Energy Policy 88 (2016) 168–177

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Anti-nuclear behavioral intentions: The role of perceived knowledge, information processing, and risk perception

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HIGHLIGHTS

- The study explores anti-nuclear behavior from a risk information perspective.
- Risk perception and knowledge matter to anti-nuclear behavioral intentions.
- Inverted U relationship between knowledge and behavioral intentions is indicated.
- More understanding of nuclear power could reduce public opposition.

ARTICLE INFO

Article history:
Received 12 June 2015
Received in revised form
9 October 2015
Accepted 13 October 2015

Keywords:
Nuclear power
Risk perception
Perceived knowledge
Information processing
Anti-nuclear behavioral intentions

ABSTRACT

This study explored the key factors underlying people's anti-nuclear behavioral intentions. The protective action decision model and the heuristic–systematic model were integrated and adapted from a risk information perspective to construct a hypothetical model. A questionnaire study was conducted on a sample of residents near the Haiyang Nuclear Power Plant, which is under construction in Shandong Province, China ($N=487$). Results show that, as expected, perceived knowledge is vital in predicting people's information insufficiency, information seeking, systematic processing, and risk perception. Moreover, the inverted U relationship between perceived knowledge and anti-nuclear behavioral intentions is indicated in the study. Information insufficiency and information seeking also significantly predict systematic processing. Furthermore, people's behavioral intentions are motivated by risk perception but fail to be stimulated by systematic processing. Implications and recommendations for future research are discussed.

1. Introduction

Many nations, especially China, are facing two urgent challenges: climate change and future energy needs. Nuclear power is considered a suitable alternative and plays an increasingly important role in Chinese energy policy to deal with these challenges (Sun and Zhu, 2014). A short pause was caused by the Fukushima nuclear accident in 2011. Thus, China's medium- and long-term Nuclear Power Development Plan (2011–2020) and Nuclear Power Safety Plan (2011–2020) stated in October 2012 that China's nuclear power running capacity would attempt to reach 40 million kW by 2020. China is currently ranked first worldwide with 28 nuclear power reactors in operation and 24 nuclear power reactors under construction; this number of reactors is more than 35% of the world's total reactors under construction (International Atomic Energy Agency (IAEA), 2015).

However, the extent of nuclear power as a feasible energy option remains a vital but contentious energy issue around the world (Visschers et al., 2011). Nuclear power can provide electrical power without environmental damage and change. However, it can cause accidents with catastrophic effects and the need to transport and store radioactive materials. One of the nuclear accidents with the most widespread influence is the Fukushima nuclear accident that occurred on March 11, 2011, and it was followed by a tsunami. The accident released a large amount of radioactive materials that threaten human health and the natural environment (Nakamura and Kikuchi, 2011). Nuclear projects in many countries (i.e., Germany, Japan, and Switzerland) have been suspended or even ceased after the Fukushima accident. The Chinese government also decided on a temporary suspension of the construction of all

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http://dx.doi.org/10.1016/j.enpol.2015.10.009
0301-4215/

nuclear projects. Moreover, nuclear power generation can create radioactive waste. The storage of radioactive waste may produce radioactive materials that can threaten groundwater or other natural environments (Stoutenborough et al., 2013).

The public's perception of and behavioral responses to nuclear power are important to political decision making because the use of nuclear power and related siting issues usually cause public resistance that results in project delays and even the failure of nuclear policy (Glaser, 2012). The public views nuclear power as sensitive in the aspect of nuclear safety. Residents oppose the building of a nuclear power station in their neighborhood because of the potential threats of radioactive materials to their health and the environment. The "not-in-my-backyard" (NIMBY) strategy indicates that people always reject the construction of facilities with potential negative effects on their health and the environment (i.e., waste yard, incinerators, and nuclear power plants in their neighborhood) (Hubbard, 2009). Previous studies have explored public risk perception and acceptance of nuclear power (e.g., Mah et al., 2014; Visschers and Siegrist, 2013; Yuan et al., in press). However, the NIMBY phenomenon (i.e., people's opposition to the construction of nuclear power plant in their neighborhoods) has not gained much scholarly attention.

The present study focuses on the key factors that influence people's anti-nuclear behavioral intentions. A conceptual framework from the view of risk information was built based on the protective action decision model (PADM; Lindell and Perry, 1992, 2004, 2012), which is a multistage model that focuses on the information flow of individuals' behavioral response to risk, and the heuristic–systematic model (HSM; Eagly and Chaiken, 1993; Chaiken, 1980), which focuses on information processing strategies. A survey was conducted among residents near the Haiyang Nuclear Power Plant (HNPP), which is under construction, in Shandong Province, China. The structural equation model was used to explore the hypothetical model.

The rest of this study is organized as follows. Section 2 presents the theoretical framework, the construction of the conceptual framework, and the detail statements of hypotheses. Section 3 describes the sample, the process of data collection, and measures. Section 4 presents the extent to which data support the model by providing the results of the measurement model and the structural model. Section 5 provides discussions of the main findings. Finally, the theoretical implications and policy implications are recommended in Section 6.

2. Theoretical framework and hypotheses

2.1. The protective action decision model

The PADM is a multistage model that explains people's protective action decisions in response to environmental hazards and disasters (Lindell and Perry, 1992, 2004, 2012). Burton et al. (1993) define protective actions as "those actions that intentionally or unintentionally reduce risk from extreme events in the natural environment" (Lindell et al., 1997, p. 328). The PADM explains that people's risk perception is stimulated by the interactions of external information related to the hazards they are exposed to and their beliefs based on prior personal experience (Lindell and Hwang, 2008). The revised PADM focusing on information flow was proposed in 2012. People's risk responses are described as a process from reception of environmental and social context, to psychological processes, in turn to behavioral responses to reduce risk, and finally to feedback. The modified PADM discusses people's behavioral responses in risk situation systematically and in multi-stages, and it is beneficial for understanding the psychological decision-making process of their protective actions.

2.2. The heuristic–systematic information processing model

The HSM proposed by Eagly and Chaiken is based on research about experimental social psychology (Eagly and Chaiken, 1993; Chaiken, 1980). The HSM assumes information processing as an antecedent to the formation of individuals' attitude (Trumbo, 2002). The HSM includes a dual-process model; systematic and heuristic strategies are used independently or simultaneously when individuals process information (Trumbo, 1999). Systematic processing is a comprehensive and analytic process in which judgments are made by individuals' scrutiny of persuasive information (Chaiken, 1980; Trumbo, 1999). In this mode, information with higher standards for quality and scrutiny is needed for individuals' decision making (Trumbo, 1999). Heuristic processing is a stingy and limited information process in which individuals employ simple decision rules with less effort to arrive at decisions (Chaiken, 1980; Trumbo, 1999). Individuals tend to make few cognitive efforts in this mode and may agree with experts and the consensus (Aaker and Maheswaran, 1997; Trumbo, 1999).

2.3. Research model and hypotheses development

The PADM is widely used in disaster communication but has not been applied to explore people's behavioral responses to the construction of a nuclear plant. The PADM is also applicable because of the following reasons. First, the use of nuclear power is controversial in the view of the public because of the sensitive aspect of nuclear safety. Residents living near a nuclear power station are worried about the potential threats to their health and the environment. One threat is the potentially negative effects from nuclear radiation, which is often linked to cancer. Therefore, the construction of a nuclear plant can be viewed as an event that may affect local residents' risk perception. Second, the PADM explains that people's behavioral decision making in different situations of danger has a similar psychological process, and the construction of a nuclear plant poses a threat to human life alike. People's exposure to risk information triggers their risk perception, and thus perceived threat from the natural environment makes people consider reducing risk by taking protective actions (Lindell and Hwang, 2008; Lindell and Perry, 2012). Therefore, the logic of behavioral responses discussed in the PADM is appropriate for the context. In conclusion, using the PADM to explore people's behavioral responses to the construction of a nuclear plant is suitable.

However, the PADM does not consider information processing that may influence people's risk responses (Johnson, 2005). The HSM has been applied to a variety of circumstances outside the laboratory that includes the context of risk (Griffin et al., 1999, 2008). Furthermore, many previous studies have indicated that the HSM is a potential and valuable research paradigm used in risk situation (Kahlor et al., 2003; Griffin et al., 1999), and the topic has recently gained substantial scholarly attention (Smerecnik et al., 2012). One of the cornerstones was conducted by Griffin et al. (1999). The present research developed a model of risk information seeking and processing (RISP) by adapting and synthesizing the components of Eagly and Chaiken's (1993) HSM and Ajzen's theory of planned behavior (TPB) (Ajzen, 1988; Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). The model was applied to understand individuals' response to health risk messages. Therefore, the integration of the PADM and the HSM for research framework should provide a more comprehensive model to discuss people's behavioral response in the nuclear power context. The research model is illustrated in Fig. 1, and it asserts that people's perceived knowledge and their assessment of information insufficiency trigger information seeking. In turn, their information processing and risk perception are induced, and their behavioral responses