

Attitude Toward the Geological Disposal of Radioactive Wastes in Japan: the Opinion of the Youth prior to the Tohoku Earthquake

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ABSTRACT: The disposal of nuclear wastes is one of the most controversial issues faced by authorities in Japan. In this regard, a survey was conducted among 172 university students to analyze the attitude towards the siting of a nuclear waste repository in the country. The study focused on a number of variables that influenced the perception of risks before the 2011 Tohoku earthquake and tsunami. Results indicate that nuclear wastes were not a top priority for the Japanese public before the event. However, there was already a strong concern about the potential leakage of radionuclides. Most respondents believed the government would take proper steps to protect them, but overall, trust in authorities was modest. Moreover, people were especially doubtful about scientists. Findings from the survey showed a polarization between supporters and opponents to the project. The NIMBY (not in my backyard) phenomenon was relevant, as acceptance decreased drastically if the facility located near the respondents' residential place. Economic incentives might not be enough to overcome the reluctance towards the siting and therefore, authorities would need additional strategies to solve the controversy. At this stage the study provides only partial answers to a complex issue. Nevertheless, the study adds new information about public attitude on radioactive wastes, and help policy-makers in subsequent phases of the repository program.

Key words: Risk perception, Public attitude, Youth, Radioactive waste, Geological repository, Japan

INTRODUCTION

A proposal of the Japanese government for the geological disposal of high-level radioactive wastes (HLW) generated an intense debate about the risks and benefits of the plan. The radioactive escape that followed the Tohoku earthquake and tsunami in March 2011 brought nuclear energy back into the eye of the storm. The authorities point out the urgency to permanently isolate nuclear residues by building a repository at about 500-m depth in a stable geologic environment. They also emphasize the responsibility of the present generation to do so. Previous to the earthquake however, there was an important sector of the public who was skeptical about the project. One of their main concerns was precisely, the potential leakage of radiation. The number of accidents that occurred in recent years at various power plants around the country played a significant role in the perception of nuclear activities. In effect, the explosions at the uranium-processing facility of Tokaimura in 1997 and 1999, the leakage at Mihama in 2004, and the events at

Kashiwazaki-Kariwa in 2007, had already influenced people's trust in the administration affecting also the credibility in the repository program. This perception is expected to have worsened after the nuclear crisis at the Fukushima reactor.

It is widely accepted that the public attitude towards a new technology or project is essential to determine its feasibility. The lack of public acceptance has made very difficult, even impossible, the siting of spent nuclear fuel in most countries (Sjöberg, 2004). Nuclear waste disposal has sometimes been called the Achilles' heel of the nuclear power industry. Without an acceptable solution for disposal, it appears irresponsible to continue the further use of nuclear power (Bodansky, 2005). Thus, the objectives of the present work are: to investigate the attitude of people towards the construction of a geological repository in Japan before the Tohoku crisis; to evaluate what attributes influenced people's perceptions at the time; to assess the relevance given to nuclear issues in relation with other problems; and to explore whether

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the NIMBY (“not in my back yard”) phenomenon was present. Finally, the paper investigates what conditions would incline society to accept, or at least make more tolerable, the storage of nuclear wastes.

The literature includes a number of studies on risk perception and acceptability of nuclear power by the Japanese society (Hinman *et al.*, 1993; Shimooka, 1993; Tsunoda, 1999; Tsunoda, 2002; Tanaka, 2004). The present work focuses on a proposed nuclear-waste repository, and expands the previous analyses by exploring not only the reasons why people (specially the youth) may oppose the development, but also what compensation they would expect in exchange for the burden. Public opinion is an evolving process that needs to be addressed on a regular basis in the context of new circumstances. In this regard, the study is the basis for currently ongoing research aiming to understand changes in risk perception following the events at Tohoku in March 2011.

Rather than trying to discern a complex situation at once, the present study concentrated on a set of variables such as dread, trust, and acceptance of risks. While these factors are widely known, there are important distinctions in how scholars across fields understand them. In the present paper, dread refers to the general concern, justified or not, that the waste facility might produce health and/or environmental hazards in the host area. Moreover, the term reflects the public worry about potential harms due to the shipment of radioactive wastes, and the potential decline in property values along the transport route and surroundings of the disposal site. Several studies considered trust as another key variable to understand risk perception. According to Cha (2004), trust is the amount of confidence that individuals have in institutions both to provide accurate information about risks and manage risks directly or indirectly. Based on this definition, the study measured the degree of trust of the youth towards experts and administrators. It is anticipated that a low credibility in government and regulators will constitute a major obstacle to the successful implementation of the storage program. Finally, the analysis focused on the acceptability of the siting. The acceptance of a determined risk would be grounded more on personal judgment (which is influenced by complex social, cultural, moral, political and economical factors) rather than on a scientific calculation. Therefore, we considered the “acceptance” of a nuclear repository simply as the attitude towards it. For some people, the underground disposal of nuclear wastes is the most attractive measure to control the hazard; for others, the facility represents a new threat that will be there for the life time of several generations. The study investigated how willing the

public was to live with a storage facility nearby. Even though the selected variables are only part of the puzzle, outcomes from the work provide new insights into people’s points of view and concerns, and have a direct application for decision makers in Japan.

MATERIALS & METHODS

A questionnaire containing 54 items related to disposal of high-level radioactive wastes was circulated among 172 undergraduate students taking lectures in geology and natural geography at the Daito Bunka University in Saitama, at the outskirts of metropolitan Tokyo. The questionnaire was distributed before the earthquake and tsunami that affected Tohoku in 2011 and therefore, it might not represent public perceptions after the event. The students belonged to diverse faculties which included social-human environmental sciences, literature, foreign languages, economics, business administration, law, and international relations. The survey was carried out after a brief lecture on geological storage and the plan of the Japanese government to address the issue. Males represented 63.4 % of the respondents, females 36.6 %. There was only one questionnaire that was not completed, which means the participation rate was above 99 %.

Demographic variables in the poll included gender and geographical origin. Age was generally between 18 to 21 years. Other characteristics as race/ethnicity and socioeconomic status are also associated with perception (Greenberg, 2005), but they were not considered due to the homogeneity of the population. In effect, Japanese people belong overwhelmingly to a unique ethnic group, whilst most of the population consider themselves part of the middle class. The familiarity with high-level wastes and a nuclear repository was assessed by asking the participants whether they knew those concepts already, if they had heard about them before, or whether the lecture was their first approach to the subject. Other questions focused on perception variables: issues of major concern; feelings of dread; trust in agencies and the government; and acceptance of risk. Items were measured on a 4-points scale ranging from “agree” (score: 1) to “disagree” (score: 4) or from “strongly worried” (score: 1) to “not worried” (score: 4). The questionnaire was originally designed in Japanese, so slight differences in the nuances may be inevitable due to translation.

Given the lack of funds, the survey was limited to students currently residing in the Saitama area. Nonetheless, the rationale is that students would bring to university their home and school values, and these would be representative of a wider community (Duncan,

1999). In effect, the poll included participants from 23 of the 47 prefectures in Japan, plus a number of Chinese students. The study included every district of the country except Ryukyu, which comprises Okinawa and surrounding islands. In Japan, there are many instances where a survey conducted in one district can be useful for predicting the attitude of people in another district (Tanaka, 2004). Thus, even when a national survey and a larger number of respondents are always desirable, the research is still valid to gain an overview of the general attitude towards nuclear storage in Japan.

RESULTS & DISCUSSION

The survey showed that regardless of their place of origin, 21 % of the students were already aware of both HLW and geological storage. While 60 % of the students manifested some familiarity with at least one of the concepts, 19 % of the respondents (equally divided between men and women) had never heard about them. These figs reveal that youth awareness about the disposal of nuclear wastes was relatively low. In addition, results reflect the general disinterestedness of the Japanese society towards public affairs. This is in agreement with similar studies (Sharma, 1997; Karimi, 2002; Shobeiri *et al.*, 2007), which emphasized the need to reorient school curriculums from an environmental perspective. The last years have seen a considerable debate about the increasing apathy of young Japanese to engage in the decision process. A clear example is provided by the voter turnout within the country. While voting turnout in most developed countries reaches up to 95% (as in the case of Australia), the general elections held in Japan in September 2007 averaged 52.3%. This value is consistent with a decreasing trend from approximately 73% in the 60s to a minimum of 48% in 2000. According to Kakuchi (2003), voting turnout ranges between 60 and 70% for Japanese over 70, but it is barely over 50% for people in their 30s or less. Whatever the reasons behind the phenomena, personal experience in Japan leads us to think that apathy among youth is largely driven by the sense that welfare and prosperity come for granted and therefore, there is no need to change the status quo through involvement in civic or political debates. Thus, decisions are left entirely in hands of a minority group or ruling elite. Nevertheless, it must be noted that recent attention drew by the media and environmental organizations, as well as the campaign launched by the federal government to gain support for HLW disposal are giving the public a closer insight into the problem.

The public is most concerned about hazards that directly and immediately influence them, their families

and friends (Baldassarre and Katz, 1992). Then, it can be assumed that people will be more preoccupied by issues confronted on a daily basis rather than worrying about a nuclear repository which, can be postponed or even delegated to future generations. In view of this, respondents were requested to rank the transcendence of building a geological repository in relation with other problems. The economy of the country was at the top of the list, followed by environmental pollution, health and pension system, and taxes. Radioactive wastes ranked eighth out of 10 different items. Nuclear-power generation and immigration were at the bottom of the list (Fig.1). While 25 % of the students agreed that the economy is the main priority to be addressed, waste disposal was the only variable never ranking at the top, reaching a maximum score of 2 from just 8 % of the participants. Similarly, only 6 % of the individuals thought that other activities on nuclear power must be prioritized. Thus, it can be confirmed that people were more concerned for problems threatening them at the individual level, rather than worrying about less tangible hazards not expected to affect their lives at least in the short term.

Unlike nuclear issues, environmental pollution was perceived as a large risk. This apparent contradiction stems from the fact that pollution is generally associated with the contamination of soils and freshwater, ozone depletion, and global warming, all phenomena with evident consequences. In contrast, people did not perceive nuclear residues as the result of electricity consumption, but as something distant, unrelated to daily life. Once aware of the causes and effects, the public is usually willing to shift into more "environmental-friendly" practices to mitigate the problem. Feeling good about doing something good for the environment has a strong influence on people's behavior (DeYoung, 1986), and a well designed campaign is expected to increase participation rates (Omran *et al.* 2009). Therefore, it is expected that a more active campaign of information will contribute to bring consciousness about the fact that nuclear wastes are a consequence of our energy requirements, generating a sense of commitment that could improve the willingness of the citizens to consider the siting of a geological repository.

The fear to nuclear wastes was measured through a Likert scale ranging from 1, or high dread, to 4, or feeling of calm. Table 1 shows that people were especially afraid of the leakage of radionuclides to the surface. Unsurprisingly, the quality of food products from the region constituted another issue of high concern. These observations are consistent with the growing national concern about pollution and protection of the environment. While shipping

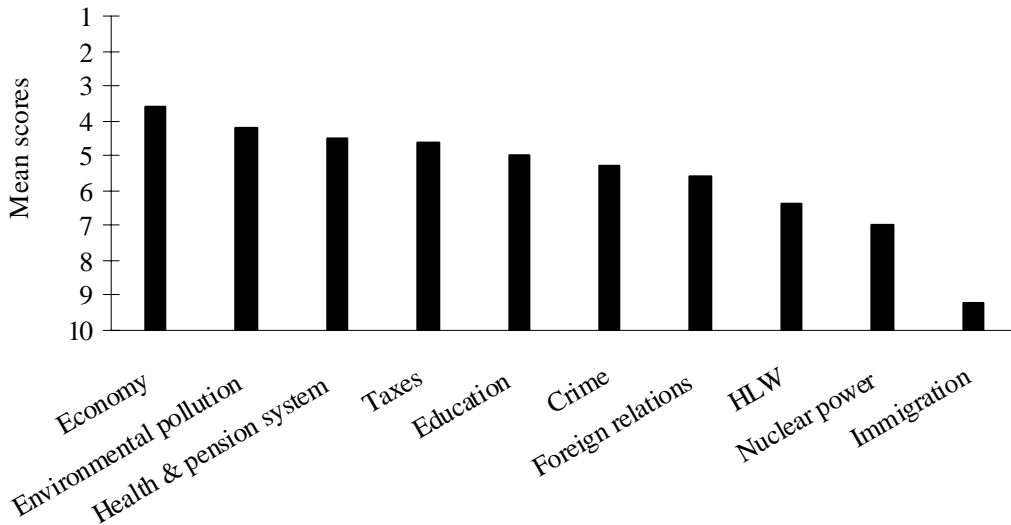


Fig. 1. Mean scores for issues that worry the Japanese youth (1: maximum worry; 10: minimum concern)

Table 1. Fear of repository activities

Risk (1: strongly worried; ...4: not worried)	Mean score (Std. Dev.)	Strong worry %	Not at all worried %
Radiation will leak into the ground and contaminate soil and waters	1.7 (0.75)	41.9	2.9
There may be an accident at the repository	1.9 (0.84)	34.3	4.1
An accident can occur during the transport of nuclear wastes to and from the site	1.9 (0.86)	36.6	5.2
There may be a terrorist attack to the facility	2.4 (0.98)	21.5	13.4
People may get sick from eating animal products or vegetables from the area	1.8 (0.86)	45.9	5.2
The land and property values in the region will decrease	2.6 (0.96)	16.3	16.9

accidents still caused preoccupation, respondents were less anxious about the possibility of a terrorist attack, or a reduction in land prices after the facility construction.

People tend to fear the unknown and in principle, we expected higher levels of dread in individuals with less knowledge about the repository. However, the Spearman rank correlation coefficient ($r: 0.11$) indicated that there was no relationship between the calculated scores and the level of awareness. This suggests thus, that dread would be independent of the person's background, but largely driven by emotions. People are more confident in preventing human threats such as a terrorist attack or a traffic accident, but feel more vulnerable to natural hazards, as they depend on a number of variables that can be only inferred to an acceptable level, but are seldom fully understood.

The word "nuclear" is commonly associated with disaster and death (Slovic *et al.*, 1991). Then, the survey explored also the fear of nuclear issues in relation to

other risks of major concern: nuclear war was the most feared hazard (Fig. 2). This high level of dread may be attributed to the memories of Hiroshima and Nagasaki, and the thousands of Japanese killed during World War II. People remember negative information about risks more than positive information (Siegrist and Cvetkovich, 2001). Even when young generations grew up in a different world, the images of the war were not totally forgotten, coming back through school, films, and the media. In Fig. 2 however, HLW and nuclear power are located in the right quadrant, appearing as significantly less dreadful than most of the hazards in consideration. This is probably related to the fact that the Japanese society coexisted with nuclear technologies for many years. While more than 67 % of the students were very worried about nuclear war, only 30 % had the same feeling in relation to a repository.

As pointed out by Tokushige *et al.* (2007), any factor that makes a hazard unusually memorable, could seriously distort perceptions of risk. In this regard, it is not surprising that before the nuclear crisis at

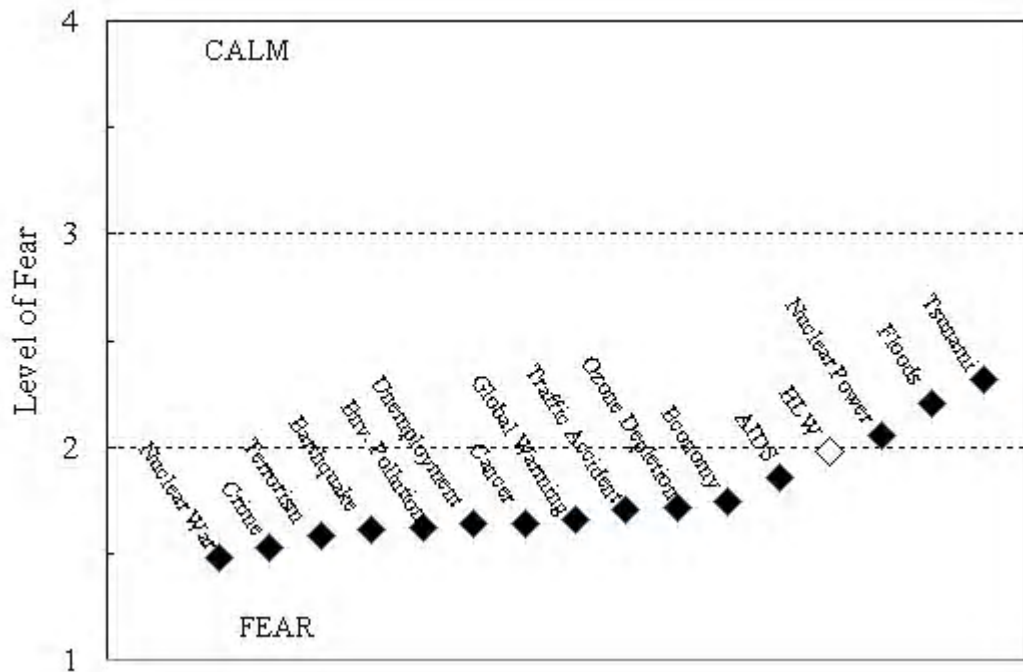


Fig. 2. Feeling of dread to different hazards

Fukushima, crime ranked near the top of the list. Despite Japan is considered one of the safest countries in the world, a number of resonant murders and attacks, from the Sarin incident in 1995 to the massacre of Akihabara in 2008, triggered a shock in society. The large media coverage and the internal debate created by these events would have crucially impacted on public opinion about crime, increasing the anxiety and level of fear towards it.

The past decades have witnessed a widespread decline of trust in the leaders of our social institutions and in the institutions themselves (Kasperson *et al.*, 1992). As widely recognized, the lack of trust is one of the main reasons behind people’s opposition to a disposal facility. In this context, the study explored public confidence and trust in the government and agencies involved in the repository project.

As seen in Fig. 3, it was strongly believed that managers would respond effectively to tackle any potential failure (84%), and that any accident would be rapidly disclosed to the public (77%). Furthermore, 66 % of the respondents affirmed that the location for the storage would be properly identified. Finally, the participants estimated that previous to any action, the government would provide a detailed explanation of the risks involved (64%). The degree of confidence was strong or at least moderate for most of the items under consideration, which reflects a positive perception about the honesty and competence of the responsible

agencies. This opens a favorable prospect for the future, although authorities still face the challenge of maintaining such recognition by promoting public participation in the process, and through an open and transparent release of information in order to allow other players to draw their own conclusions.

Interestingly, trust weakened when institutions were analyzed at the individual level. The Congress received the lowest scores, with 74 % of negative opinion (Table 2). The city governments were considered the most reliable, although still with a negative image of 57 %. The prime minister and the prefectures appeared in an intermediate position. As seen above, people were not concerned about the technical skills of the regulators, but were reluctant to believe that their health would be prioritized over other benefits of the project. National authorities are the main proponents of the repository and thus, their safety assessment was not perceived to be objective. On the other hand, many prefectures and local communities have already expressed their disagreement with geological storage in their land enhancing the move against the central authority which is regarded as an intruder that not only imposes an undesired facility upon a scheduled community, but also forces its people to take the risk on behalf of the whole country. Then, it is not surprising that any local government opposing the project gain strong support from nearby residents, as people are usually against the dictates of “outsiders”. These results are consistent

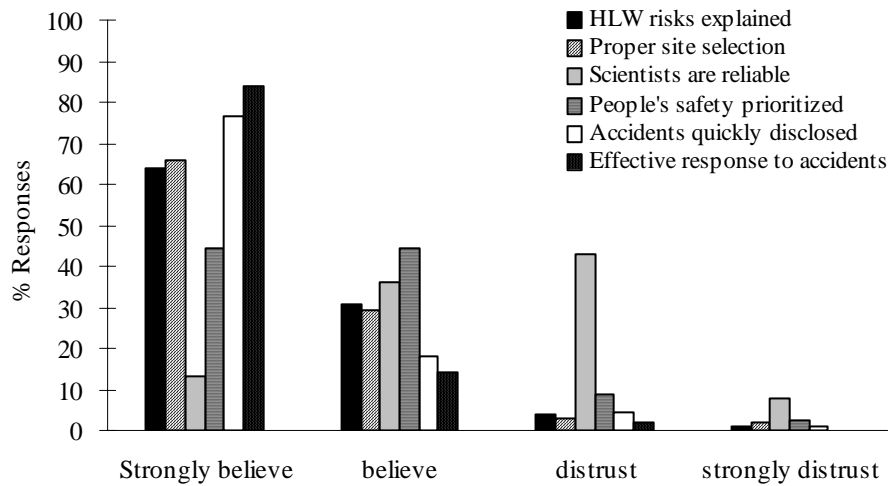


Fig. 3. Public trust towards the repository

Table 2. Trust in authorities (in percentage of responses)

	Strongly Trust	Trust	Distrust	Strongly Distrust	Total Percent
Prime Minister	9.5	31.4	36.1	23.1	100
National Congress	2.9	22.9	47.1	27.1	100
Prefecture Gov.	5.9	34.9	43.8	15.4	100
City Gov.	7.7	34.9	41.4	16	100

with the findings of Pijawka and Mushkatel (1991/1992), for the Yucca Mountain repository. In that study, the office of the Governor received the greatest trust (40 %), while the Congress, which had played a critical role in the decision process, was the least trusted institution (18 %). As the authors mentioned, this trend would suggest that state and local positions, which have characterized the potential risks associated with the project as larger than that suggested by federal agencies, seem to be more credible to the urban residents.

Finally, only 13 % of the respondents considered the scientists working in the program as strongly trustworthy. These findings are relevant as the public doubts about researchers may undermine any effort to gain acceptability for the project. But, what is the reason behind people’s distrust in scientists? According to some participants, the experts are normally affiliated with national institutes or universities and therefore, their conclusions would tend to be in line with the authorities. Again, it is not the competence of the scientists what is questioned, but their independence, along with the perception that either voluntarily or not, they might bias their findings in favor of the government initiative. A significant relationship could exist between a scientist’s place of employment and both political ideology and attitude towards risk (Lynn, 1986).

According to this author, government and university scientists are more likely to believe that risks are exaggerated by the media and the public. Hence, it is predicted that the credibility of the project could be improved by promoting a more active participation of private companies and independent consultants with background in waste disposal. In addition, trust in researchers and regulators can be further enhanced by appointing periodic reviews from international organizations with no commitments to policy makers in Japan. In this context, the students were also asked about their preference for the selection of the disposal site and for management of the facility: scientists, regulators, private companies, or a composite body. Consistent with the findings above, 62 % of the respondents supported the creation of a composite body, relegating other institutions or groups to percentages below 20 %.

It is still unclear however, whether trust between scientists and the youth can be easily restored. Some students argued that researchers are “elitist and isolated from reality”. While these were specific comments, they may reflect the perception of a larger population. In fact, many of us have been exposed for years to the debate between professionals in academy and industry, something that closely resembles the student’s ideas. While some colleagues in academia

associate their counterparts in the industry as business oriented, the latter often think that scientists specialize in irrelevant topics. The analysis of this controversy requires further discussion, but all in all, it is argued that interaction between different parties, the promotion of joint-research at the national and international level, and a strict review and validation of new advances is fundamental to rebuild confidence in the scientific community.

The final part of the survey investigated to what degree the public could accept the sitting of the repository. The level of acceptance was relatively high, with an important polarization between moderate support and opposition to the project (Fig. 4). The most negative attitude appeared in the Saitama-Tokyo-Kanagawa belt where approximately 55 % of the respondents were against the project. A priori, it seems that acceptability would increase out of the big metropolis, probably due to the perception that the sitting will be accompanied by a large inflow of cash to the regional economy. However, the Mann-Whitney U test showed that at the 0.05 significance level there was no sufficient evidence to support differences between both groups (p: 0.22). Therefore, the null hypothesis of similar acceptability all over the country was considered to be valid.

Even when the public was aware of the necessity of a nuclear repository, 70 % of supporters for the sitting opposed the construction near their place of residence. This phenomenon where people agree on a risk (in this case a nuclear repository), but disagree if it is to be built where they live is popularly known as NIMBY. As a result, a large number of people in favor of the repository construction do not mean that they have accepted it. People may be inclined to support the sitting in a general situation, but might change their

minds when confronted with a local project. Thus, public acceptance could be better clarified based on the opposition level, rather than on the number of supporters. It can be expected that people who were in principle against the technology will remain so (van der Horst, 2007). On the other hand, positive responses do not assure that the degree of acceptance will be maintained, as some people are likely to change their minds latter on.

What would people do to stop the construction of the repository in their area? To clarify this question, the survey inquired how, and to what extent people would raise their voice against the construction. Half of participants said they would sign petitions (50.6 %), while others would expect to deactivate the project by voting for political leaders who are against the sitting (18.2 %). At the bottom line, 4.5 % of the respondents would join a demonstration, while nearly 6 % supported public meetings to debate the issue. The remaining 21 % of respondents expressed no intention to do anything (Fig. 5). These results showed that those interviewed were reluctant to be directly involved in any controversy or dispute and hence, are passive in their opposition. Any support for local protests or groups playing an active role against the project is tempered by the responsibility of keeping social harmony. Consequently, most people would find it socially unacceptable to express their opinion in an active or obvious way, and even when they may have an anti-project attitude, it does not mean that they are going to do something about it. For more details about this phenomenon, known as “value-action-gap”, the reader is referred to van der Horst (2007), and Barr (2004).

In spite of the fear, 25 % of the respondents said they would accept the construction of the facility in

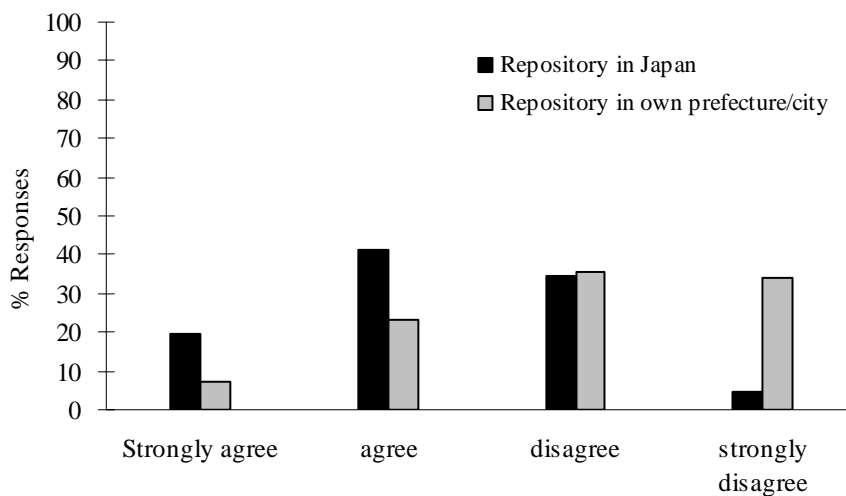


Fig. 4. Percentage of respondents in favor and against the nuclear repository

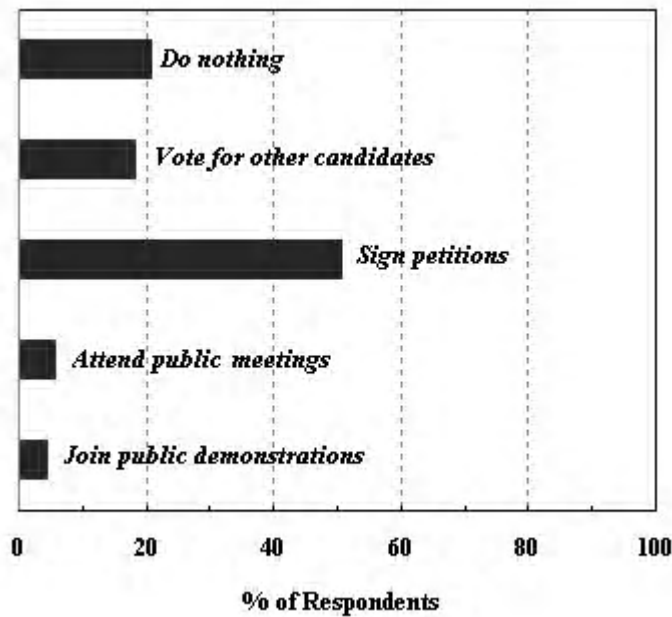


Fig. 5. How the Japanese youth would express its opinion against the project

Japan if it is beneficial to the nation. Another 40 % would adopt a similar attitude, although they were not strongly convinced. Confirming the NIMBY phenomenon however, only 7 % of the students were inclined to accept the sitting in their residential area, even if there are economic benefits for the local community. Another 22 % might accept the facility, but this value is nearly half of the acceptability in a national context. From smoking to drinking alcohol, from crossing a street to flying on a plane, there is a permanent trade of risk for benefits. Thus, it can be hypothesized that people would eventually trade the risk of living close to a nuclear repository in exchange for a reward. In fact, one of the main barriers to acceptance could be the fact that benefits do not go directly to the stakeholders but to the municipal or prefecture government. These institutions are distrusted and thereby, there are no reasons for people to take risks when the benefits are doubtful. In this regard, the poll assessed whether respondents who agreed with the sitting would accept the construction in exchange for a fair compensation. Approximately 25 % of the students agreed with the disposal if they/their families receive a payment of at least US\$ 1M. Similarly, 26 % of the people said that US\$ 100,000 would be acceptable. Nearly 10 % of the respondents would welcome the facility if the payment falls in between the above figs. The remaining 39 % preferred not to answer the question. The percentage of people willing to accept the repository was still significantly less than the support measured in a general situation suggesting therefore, that the majority of the people do not want to live close to a storage facility even if a

substantial incentive is offered. Communities and individuals under severe economic distress may be more willing to accept the risks associated with hazardous industries than more affluent individuals who are not struggling to preserve their economic viability (Hine *et al.*, 1997). The Japanese society enjoys financial security and a high standard of living that discourages any change, or the tradeoff of risk for additional benefits. Results suggest that for the Japanese youth, the cost of living close to a repository exceeds the potential gains. This suggests that the project should be moved either to communities economically depressed where it could encounter a more positive reception, or the compensation offered should be of such a magnitude that even the strongest opponents will not reject it. The case of South Korea provides a successful example of the approach. In here, the government announced financial support for whichever community accepted the disposal, took measures to revitalize the job market in the region, and provided veto power to local residents by introducing a referendum on the final site selection. The subsequent reaction was not concern, but rather fierce competition between four cities to host the facility (Chung and Kim, 2009). It may not be the ultimate solution to the problem, but the offer of compensation packages would be a key strategy to change public attitudes.

CONCLUSION

Understanding public perceptions and concerns is fundamental to gain a positive reception for the construction of a large-scale project. In this context, the present study examined the attitude of young

Japanese towards the siting of a nuclear repository in the country. Results represent people's attitude before the nuclear crisis at Fukushima in March 2011. It is concluded that people were not well aware of the geological storage of radioactive wastes, although the influence of the media and the political debate recently installed would have increased the knowledge on the problematic. The society wants solutions for daily struggles, and shows little concern for what do not impact directly on the day to day. The disposal of nuclear wastes is a particular problem and as such, it received a low recognition in comparison with other risks. In an apparent contradiction, the contamination of natural resources was ranked as highly important, suggesting certain confusion in the public, as HLW was not perceived as another environmental problem. This implies that increasing efforts to explain to the public the environmental threat posed by the radioactive wastes if they are not stored underground may translate into higher levels of acceptance for the repository.

People were also afraid of the leakage of radionuclides to the surface. This fear is expected to have increased substantially after the Tohoku crisis. However, at the moment of the survey respondents felt that common risks as crime and terrorism were more threatening than nuclear wastes. Nuclear war appeared as the hazard most feared by the Japanese youth. This could be related to the memories from Hiroshima and Nagasaki.

The research also indicates the need to strengthen the trust between the general public and administrative agencies. Confidence in site selection and management of the repository is shadowed but distrust in the government, especially at the national level. Nonetheless, there would not be hostility or active opposition to the project, which means the government still has the opportunity to achieve more credibility. It is likely that both formal and informal mechanisms of public consultation and a more active involvement of citizens in the decision process will make a significant contribution to build confidence in the siting. Distrust impacts also on the scientific community. Scientists working on the project are considered elitist and with a biased opinion. Communication strategies, reviews by independent organizations, and public debates may be the key to revert this perception.

In terms of acceptability, the study revealed a polarization between moderate support and slight opposition to the project. At the same time however, most people disagreed with setting a repository near their place of residence. In this context, the question is whether the NIMBY attitude can be overcome by trading risk for reward. The conclusion is that the

financial security and the high standard of life of the Japanese society mean that economic incentives alone are not attractive enough to overcome the fear. Again, the resolution of the problem may be associated with education and more fluid communication with stakeholders. This challenge requires further efforts to reach out to people who live around areas favorable for a siting, as well as disclosing the activities currently conducted by public organizations, explaining in a transparent manner the advantages and safety of the project, engaging residents in the political decisions, and designing a package of welfare incentives and compensations for those communities and individuals willing to accept the burden.

Finally, some limitations of the study should be pointed out. The questionnaire was responded exclusively by university students and therefore, further studies should explore the attitude of a larger sample of the population. Moreover, the survey focused on a number of variables affecting the public perception toward nuclear wastes. Thus, we are currently investigating which and how other parameters influence the public perception toward the risk, and how public perception evolved after the nuclear crisis in March 2011.

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