



# Nuclear power before and after Fukushima: The relations between acceptance, ambivalence and knowledge



Vivianne H.M. Visschers<sup>a,\*</sup>, Lasse Wallquist<sup>b</sup>

<sup>a</sup>ETH Zurich, Institute for Environmental Decisions, Consumer Behavior, Universitaetstrasse 22, CHN J75.2, Zurich 8092, Switzerland

<sup>b</sup>Risk Dialogue Foundation, St. Gallen, Switzerland

## ARTICLE INFO

### Article history:

Available online 18 July 2013

### Keywords:

Ambivalence  
Knowledge  
Nuclear power  
Longitudinal survey  
Fukushima

## ABSTRACT

Salient events, such as the nuclear accident in Fukushima, can change people's acceptance of a hazardous technology. The aim of the present study was to investigate how people's acceptance of nuclear power relates to their ambivalence and knowledge before and after Fukushima. Additionally, we examined what explains people's change in acceptance of nuclear power since Fukushima. We conducted a longitudinal survey in Switzerland. Overall, the relations between acceptance and ambivalence at both time points, and between acceptance and knowledge resembled inverted U-functions. The influence of Fukushima on ambivalence appeared to depend on people's prior level of acceptance. Change in acceptance since Fukushima could mainly be explained by prior support for nuclear power and, to a lesser extent, by knowledge among women and by ambivalence. Thus, prior acceptance levels seem to have a central role in people's acceptance of a technology after a nuclear accident.

© 2013 Elsevier Ltd. All rights reserved.

## 1. Introduction

Previous nuclear accidents have shown that such unexpected, salient events can change the public's acceptance of nuclear power (Eiser, Spears, & Webley, 1989; Lindell & Perry, 1990; Verplanken, 1989). The public's acceptance of an energy technology plays an important role in a country's energy policy. This was again highlighted after the nuclear accident in Fukushima, Japan, in March 2011: politicians in countries with upcoming elections, such as in Germany (state elections) and Switzerland (parliament elections), quickly decided under public pressure to phase out their country's nuclear power era. Investigating public acceptance of nuclear power and its antecedents and consequences is, therefore, worthwhile, especially after a nuclear accident. A few studies compared people's acceptance levels<sup>1</sup> of nuclear power before and after Chernobyl or Fukushima as well as factors that could explain the levels of pre- and post-event acceptance (e.g., Katsuya, 2001; Verplanken, 1989; Visschers & Siegrist, 2013). However, the determinants of people's *change in acceptance* (in light of specific nuclear accidents) of this technology have not been investigated thoroughly (cf., Eiser et al., 1989; Lindell & Perry, 1990; Verplanken, 1989).

One of the constructs that has been related to the acceptance of nuclear power and to the stability of acceptance is the ambivalence regarding this issue (Midden & Verplanken, 1990). In other words, to what extent people are torn between the positive and negative elements of this technology (Conner & Sparks, 2002). Midden and Verplanken (1990) found supporters of nuclear power to be more ambivalent regarding this technology than opponents are. Moreover, they found that more ambivalence seemed to be related to less stable attitudes over time. Consequently, more ambivalent people may be more easily affected by a salient event, such as the nuclear accident in Fukushima. However, their study was conducted *after* Chernobyl, and thus could not indicate to what extent people's change in acceptance after this salient event was related to their ambivalence about nuclear power.

In the current paper, we present a longitudinal survey that investigated people's acceptance of nuclear power and their ambivalence regarding this technology both before and after the 2011 nuclear accident in Fukushima. In addition, we examined people's knowledge about nuclear power and the relation of knowledge to acceptance and ambivalence.

### 1.1. Public acceptance of nuclear power

Since the late 1960s, the deployment of nuclear power has constantly been shaped by public attitudes. A few nuclear accidents and growing environmental concerns regarding the safe storage of

\* Corresponding author. Tel.: +41 44 632149; fax: +41 44 632 10 29.  
E-mail address: [vvisschers@ethz.ch](mailto:vvisschers@ethz.ch) (V.H.M. Visschers).

<sup>1</sup> Throughout this paper, "acceptance" refers to the level of acceptance (i.e., measured on a scale) and not to a binary value (i.e., yes/no acceptance), unless otherwise stated.

radioactive waste had gradually reduced acceptance levels of nuclear power in the western world up to the turn of the century (Bolsen & Cook, 2008; Rosa & Dunlap, 1994). However, in the beginning of the 21st century, opinion polls showed a rise in acceptance levels in the US and in Europe (OECD, 2010). The topic of climate change had entered the nuclear debate and offered an environmental bonus to the technology (European Commission, 2008). The climate change argument seemed to increase acceptance of nuclear power (Visschers, Keller, & Siegrist, 2011); however, this acceptance has been characterised as “reluctant” (Pidgeon, Lorenzoni, & Poortinga, 2008).

Directly after the nuclear accident in Fukushima, opinion polls showed a worldwide decrease in acceptance of nuclear power (WIN-Gallup International, 2011). Similarly, a longitudinal study in Switzerland revealed that the Swiss public showed less acceptance of nuclear power directly after the Fukushima accident compared to five months before (Visschers & Siegrist, 2013). However, this decrease appeared relatively small. Nine months after the Fukushima accident, a poll in Great Britain indicated that the public's opinion was more positive compared to directly after the accident (Ipsos MORI, 2012).

### 1.2. Ambivalence

The concept of *ambivalence* refers to the simultaneous presence of both positive and negative evaluations of an object (Conner & Sparks, 2002). Additionally, these evaluations need to have the same level of intensity (Thompson, Zanna, & Griffin, 1995). For example, a study in Germany found that individuals believed that a NATO military intervention in Kosovo (in 1999) was necessary but at the same time felt reluctant that innocent people were hurt (Hanze, 2001). Ambivalence should be distinguished from indifference, which implies that the person does not care about the issue. Ambivalence cannot only involve attitudes but also beliefs (Eagly & Chaiken, 1993). Ambivalent attitudes and beliefs have been found to be related to attitude instability and to be easily affected by environmental cues that make the object's positive or negative elements more salient, such as persuasive communication and an unexpected event (Conner & Sparks, 2002; Eagly & Chaiken, 1993). This so-called response polarization can result in more favourable behaviour towards the salient elements of the object. Attitudes and beliefs that are strongly anchored in prior knowledge structures are hypothesized to be less likely to result in ambivalence as they are more stable and less pliable (Conner & Sparks, 2002).

The studies investigating the pliability of attitudes have mostly used an experimental design in which respondents were consciously or unconsciously exposed to persuasive information (see Conner & Sparks, 2002 for an overview). Furthermore, the review by Conner and Sparks showed that knowledge has not been related to attitude stability or attitude change. We found only one study that investigated ambivalence and attitude stability related to nuclear power (Midden & Verplanken, 1990). The authors examined the same sample of respondents in five surveys between December 1986 and October 1988 and assessed the respondents' ambivalence using beliefs. Supporters of nuclear power appeared more ambivalent towards this energy source than opponents of nuclear power at all five measurements. Moreover, the nuclear attitudes of more ambivalent respondents appeared less stable over time than those of less ambivalent respondents. Attitude stability could mostly be explained by attitude position (pro vs. contra) and, to a smaller but significant extent, by ambivalence.

In short, because beliefs form attitudes (Fischbein & Ajzen, 1975), we assume that ambivalent beliefs can result in instable attitudes, in other words, in a change of acceptance after a salient

event. Ambivalence may thus explain people's change in acceptance after a salient incident. More specifically, it may explain why some people change their acceptance to a larger extent than others do. Nuclear power seems to evoke ambivalent evaluations among the public. It has not yet been investigated how a serious event, such as a nuclear accident, can affect the relation between people's acceptance of nuclear power and their ambivalence regarding this technology. Moreover, although it has been hypothesised that less ambivalent beliefs are more strongly anchored in knowledge structures than more ambivalent beliefs, the relation between knowledge and ambivalence, and whether ambivalence and knowledge can explain people's changes in attitudes have not been investigated.

### 1.3. Knowledge about nuclear power

It may seem straightforward that the amount of knowledge people possess about a technology is related to their acceptance of this technology. Knowledge is assumed to determine an attitude indirectly through salient beliefs as knowledge is one of the elements that form a belief next to, for example, stereotypes (Fishbein & Ajzen, 1975). The findings regarding the relation between knowledge and attitudes or between knowledge and risk perception are mixed: some studies found a positive relation, some found a negative relation and others did not find a significant relation (see Johnson, 1993 for an overview).

A similar picture emerges when only reviewing the studies about nuclear power knowledge and attitudes, probably because these studies differed in samples, types of nuclear power hazards, and types of knowledge assessments. Kuklinski, Metlay, and Kay (1982) found that more objective knowledge was related to more positive attitudes towards nuclear power among laypeople. In another study in the USA, knowledge about nuclear power generation in space was positively related to a higher acceptance of this technology (Maharik & Fischhoff, 1993). Also, more knowledge was associated with lower levels of perceived occupational risks among nuclear power plant employees (Sjöberg & Drottz-Sjöberg, 1991). Costa-Font, Rudisill, and Mossialos (2008) found that more knowledge about nuclear waste decreased support for nuclear power generation. In studies in which respondents' self-reported knowledge regarding nuclear power or nuclear waste was assessed, its relation with attitudes was small to non-existent (Biel & Dahlstrand, 1995; Drottz-Sjöberg & Sjöberg, 1991; Katsuya, 2001). The relation between knowledge and risk perception was also found to be moderate among Japanese respondents (Katsuya, 2001). Moreover, the direction of the relation between knowledge and attitudes differed between the studies that assessed self-reported knowledge.

The type of knowledge assessment may explain the various findings regarding the relation between knowledge and attitudes. Self-reported knowledge can easily be influenced by external factors and socially desirable responding. People are also prone to overestimate their skills (Kruger & Dunning, 1999). Therefore, self-reported knowledge lacks validity and reliability. Indicating that one is aware of nuclear technology activities in the vicinity does not mean that one understands the technology (cf., Solomon, Tomaskovic-Devey, & Risman, 1989).

Similarly, the different knowledge domains investigated in the different studies may explain the contradicting findings regarding the relation between knowledge and attitudes regarding nuclear power (Davidson & Freudenburg, 1996). For example, when the knowledge scale concerned the facts stressed by critics of nuclear power, more knowledge was related to less acceptance of nuclear power. Similarly, attitudes towards a different technology (i.e., carbon capture and storage (CCS)) were positively related to a few

Download English Version:

<https://daneshyari.com/en/article/7246508>

Download Persian Version:

<https://daneshyari.com/article/7246508>

[Daneshyari.com](https://daneshyari.com)