to agree with.

When trying to develop an unbiased procedure, a method proposed by Rawls (1999) that places citizens in original positions under veil of ignorance is effective. Rawls explained that the fundamental principle for unbiased distribution of social resources takes the condition that all social members are unaware of their own individual attributes. The method creates a hypothetical condition that places a veil of ignorance on everyone, so no one knows where he stands and can accept an unbiased distribution that maximizes benefit to the most suffering.

Rawls focused on fairness in the distribution method of social resources; however, we can also apply the veil of ignorance in assuring fairness in procedures of forming agreements. Applying Rawls' veil of ignorance to selecting the location of deep HLW repository leads to the following: All members of the society, after recognizing the need for deep HLW repository for the society as a whole, acknowledge that anyone can end up living in the region that is determined as the final location of deep HLW repository. If all citizens are under the veil of ignorance that hides whether their regions can meet geological safety or economical requirements, they can start unbiased discussions about what are important as evaluation standards for deciding the final location. Selecting the region suited as the final location based

on the evaluation standards that were so determined will have the citizens decide to accept the results because they had agreed that the selection process was unbiased.

Reaching an agreement about NIMBY-type risks requires proposing actual citizen engagement based on veil of ignorance followed by deliberation by the whole society.

18.3.3 For Risk Governance

Risk governance means cooperative activities by the whole society to make use of limited resources for well-balanced control of all risks scattered throughout the society.

As we discussed earlier, the problem of necessary resource distribution needed for risk management strongly affects risk governance. As we have to plan how to distribute the budget for preparations against earthquakes and global warming, we are faced with the problems of distributing cost for measures against diverse societal risks. Our budget is limited, and we, of course, have to form a balance between the cost of risk preparation and the convenience of risk reduction, but at the same time, we have to consider different evaluation standards like fairness in risk-taking and urgency in risk reduction for settling the budget distribution. Placing priority on which standard takes not just scientific evaluations, but it requires agreement by the whole society based on ethical and political judgments.

It is important that all social members share a common recognition that forming agreements about societal risks requires diverse evaluation of the trade-offs among multiple benefits and risks. In addition, governing societal risks requires all those affected to take steps beyond their own interests and agree on the procedures of making decisions that all can recognize unbiased.

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