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ORIGINAL ARTICLE

The role of trust and risk perception in current German nuclear waste management

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Abstract
One of the lessons learned in various countries that have to deal with spent nuclear fuel is that finding a proper place and siting a repository for high-level nuclear waste (HLW) cannot be achieved without public consent. After decades of obstruction, Germany recently launched a new, participatory, site-selection process for the disposal of HLW in deep geological formations. Nonetheless, significant opposition is assumed. Therefore, citizens' trust in the procedure and the agents involved may be paramount. We conducted an online survey ($N \approx 5000$) in March/April 2020 to test a theoretical model on trust, perceived risks and benefits, and acceptance. We differentiated acceptance as a dependent variable according to distinct phases: the procedure, a possible decision on a disposal location, and the repository facility itself. The results show that trust is mainly important for explaining acceptance of the ongoing procedure and less so for the acceptance of the decision or the repository facility itself. Moreover, our investigation of the sample using a cluster analysis reveals characteristic patterns of trust, risk perception, and acceptance by three clusters: a cluster focusing on risk perception, an ambivalent cluster, and an indifferent cluster. Trust is lowest in the risk-focused cluster and highest in the ambivalent cluster.

KEYWORDS
acceptance, nuclear waste repository, procedure, risk perception, trust

1 | INTRODUCTION

1.1 | Roles of trust and risk perception in the German siting procedure

Decision making in contested issues needs acceptable procedures, for example, in terms of fairness and public participation (Krütli et al., 2012, 2015). Moreover, the decision itself (i.e., the political intricacies) and the issue (technology) at hand (McKnight et al., 2009) have to be acceptable to a critical public. Here, we deal with nuclear technology infrastructure—a potential deep geological repository for high-level nuclear waste (HLW) in Germany.

In fact, Germany decided to phase out nuclear power. The last three reactors are scheduled to be disconnected very soon, in 2022. However, a "phase-out of nuclear waste" is not possible in the short term. Adding the high-level waste that is still produced (until 2022), Germany has to deal with approximately 30,000 m^3 of highly active waste (mainly spent fuel and vitrified waste from fuel reprocessing).

In 2017, German political parties agreed on a new (this time, participatory) procedure for disposing of the country's HLW (Hocke & Kallenbach-Herbert, 2019; StandAG, 2017). In this regard, Germany follows a new approach, currently perceived as state-of-the-art after failed siting procedures in many countries (Bergmans et al., 2015). These failed approaches have left many citizens devoid of trust, specifically in official agents and politics. The new German deliberative approach seeks to establish public trust in the involved agents, specifically experts, operators, and regulators, by involving the interested and the critical public. We observe the underlying political rationale that a

procedure involving public participation leads to heightened legitimacy of the decision for a site and finally acceptance of the repository. In fact, political parties and responsible institutions generally perceive public trust as a precondition for citizens' acceptance of a repository (Brunnengräber & Di Nucci, 2019). This rationale is linked to an instrumental function of participation. It makes a decision "more legitimate and leads to better results" (Fiorino, 1990, p. 228). The current discourse on governance and communication and creation of trust *through* governance (Boholm, 2019; Pollak, 2016) resembles this instrumental notion of participation. In fact, trust has been shown to have some explanatory value concerning acceptance of nuclear infrastructure (Freudenburg, 1993; Siegrist, 2019; Vira, 2006). Why could trust be important?

First, trust in experts is needed because citizens (and of course, researchers) have no all-encompassing education in the necessary sciences. In other words, if someone lacks knowledge in a particular field, one needs to trust specialists in that domain (Andersson et al., 1998; Siegrist, 2019). Trust in regulators is also needed.

The most important reason is that trust is assumed to attenuate the perception of risk (Siegrist et al., 2000; Siegrist et al., 2005), with a potential impact on acceptance (or opposition). For instance, Flynn et al. (1992) find "a strong effect of *trust in repository management* on *opposition to the repository* by means of its effect on *perceived risk*" (Flynn et al., 1992, p. 422, emphasis added). These and similar results substantiate the widespread (political) expectation that perception of low risk leads to acceptance. Therefore, the aim of politics is to gain trust, hoping that it amplifies the acceptability of a proposed technological option. Thus, theoretically, trust should increase acceptance by attenuating the perception of risk. There are several ways in which trust may actually attenuate risk perception. The perceived transparency and openness to participation may reassure citizens that the responsible institutions and agents do their best to find the safest possible solution. This differentiation is not the focus of our study, however.

For our study, other important drivers are the pragmatic questions of what the status of trust is in Germany, and which subgroups possibly exist. It is known that some groups oppose nuclear repositories, which is why more insights into public opinion are needed. Do these groups indeed lack trust, and what does this potentially mean for risk perception and acceptance?

International surveys suggest that currently, some countries' citizens lack a high level of trust in institutions responsible for HLW disposal, which may be due to cultural differences, among others (Lehtonen et al., 2021). "Organizations involved in managing nuclear waste are not often trusted by members of the public" (Ramana, 2018, p. 7). The European Social Survey periodically gauges trust and other variables concerning nuclear topics, such as nuclear waste management (European Commission, 2007, 2010). The results show differences among European countries' citizens, with Germans being more skeptical on average. However, these data neither explicitly consider a heterogeneous population, comprising subgroups, when measuring risk perception, nor provide correlational results between trust and risk perception or acceptance. As the research shows, we cannot assume a homogeneous public response. In fact, people hold many different views on nuclear power and nuclear waste (Gupta et al., 2020). Some people focus on risk and tend to oppose nuclear technologies. Others may have more ambivalent attitudes toward these topics, lacking a clear preference (Seidl et al., 2013; Stefanelli et al., 2017). A moderate or middle group may actually form the majority of a country's population, whereas the salient agents in public discourse come from the extreme fringes—opponents and protesters versus proponents of a specific technological solution.

1.2 | Theoretical model of trust and risk perception

We adapted the above-cited theoretical model by Flynn et al. (1992), which comprises the following variables: benefit effects, perceived risk, trust in repository management, stigma effects, and opposition to the potential repository. For our model (see Figure 1), we omitted stigma effects but kept the following as independent variables: trust in information from various agents, as well as risk and benefit perceptions concerning a potential repository. We differentiated the dependent variables (DVs) into (1) acceptance of the procedure (of finding a proper location), (2) acceptance of the decision (by the parliament), and (3) acceptance of the actual repository facility in one's own municipality.

From a theoretical perspective, a distinction can be made between generalized and specific trust (Kassebaum, 2004; Siegrist, 2019). General trust means that some people, in general, have more trust than others do. Some risk perception studies reveal limited evidence for the explanatory power of general trust (Sjöberg, 2001). In contrast, specific trust relates to individuals or groups and is considered more appropriate for predicting particular acceptance questions (Siegrist, 2019), especially on societally contested issues, such as facilities for HLW. Another distinction can be made between confidence in institutions' performance (Earle, 2010; Siegrist et al., 2005) and social trust in individuals or groups. The cited authors argue that confidence is related to performance. In other words, if institutions are perceived as performing poorly, there may be low public confidence in their abilities. Chryssochoidis et al. (2009) name institutional characteristics, which can serve to either increase or destroy trust. Among these attributes are competence, knowledge, openness, and honesty, which are perceived by the public and influence their judgment on confidence.

McKnight and Chervany (1996) distinguish further constructs and measures for determining trust in technology, such as reliability, faith in general technology, or helpfulness.

Due to the above-mentioned knowledge asymmetry between laypersons and experts, most citizens have to rely

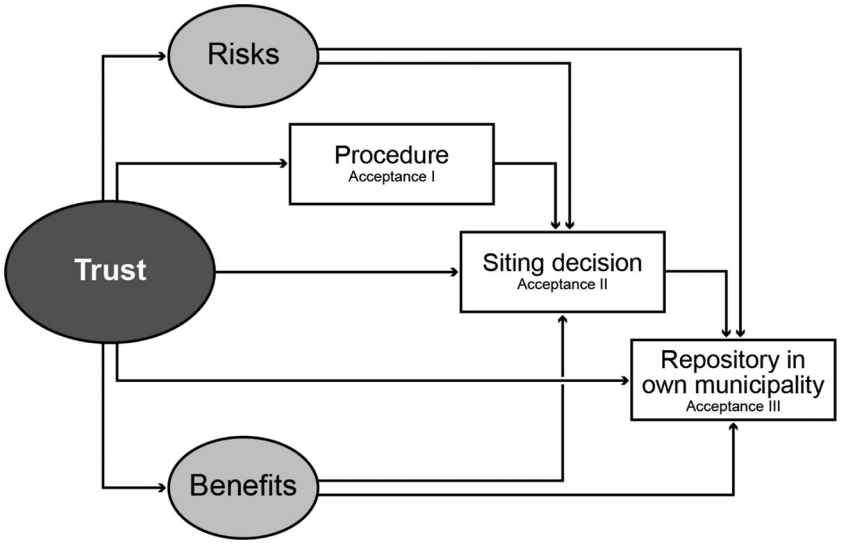

FIGURE 1 Theoretical model

on information from experts and responsible agents. In this study, we therefore measured trust as "trust in information about nuclear waste siting" provided by various agents, such as "science" (*Wissenschaft* in German), "nuclear power plant operators," "traditional media," or "local and regional authorities." This is in line with other approaches that measure trust in general agents (Ryu et al., 2018; Sjöberg, 1996; TNS opinion, 2013).

Moreover, we measured respondents' consent to various items containing environmental, ethical, and health risks, as well as mainly economic benefits associated with a potential repository for HLW (for details, see Table 2 in the Methods section). The questionnaire comprised five statements for each construct, adapted from a Swiss survey (Seidl et al., 2013). These items included issues such as transport risks or leakages into groundwater and health risks. An extensive database on such features, events, and processes during different phases is part of a safety case (Nuclear Energy Agency, 2000). Potential benefits are the establishment of additional (local) workplaces and improved economic development.

Acceptance too can be operationalized in different ways. In a study on gene technology acceptance, Siegrist asked the respondents some questions, such as "Would you buy chocolate containing genetically modified lecithin?" (2000, p. 198). Ryu et al. (2018, p. 9) measured acceptance of a nuclear power plant with three items, one being "I agree to [have] the radioactive waste disposal site [built] in our local [area]." As indicated above, in our current study, we used three different acceptance concepts. In a traditional fashion, we asked the respondents to rate their potential acceptance of a repository for nuclear waste in their own municipality. However, we also asked them to rate their acceptance of the present German procedure and the impending siting decision (i.e., where the actual facility should be located). The rationale behind this differentiation in the DVs is that questions about potential acceptance of a repository facility whose construction will not be started before 2050 (if all works well) remain abstract to most citizens at the present time. What is currently on the horizon is the selection procedure for a suitable location. The subsequent step is the decision making of the German officials and finally the parliament. Trust may well play a significant role in explaining acceptance of all DVs. Risks and benefits were assessed in terms of those expected for the repository facility itself. However, we assumed that acceptance of the decision would also be influenced by risk perception (see Figure 1).

1.3 | The research question and hypotheses

We asked this overall question: To what degree is trust relevant for explaining the three different DVs? We formulated this hypothesis:

1. Trust would positively influence all DVs. Its influence on accepting the procedure should be stronger than on accepting the repository itself. This is because the procedure is currently the most relevant and depends on the trusted agents' performance. It forms a precondition for accepting the decision and (later) the facility itself.

With respect to the relations among the variables trust, risk, and benefit (Siegrist, 2019; Siegrist et al., 2000), an attenuation of risk perception through trust would be expected, whereas benefit perception should increase acceptance of the repository. Our hypotheses were as follows:

1. Highly perceived risks would directly decrease acceptance of a repository facility in one's own municipality.
2. Perceived benefits would directly increase acceptance of the repository in one's own municipality.

Besides the influence of trust on acceptance, we assumed that acceptance of the procedure and of the decision would both have a positive effect on the acceptance of the repository:

1. Acceptance of the procedure would increase acceptance of the siting decision and indirectly acceptance of the repository itself.
2. Acceptance of the siting decision would increase acceptance of the repository itself.

Thus, we postulated a path from trust, via risk/benefit perception and via acceptance of the procedure and of the decision, to acceptance of the repository itself.

In our second analysis, we considered a potential heterogeneity among the respondents with respect to risk perception (Jenkins-Smith et al., 2015). We hypothesized four groups as found in a Swiss study (Seidl et al., 2013) through a cluster analysis, which categorized the respondents according to their risk perception: a cluster of respondents focusing on the benefits of a repository (while rating the risks low), a cluster rating the risks high (and the benefits low), and two clusters rating both risks and benefits at the same level. However, one of the two clusters rated both issues low (thus denoted as indifferent), and the other cluster rated both issues high (denoted ambivalent; Thompson et al., 1995). We were curious about whether we would find the same pattern in our German sample. Moreover, we were interested in how these groups would differ in their trust in and opinions about the current procedure and decision making. We hypothesized that a risk-focused group would show low trust and would oppose a repository facility, whereas a potential benefit-oriented group would show high trust and would more readily accept the facility. For the other two groups, we had no specific hypotheses. It could be assumed that the indifferent cluster (as in Switzerland) would show relatively higher acceptance values. Moreover, the groups emerging from the cluster analysis might show different patterns concerning the individual path analyses.

2 | METHODS

2.1 | Sample and survey

We administered our online questionnaire to 5029 citizens via the marketing company respondi in February/March 2020. We considered 16- to 69-year-old participants, a 50/50 split for gender, and a distribution for age and educational levels that would be representative of the general German population. Before administering the survey, we conducted two pilot studies ($N = 100$ each) to test its functionality and whether the items would work as intended. Some adaptations were made for the final version. The main survey's respondents were checked according to their answers in the survey. Those respondents who completed the survey much faster than the reasonable time or provided suspicious data (e.g., number of household members > 10 or only answered with one rating level) were excluded from the sample. The final sample comprised 4690 respondents, divided into 2340 females and 2344 males, and the remaining six did not identify their gender. The mean age was 44 years (median = 45, standard deviation [SD] = 15, minimum = 16, maximum = 69). Concerning education, 43% had finished primary school, 49% had attained a secondary education, and 8% had obtained a university degree (including a doctorate). The distributions fit the German statistical data for age and education. Details about the age groups can be found in the Appendix, Table AI.

In the analysis, we focus on the variables relevant for the theoretical model. Unless stated otherwise, the respondents could answer the questions using a 7-point Likert scale, with all points labeled (following Menold & Wolbring, 2019). The English translation (Menold & Tausch, 2016) reads: (1) *does not apply at all*, (2) *does not apply*, (3) *applies to some extent*, (4) *applies partly*, (5) *applies to a great extent*, (6) *applies almost fully*, and (7) *applies fully*.

One item in the beginning of the questionnaire asked the respondents to rate their degree of interest in the topic of nuclear waste disposal ("I am interested in the topic of final disposal," M = 4.9; SD = 1.6). We also included three items measuring political opinion: "Politicians care about what the average citizen thinks." (M = 3.3; SD = 1.5). "Politicians strive to maintain close contact with the population." (M = 3.1; SD = 1.4). The third item was a question about the general political position on a response scale from left = 1 to right = 11. The political opinion of the whole sample is located at the center of the scale (average value M = 5.6, SD = 1.9).

2.2 | Trust

We measured trust in information on nuclear waste disposal, as provided by 13 agents (see Table 1), such as "science," "nuclear power plant operators," "traditional media," or "local and regional authorities," in the sense of "trust in general agents" (Sjöberg, 1996). The item for measuring trust asked: *How much do you trust the following sources concerning information about the safety of repositories for high-level radioactive waste?* Table 1 shows the mean values in descending order. The respondents' trust is highest in science but lowest in social media. The mean of all agents' ratings forms a scale, which is used for comparison of the clusters. The internal consistency measure for the trust scale shows a high Cronbach's α at 0.91.

Regarding confidence, we considered this variable in our study. However, this variable yielded plenty of missing data because only the respondents who were familiar with the provided list of institutions had to answer the question about their level of confidence in these institutions. Anyway, it did not turn out to be a valid predictor of acceptance over and above trust. We provide more information on that variable (see Appendix, Figure AI and Tables AIV and AV). In this paper, for the sake of simplicity, we constrain our model to the variable *trust*.

TABLE 1 Trust in information from various agents

Agent	Mean (M)	Standard deviation (SD)
Science	5.0	1.4
Friends and family members*	4.6	1.6
International organizations dealing with issues of (highly) radioactive waste management	4.3	1.4
German courts	4.3	1.5
National authorities responsible for safety in the management of (highly) radioactive waste	4.2	1.5
Regional and local authorities	4.0	1.4
Non-governmental organizations	3.9	1.4
Authorities and ministries	3.9	1.5
Traditional media (television, radio, newspapers)	3.9	1.5
Federal government	3.7	1.6
Political parties	3.3	1.4
Nuclear power plant operators	3.3	1.5
Social media (e.g., Facebook groups, blogs)*	2.8	1.5
Trust scale	*4.0*	*1,0*

Note: The two items marked by * are not used in the path analysis because in a confirmatory factor analysis, they load on their own factor (see Appendix, Table AVI).

TABLE 2 Risks and benefits of a potential repository for high-level nuclear

Risks and benefits	M	SD
Social protests due to planning and construction of a facility	5.5	1.4
Health risks for future generations	5.5	1.4
Pollution of groundwater	5.4	1.4
Uncontrollable consequences due to radioactive waste	5.3	1.5
Health risks for myself	5.1	1.5
Risks scale	*5.4*	*1.2*
Creation of additional permanent jobs in the region	4.2	1.5
Promotion of sustainable development in the siting region	3.9	1.59
Economic stimuli for local trade and industry	3.8	1.54
Improvement of the infrastructure in the region	3.7	1.60
Improved sales opportunities for real estate	3.0	1.68
Benefits scale	*3.7*	*1.28*

Note: $N = 4690$.

2.3 | Risks and benefits

For the measurement of risk perception, we asked the respondents to rate their level of consent using two sets of items, addressing the potential risks and benefits of a nuclear waste repository in their own region. We presented five statements for each concept, adapted from the study of Seidl et al. (2013), see Table 2, accompanied by this question: *How strongly do you associate a possible repository in your region with the following conceivable (positive and negative) effects?* The respondents rated the risks (the first five items in Table 2) higher than the benefits altogether. The means of all risk and benefit item ratings form two scales, which are used for comparing the clusters. Both scales have good internal consistency (reliability). Cronbach's α values are 0.87 each for the risks and for the benefits scale. A factor analysis separating the scales can be found in Table AVII in the Appendix.

2.4 | DVs

As for the DVs, the respondents' opinions on the current procedure were assessed by this item: "Overall, what is your present opinion on the procedure to find a suitable final repository site in Germany?" It was followed by these two statements that the respondents had to rate on the 7-point scale: "The procedure is suitable for finding the safest location." "I accept the procedure." (= Acceptance I). A brief explanation about the German procedure was presented in a text box above the items. The Appendix provides more details about how this information was given.

This item assessed the respondents' opinions about the decision making: "Imagine that at the end of the site-selection procedure, the legislature (German Parliament) decides that the repository will be built in a region that is personally important to you. To what extent can you accept this decision?" It was followed by this statement that the respondents had to rate on the 7-point scale: "I can accept a decision in favor of a site in a region that is important to me." This item measured Acceptance II.

Finally, the acceptance of a repository facility in one's own municipality was measured with this item: "What is your basic opinion on a possible final repository in your own

municipality?" (= Acceptance III). Following the prompt "I am …" the respondents could rate this statement on a 5-point scale (Seidl et al., 2013): 1 = *against it*, 2 = *rather against it*, 3 = *do not know/undetermined*, 4 = *rather in favor*, 5 = *in favor*.

2.5 | Analysis

2.5.1 | Path analysis

Based on the literature on trust and risk perception, we established a theoretical model (depicted in Figure 1) and operationalized the variables according to the description in Section 2.1. Since our data had no missing values, we could apply the method to all 4690 cases. We used scale and item values as the observed variables. As we were interested in a particular path of influence, we tested the specific model by applying a path analysis (utilizing Amos software in the SPSS package, Version 26). The model was applied to the whole sample, as well as to each cluster, testing for differences among them. However, the basic results show the same pattern for each cluster; thus, the model holds for different subsamples.

We applied the maximum likelihood method. We assessed model fit by several indices. Among various suggestions on how to interpret indices' values, we refer to those of Hooper et al. (2008) and Little and Kline (2016) and report the cut-off values for the following indices:

- root mean square error of approximation (RMSEA) < 0.07
- comparative fit index (CFI) ≥ 0.95
- normed fit index (NFI) ≥ 0.95
- non-NFI (NNFI; denoted as the Tucker–Lewis index [TLI] in Amos) ≥ 0.95
- goodness-of-fit index (GFI) ≥ 0.95
- adjusted GFI (AGFI) ≥ 0.90
- standardized root mean square residual (SRMR) < 0.08

2.5.2 | Cluster analysis and analysis of variance (ANOVA)

For grouping the sample, we performed a cluster analysis with the Ward method, following the procedure described by Seidl et al. (2013) for comparability of our results. Moreover, we used a z-standardization. Differences among the clusters were tested by ANOVA, with Bonferroni multiple comparison, 99% confidence interval). We started with a five-cluster solution and stepwise reduced the number of clusters to three (Appendix, Table AII). Essentially, in all solutions, two larger clusters emerged (> 1000 members), independent of the initial sorting. The three-cluster solution was stable across different ways of sorting cases and appeared as the best option in terms of interpretation. The four-cluster solution yielded two risk-focused clusters, with one cluster showing more extreme values (less benefits, more risks).

TABLE 3 Accepting the procedure and the siting decision

Acceptance I to III	M	SD
The procedure is suitable for finding the safest location	4.8	1.3
I accept the procedure. = *Acceptance I**	4.7	1.4
Procedure scale	*4.7*	*1.3*
I can accept a decision in favor of a site in a region that is important to me = *Acceptance II*	4.3	1.5
What is your basic opinion of a possible final repository in your own municipality? = *Acceptance III*	2.4	1.1

Note: * The item "I accept the procedure" is used in the path analysis. The scale value is used for comparing the clusters.

3 | RESULTS

3.1 | Explaining acceptance with a path analysis

The results for the DVs are shown in Table 3. The two items on the procedure are also combined, and their mean value forms the *acceptance procedure scale* (M = 4.7, SD = 1.3), which is used for comparing the clusters. The internal consistency is high (Cronbach's $\alpha = 0.88$). The item *"I accept the procedure"* is used as Acceptance I in the path analysis for consistency and simplicity. Acceptance II is measured by one item, asking if the decision in favor of a site in a region can be accepted. Acceptance of a repository facility in one's own municipality (Acceptance III) is measured on a 5-point scale (from 1 = against to 5 = in favor) for comparability with another study (Seidl et al., 2013).

A structural analysis with Amos software allows an examination of the paths and relative direct and indirect effects in our theoretical model. The model yields a high Chi^2 value (252.3, degrees of freedom = 4, $p < 0.001$). This value should be good enough, given the relatively large sample size. According to the literature, the Chi^2 value increases with the sample size, which is large in our case (Hooper et al., 2008). Adjusting the Chi^2 value by dividing it by the degrees of freedom yields a value of 63.1, which is fairly large, however. The statistical values suggest a good model fit: RMSEA = 0.115, GFI = 0.981, AGFI = 0.902, NFI = 0.966, NNFI/TLI = 0.876, CFI = 0.967, and SRMR = 0.059. The values shown in Figure 2 indicate standardized estimates and estimates of squared multiple correlations (i.e., explained variance). We did not apply any modifications to the original model.

The results show that trust has a highly significant impact on benefits ($r = 0.29$, $p < 0.001$) but not on risks ($r = 0.04$, $p = 0.098$). This is somewhat odd compared with earlier research findings that trust usually levels down risk perception, so we would expect a significantly negative correlation. As we show below, further investigation by using the cluster analysis can shed some light on the reasons.

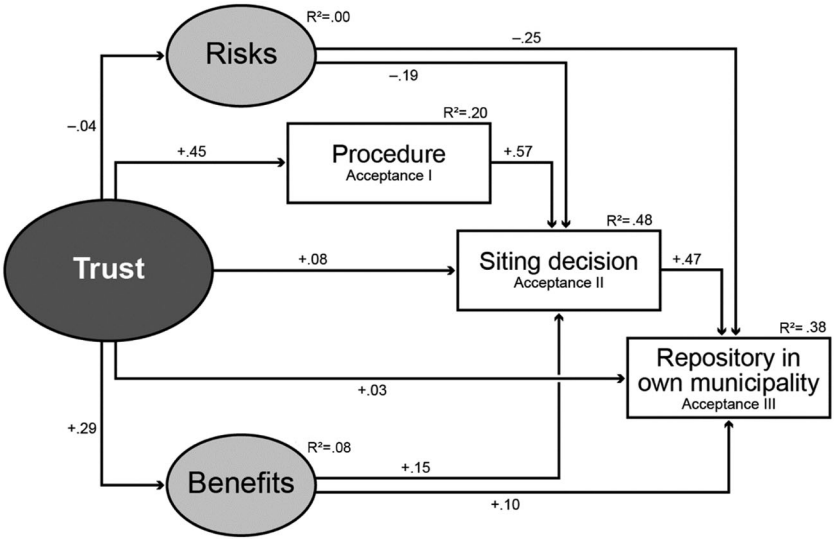

FIGURE 2 The theoretical model in Amos with the standardized estimates (at the arrows) and explained variance (at the boxes and circles)

TABLE 4 Standardized total effects (direct effects in parentheses)

Standardized total (and direct) effects	Benefits	Risks	Trust	Acceptance of procedure (I)	Acceptance of siting decision (II)
Acceptance of procedure (I)	0	0	0.452	0	0
Acceptance of siting decision (II)	0.150	−0.194	0 (0.077)	0.575	0
Acceptance of repository (III)	0.172 (0.101)	−0.341 (−0.249)	0.255 (0.030)	0.272 (0)	0.473

The direct (and indirect) effects of trust on the three DVs are of particular interest. Table 4 shows that trust has very low direct effects on acceptance of the siting decision (II) and acceptance of the repository (III). However, it has a strong effect on procedural acceptance (I). As hypothesized, trust is strongly related to procedural acceptance, which is then related to acceptance of the siting decision, which in turn is related to acceptance of the repository. Thus, as suggested by our model, the analysis corroborates a path from trust to acceptance of the repository.

As expected, the perception of risks negatively affects the acceptance of a repository, and the perception of benefits has the opposite effect. This confirms our assumptions that risks and benefits are closely related to the acceptance of the facility itself, while trust is not (directly) related to it. Risks and benefits also have a noteworthy impact on the acceptance of the siting decision.

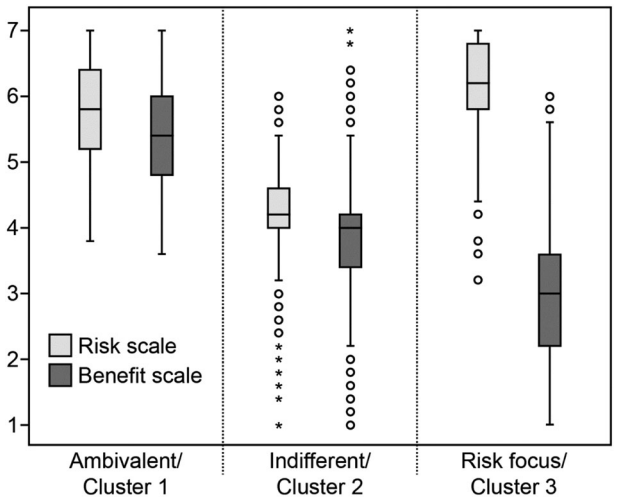

FIGURE 3 The boxplot for the three clusters' response patterns concerning risks and benefits

3.2 | Differentiation by cluster analysis

As indicated in the Introduction section, we do not assume a homogeneous sample with respect to risk and benefit perceptions. To delve deeper into the sample, we conducted a hierarchical cluster analysis. The analysis suggests a three-cluster solution. The three clusters in our sample show the following pattern (Figure 3): Cluster 1 ($N = 886$) can be denoted as ambivalent (both scales have relatively high values). Cluster 2 ($N = 1814$) appears indifferent (the ratings on both scales show moderate values). Cluster 3 ($N = 1990$) is risk-focused. We could not determine a benefit-oriented cluster as hypothesized (as stated above, an emerging fourth cluster shows a more extreme type of risk focus). Cluster 2 actually appears to be indifferent to the topic as such. On the item, "I am interested in the topic of final disposal," it rates significantly lower (M = 4.5; SD = 1.5) than Clusters 1 (M = 5.2; SD = 1.5) and 3 (M = 5.1; SD = 1.5), which are not significantly different ($F_{(2, 4686)} = 112.8$, $p < 0.001$).

TABLE 5 Descriptive variables of the clusters

Cluster	Females	Males	Age	Politicians care about what the average citizen thinks		Politicians strive to maintain close contact with the population		Political position (1 = left to 11 = right)	
	Frequency (%)		M (SD)	M	SD	M	SD	M	SD
1 – ambivalent ($N = 886$)	389 (44%)	497 (56%)	43 (14.2)	3.7	1.7	3.6	1.7	5.7	2.0
2 – indifferent ($N = 1811$)	819 (45%)	992 (55%)	43 (15.0)	3.3	1.4	3.2	1.3	5.7	1.9
3 – risk-focused ($N = 1987$)	1132 (57%)	855 (43%)	45 (15.2)	3.0	1.4	2.8	1.3	5.3	1.9

TABLE 6 The clusters' ratings for the dependent variables

Cluster	Acceptance of procedure (7-point response scale)		Acceptance of siting decision (7-point response scale)		Acceptance of repository (5-point response scale)	
	M	SD	M	SD	M	SD
1–ambivalent	5.3	1.2	4.9	1.4	2.7	1.3
2–indifferent	4.8	1.1	4.6	1.2	2.8	1.0
3–risk-focused	4.5	1.39	3.7	1.60	1.9	0.99

Note: An analysis of variance indicates that the main effects (mean differences) are significant at the 0.001 level.

To describe the clusters, we show the data on gender, age, and political opinion (Table 5). Cluster 3 comprises relatively more women (57%) than the other two clusters, and its members are older on average. Clusters 1 and 2 tend toward the political right, whereas risk-focused Cluster 3 tends toward the left.

The general level of trust is moderate (M = 4.0, SD = 1.0 for the whole sample; see Table 1). Science is trusted most, whereas political parties, operators of nuclear power plants, and social media are trusted least of all named agents. This trust pattern is true for all clusters and not repeated here. However, the clusters show differences in the overall amount of trust. We therefore report the results of an ANOVA for the trust scale. It appears that the ambivalent Cluster 1 shows higher trust on average than Clusters 2 and 3. The group differences among all clusters are statistically significant at the 0.001 level (overall: $F_{(2, 4786)} = 162.94$): Cluster 1: M = 4.5, SD = 1.2; Cluster 2: M = 3.9, SD = 0.9; Cluster 3: M = 3.8, SD = 0.9.

As stated above, we did not expect the very low correlation between trust and risk perception. To investigate this finding, we performed correlation analyses between trust and risk perception for each cluster separately. The expected pattern emerges for the risk-focused Cluster 3 (trust*risk: $r = -0.14$, $p < 0.001$) but not for Cluster 1 (trust*risk: $r = 0.01$, $p = 0.390$). Cluster 2 rates risks and benefits equally (moderate), as well as shows a small but significant positive correlation between trust and risk perception (trust*risk: $r = 0.08$, $p < 0.001$). Cluster 2, with its considerable number of respondents, appears to influence the structural model results for the whole sample (presented above; for further details, see Appendix, Table AIII).

The model results show that procedural acceptance (Acceptance I) is strongly influenced by trust and that this acceptance further leads to acceptance of the decision (II) and of the repository (III). However, considering the clusters' different risk perception patterns, we wondered whether the clusters would differ if we would apply the path analysis to each cluster separately. Our findings reveal the same pattern of the standardized effects for all clusters; thus, we do not report the details here (see Appendix, Figure AII). Nevertheless, there are other points of interest concerning acceptance, for instance, the question of the degree to which the risk-focused Cluster 3 accepts the procedure (Acceptance I) and thus the other DVs (Acceptances II and III). Table 6 shows that Cluster 3 indeed rates all three acceptance variables lower than the other clusters do. These differences are statistically significant at the 99.9% confidence interval (tested with Bonferroni multiple comparisons). The indifferent Cluster 2 shows the highest value for Acceptance III, even compared with Cluster 1 (although all values remain at a low level and far from actual "acceptance"). Cluster 1 shows the highest ratings for accepting the procedure and the decision.

According to the literature, the procedure may be more important than the outcome valence and distributional justice (Krütli et al., 2012, 2015). Ultimately, this does not mean that the public would accept a repository if it would judge the procedure as fair. However, we included this item in our survey on that issue: "I accept the outcome of the site-selection process (decision for site X)—even if it affects my region—as long as the process was fair, and the decision was fact-based." The results are informative as they show that ambivalent Cluster 1 (M = 5.3, SD = 1.3) does rate this item higher

than the other clusters do (Cluster 2: M = 5.0, SD = 1.3; Cluster 3: M = 4.5, SD = 1.6; the differences from Clusters 2 and 3 are also significant at the 0.001 level). It appears that risk-focused Cluster 3 is skeptical about the procedure, too, and thus does not accept it at the same level. We further analyzed the responses to this item and found 674 respondents rating it with low consent on the 7-point scale (1 = *does not apply at all*, 2 = *does not apply*, or 3 = *applies to some extent*). Of these 674 individuals, 71% belong to Cluster 3, 18% to Cluster 2, and only 11% to Cluster 1.

4 | DISCUSSION

Against the background of the participatory procedure for HLW disposal in Germany that was launched in 2017, in this study, we analyze the data from a large survey among the German population. The literature on participatory processes (Krütli et al., 2015) shows how important trust building and fairness are in such a procedure (Andersson et al., 1998; Committee of Radioactive Waste Management, 2006; Skarlatidou et al., 2012). For instance, it could be conjectured that a region may be chosen due to its structural problems and low status (Jenkins et al., 2016), which would be perceived as unfair. As a result, such a procedure would not be accepted.

In this study, we focus on trust, complemented by risk and benefit perceptions. We propose and test a theoretical model, focusing on a specific path of influence by trust on acceptance at three distinct phases: the procedure, a possible decision on a disposal site, and the repository facility itself. Moreover, we differentiate the sample by a cluster analysis and reveal characteristic patterns of risk perception and acceptance.

In previous surveys, a frequent question is "who can be trusted" concerning information on HLW disposal. The results of an opinion poll (TNS opinion, 2013, p. 107) show the percentages of the respondents who trust the following agents: non-governmental organizations (NGOs, 38%), scientists (36%), international organizations working on peaceful uses of nuclear technology (33%), national agencies in charge of dealing with radioactive waste (32%), the nuclear industry (21%), the federal offices (14%), and the media (7%).[1] Similar results can be found in the study of the European Commission (2010, p. 117). The current study partly corroborates these surveys' results, as for our German sample, we find that science ranks highest concerning trust, while operators of nuclear power plants rank second to the last. However, an interesting deviation from other studies' findings is that our respondents trust social media to a lower degree than any other agent. Moreover, trust in family members is unexpectedly high (second only to science), which may be surprising because information from agents should be backed by some expertise in this particular matter. In fact, in the 2007 Eurobarometer (European Commission, 2007, p. 51), family members and friends are trusted least (9%). However, a study about trust and perceived risks from contaminated land finds that "residents' groups and friends and family […] are quite highly trusted despite not being seen as particularly expert. This appears to be because these sources are seen as scoring highly on openness and shared interests, and showing a more precautionary bias in interpretation and communication" (Eiser et al., 2009, p. 296).

It could also be argued that providing information may particularly be a procedural act and therefore a matter of fairness (Leventhal, 1980). Thus, if we would measure trust in information, we would (also) measure aspects of procedural fairness. If we would measure not only trust in information but also implicitly trust in the fairness of the procedure, this might explain the strong direct impact on the acceptance of the procedure and the lack of impact on the acceptance of the facility itself. This potential relation could be investigated further in the future.

Further variables in our study are risk and benefit perceptions concerning a repository. We applied five items each to measure risks and benefits referring to the literature. However, the risks and the benefits that people perceive as connected to a repository for HLW may differ. In fact, if open questions are asked (Stefanelli et al., 2017), risks are often framed in terms of lacking safety. Alternatively, safety is viewed as the absence of risks (Aven, 2009). The risks and the benefits that people perceive when thinking about a repository should not be neglected because they may define the public discourse in a specific manner. Risk and benefit narratives presented by other agents may also influence the discourse and public perception. By either including or omitting certain risks and benefits (in research or communication), the discourse could be biased. A positive narrative for an HLW repository appears possible but difficult to achieve, depending on the cultural context (Brunnengräber, 2019).

Nonetheless, health risks, risks from radiation, and risks for the environment are found to be valid examples to be used in a risk perception study. In our study, as expected, perception of risks decreases the acceptance of a repository facility in one's own municipality, whereas perception of benefits increases acceptance. Besides these direct effects from risk/benefit ratings, the structural model shows that it is beneficial to avoid focusing on one acceptance variable only (i.e., the repository itself) but to include three distinct DVs. These variables represent three different phases in the entire process of HLW disposal in Germany. It turns out that acceptance of the procedure depends directly on trust more than the two subsequent phases do. In our view, this is rational because during the participative procedure, trust is conceptually important to current citizens (not future generations, who will be more affected by the repository facility itself). For nuclear waste management, we could show that it is plausible for the acceptance of the repository itself to be directly linked to perceptions of risks and benefits and indirectly to social trust. Although not referring to an identical case, Siegrist (2019) mentions this pattern: "In the case of nuclear power, where the majority of the discussions focus on the possible risks and benefits associated with the technology, a plausible

[1] This was the question: *Which of the following, if any, would you trust to give you information about the way that radioactive waste is managed in (our country)?*

model may be one that shows the acceptance of nuclear power as directly influenced by the perceived risks and benefits and indirectly by social trust" (Siegrist, 2019, p. 6). Adding to this argument, we find that in our model, trust is more important for the procedure and less important for explaining the other DVs. This is an essential finding as previous studies have employed acceptance as a DV pointing to a technology, such as nuclear power (Ryu et al., 2018), an HLW repository (Flynn et al., 1992), or in another context, gene technology (Siegrist, 2000). Trust yields indirect effects on acceptance of these technologies but direct effects on earlier phases (e.g., risk assessment and approval processes).

As indicated in the Introduction section, HLW and nuclear facilities constitute a complex problem where most citizens have only rudimentary technical expertise. Based on their study, Chryssochoidis et al. (2009) report that whether trust is a relevant predictor also depends on the level of knowledge: "For those associated with high level of knowledge, trust did influence perceived risk, suggesting that trust is an important determinant in explaining the perception of risk in the absence of knowledge" (Chryssochoidis et al., 2009, p. 174).

The notion of a heterogeneous public, as represented in our sample, is important to consider. Otherwise, a one-size-fits-all risk communication strategy might be assumed (Gupta et al., 2020; Stefanelli et al., 2017). We hypothesized that the risk-focused Cluster 3 would show lower trust than the other clusters, which is corroborated by the data. We also hypothesized a benefit-oriented cluster (Seidl et al., 2013); however, it is apparently absent in our German sample.

Trust supposedly attenuates the risk perception about a repository for HLW (e.g., Biel & Dahlstrand, 1995; Flynn et al., 1992; Siegrist, 2019). While the risk-focused Cluster 3 shows the proposed effect, we find no effect at all for the whole sample and for the ambivalent Cluster 1. The explanation for our results appears to lie in the indifferent Cluster 2, which shows a not very large but still significant positive correlation between trust and risk. We can only conjecture that if the focus is on perceived risks, trust has an attenuating effect, as proposed by the above-cited earlier research. If risk and benefit are perceived at an equal level (as for Clusters 1 and 2), trust may lose this effect. For the sample's indifferent faction, it may be that trust does not contradict risk but both can co-exist at low level. Further research should clarify whether the found pattern is specific to indifferent and ambivalent respondents.

Particularly in Germany, a high level of risk perception in a subgroup is not surprising. This risk focus as a prior attitude may bias respondents' trust ratings. In other studies, trust levels concerning given information are influenced by prior attitudes (Poortinga & Pidgeon, 2006; Siegrist, 2019). For instance, those who are more positively inclined toward a technology would therefore show more trust in authorities' information. We actually find a significant positive correlation between trust and benefit perception for the whole sample and for all clusters. The path analysis suggests that trust directly influences benefit evaluations and indirectly affects acceptance.

The indifferent cluster is fairly large, whereas the ambivalent cluster is comparatively small. It appears that in Germany, indifference still prevails at this phase, side-by-side with an opposing group stressing the risks. This pattern is not surprising if one recalls the special history of nuclear power and nuclear waste in this country. It is interesting to further observe the developments and potential changes in the future. We plan to repeat the survey over the next 3 years and compare the results.

The third, risk-focused cluster's members are older, comprise more females, and show low ratings for these statements: "Politicians care about what the average citizen thinks." "Politicians strive to maintain close contact with the population." As the risk-focused Cluster 3 is more oriented toward perception of risks than of benefits, this may also be due to its larger percentage of women. The literature shows that women are more sensitive to risks, particularly technological and nuclear risks, compared with men (Siegrist et al., 2005). This can also be observed in our sample, although it is not a focus of this study.

Regarding their study's results, Hoti et al. (2021) argue about the willingness to participate in a procedure dealing with the decommissioning of a Belgian nuclear power plant, in which of the few individuals who indicate interest, most share higher risk perception and low trust. In other words, because low trust and high perception of risk trigger interest, the authors conjecture that if only the motivated people would be invited to participate, a fairly biased sample would be generated. They suggest various instruments to ensure high heterogeneity and mutual learning without opinion polarization. However, it would still be a challenge to select the indifferent respondents from our sample for longer-term participatory processes. Our indifferent Cluster 2 shows very low interest in the topic. Drawing on the results of the study by Hoti et al. (2021), it may be that the indifferent faction of the public shows low interest *because* the members' trust is sufficient to outweigh their perceived risks. More research on the attitudes of this segment of society would be necessary, though.

Moreover, the respondents generally rate risks higher than benefits. It could be argued that this is due to a loss aversion (Kahneman & Tversky, 1979). "[A]ccording to behavioral theories of decision-making, the potential for loss is more germane to a decision (in this case, support or opposition for the Yucca Mountain project) than is the potential for gain of equivalent magnitude" (Flynn et al., 1992, p. 424).

Because of the current situation where nuclear waste disposal, its procedure, and related institutions in Germany are not widely known by the public, we only used trust, measured as trust in information provided by various agents. We did not use our measure of confidence or other trust concepts. The results appear similar if trust is replaced by confidence, but to be sure in future studies, researchers could investigate the relation of the two variables in more detail. Trust could also be measured in a more differentiated way by using other concepts from the literature (McKnight et al., 2009;

Renn & Levine, 1991). For example, Renn and Levine (1991) name five dimensions of trust, which could be assessed in a structured way: perceived competence (basically what we measured as *confidence*), objectivity (absence of information bias), fairness (representing various points of view), consistency (predictability of the institutions' behavior), and faith (the general expectation of good will). This concept more completely comprises what trust in a society could mean, including procedural aspects.

5 | CONCLUSION

First, we conclude that it makes sense to differentiate the DV acceptance to explicitly comprise the procedure and the decision. The main finding corroborates our primary hypothesis that trust would positively and directly influence acceptance of the procedure. In terms of public procedures in general, it may also be advantageous for other studies on trust and risk perception to consider risk assessment or approval processes. Observing the participatory procedure in Germany suggests that trust is in fact essential. The procedure's success depends on the trusted agents' behavior, which the critical public closely follows. Politicians and authorities often stress trust as an essential factor and may be right in doing so. Trust presently appears to be relatively more important for the current phase of the German procedure of finding a suitable location for the HLW repository than for the subsequent phases. It may be that this pattern is time-dependent and will change in the future, when the current phase closes and the parliament's decision is due. Anyway, our results hint at the relevance of trust during a participatory procedure, such as the German quest for the safest possible location for depositing its HLW.

In terms of risk communication, we consider it beneficial for official agents to distinguish among the different phases explicitly when addressing potential risks and risk perception. In public communication, authorities may emphasize the safety measures, which tackle the potential risks of a repository as a separate issue, not directly connected to the current participatory procedure. The latter is more linked to the public's trust and accepted if people trust the authorities.

Although in our study design, we related risks and benefits to the repository itself, and the influence of trust on risk is not perfect across all clusters, we can still presume that higher trust results in lower perception of risk (and higher perception of benefits) and thus higher acceptance.

We can also conclude that our German sample is heterogeneous with respect to risk perception and that the perceptions of risks and of benefits have negative and positive effects, respectively, on the acceptance of the repository facility. A clear statement is that the responsible authorities must take care of the risk-focused cluster, which in Germany is particularly sensitive to issues of fairness, transparency, and trust. They should also convince this critical segment of the public that the procedure is worth trusting in order to gain support for further phases.

The members of Cluster 1 should once and for all give up ambivalence and develop a positive attitude toward a repository for HLW in Germany and even in their own municipalities. For this to occur, we suggest addressing the ambivalence explicitly in communications, openly discussing trade-offs or pros and cons of a repository, and taking concerns seriously. It is generally important to keep in mind that communicating with the public should be done by using ethical and just arguments. Perceived risks and potential benefits do not need to be equal, for instance. If people expect more risks than benefits, these concerns have to be taken into account. For example, their own health is not debatable for many people, and perceived health risks due to a repository cannot be compensated for at all. Moreover, it could be speculated that a repository might be placed in a structurally impaired or generally poor region, with compensation offered for acceptance. This could be perceived as unethical and provoke opposition; from a substantive perspective, it would not be justifiable, either.

Some questions on the consequences for communication and participation, addressed to the authorities, remain to be answered. For instance, how can an indifferent segment of the population be reached? Is it even necessary to engage these people because they show relatively high acceptance anyway?

Finally, to date, we cannot resolve the puzzle about whether Germany or Switzerland may present a "special case" concerning the risk perception pattern of each. In other countries, we may find four-cluster solutions (as in Switzerland) or three-cluster solutions (as in Germany) or even other patterns. More international and comparative research is needed.

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APPENDIX

TABLE AI Age distribution of the sample. The statistical data for Germany are similar

Age group	Percentage in sample
16–21 years	9%
22–35 years	24%
36–49 years	25%
50–60 years	25%
61–69 years	16%

TABLE AII The different cluster solutions and respective cluster sizes

	Five-cluster		Four-cluster		Three-cluster	
	N sorting 1	*N* sorting 2	*N* sorting 1	*N* sorting 2	N sorting 1	*N* sorting 2
Cluster 1	886	629	886	629	886	629
Cluster 2	672	662	1814	1597	1814	2417
Cluster 3	1142	820	1434	820	1990	1644
Cluster 4	1434	935	556	1644		
Cluster 5	556	1644				

TABLE AIII Correlation analysis for each cluster between trust and risk and benefits

Correlation	Cluster 1	Cluster 2	Cluster 3	Total
Risks*Trust	0.009	0.083**	−0.142**	0.019
Benefits*Trust	0.228**	0.141**	0.279**	0.328**

**All correlations are significant at the 0.01 level (one-tailed).

Explanations for the questions on the current German procedure. We provided the respondents with essential information according to the official texts and referenced a link to the German website.

The purpose of the site-selection procedure is to find the site for a final repository in Germany that will provide the best possible safety over a period of one million years. The search has to be guided by the following principles:

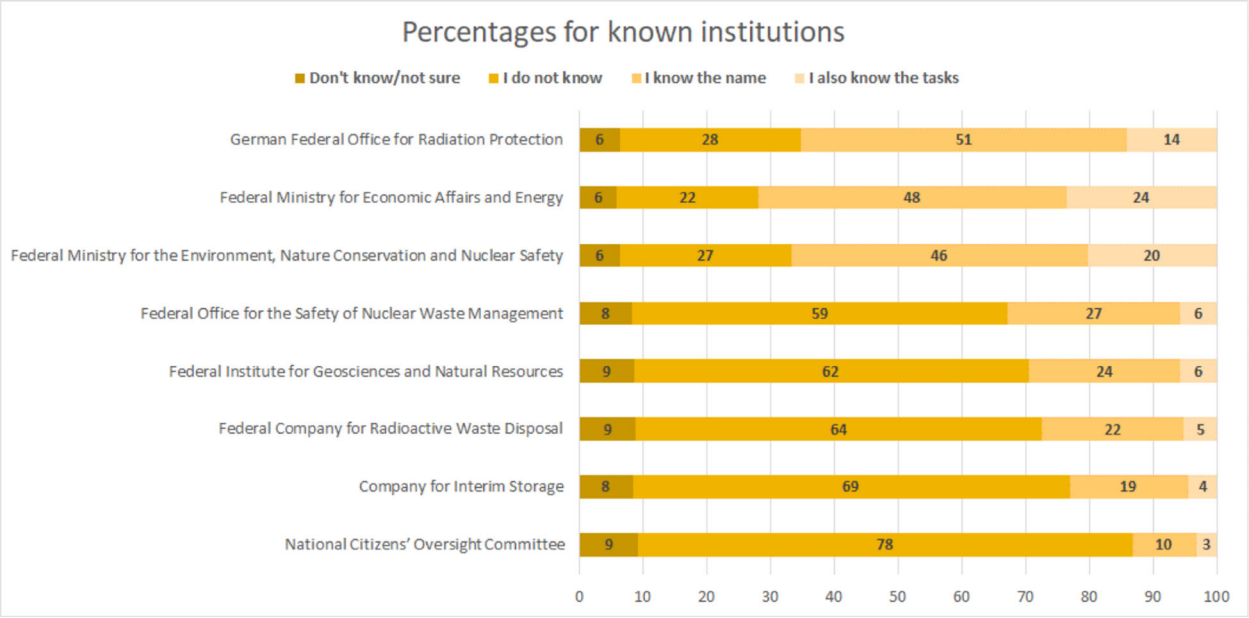


FIGURE AI Do respondents know named institutions? Shown are percentages for each category. The item read "We will now name state institutions in the field of (high-level) radioactive waste disposal. Please indicate in each case whether and how well you know them. *Note*: If you move the mouse over the institution name, you will get further information. The link leads to the corresponding homepage"

TABLE AIV Means and SD for the confidence in institutions. The item read "You have indicated that you know the following government institution(s) at least by name. Please rate the statement The institution can fulfill its responsibilities for safe final disposal on the following scale for each institution you know"

	Federal Office for the Safety of Nuclear Waste Management	Federal Company for Radioactive Waste Disposal	National Citizens' Oversight Committee	Federal Ministry for the Environment. Nature Conservation and Nuclear Safety	Federal Institute for Geosciences and Natural Resources	Federal Ministry for Economic Affairs and Energy	German Federal Office for Radiation Protection	Company for Interim Storage
N	1538	1286	620	3130	1380	3057	3371	1081
M	4.8	4.8	4.6	4.7	4.7	4.8	4.1	4.7
SD	1.25	1.26	1.33	1.28	1.30	1.32	1.35	1.26

Fair. The site-selection process starts from a "white map," meaning that all federal states are included and all internationally pursued repository concepts regarding claystone, rock salt, and crystalline rock are examined for their suitability.

- Transparent. The public is involved at an early stage of the process, through extensive information, supraregional participation formats, and regional conferences set up in the affected areas. A national monitoring committee has the task of overseeing the selection process and in particular, the participation processes, independently and in a public welfare-oriented manner.
- Science-based. For the evaluation of the sites, the geoscientific requirements and criteria are prioritized and developed by the repository commission. The safety of the repository is the top priority in the site selection. If this is insufficient to determine the sites, additional spatial planning criteria may be considered.

The original link for the German reference we used has changed in the meantime, but see:
Site selection procedure for a repository for heat-generating radioactive waste | BMU.
Additionally, we show the original German part from the Survey below:
Data for the path analysis: Confirmatory factor analyses for trust, risks and benefits.
Explained variance (Rotation Sums of Squared Loadings): 60%
Explained variance for risks alone: 61 %; for benefits alone: 57%

TABLE AV Factor analysis to identify potential subgroups of known institutions concerning confidence

	Factor
Factor matrix[a]	**1**
Federal Office for the Safety of Nuclear Waste Management	0.896
Federal Ministry for the Environment. Nature Conservation and Nuclear Safety	0.891
German Federal Office for Radiation Protection	0.885
Federal Institute for Geosciences and Natural Resources	0.884
Company for Interim Storage	0.877
Federal Company for Radioactive Waste Disposal	0.873
National Citizens' Oversight Committee	0.863
Federal Ministry for Economic Affairs and Energy	0.814

Note: Extraction method: Alpha factoring.
[a]1 factor extracted. 3 iterations required.

TABLE AVI Factor analysis to identify potential subgroups of agents concerning trust

Rotated factor matrix[a]		
	Factor	
	1	**2**
National authorities responsible for safety in the management of (highly) radioactive waste	0.805	
Authorities and ministries	0.775	
International organizations dealing with issues of (high-level) radioactive waste management	0.751	
The Federal Government	0.744	
German courts	0.657	0.364
Regional and local authorities	0.648	0.482
The science	0.640	
Political parties	0.623	0.484
Traditional media (television, radio, newspapers)	0.551	0.455
NGOs	0.549	
Social media: For example, Facebook groups, blogs		**0.788**
The nuclear power plant operators	0.399	0.433
Friends and family members		**0.418**

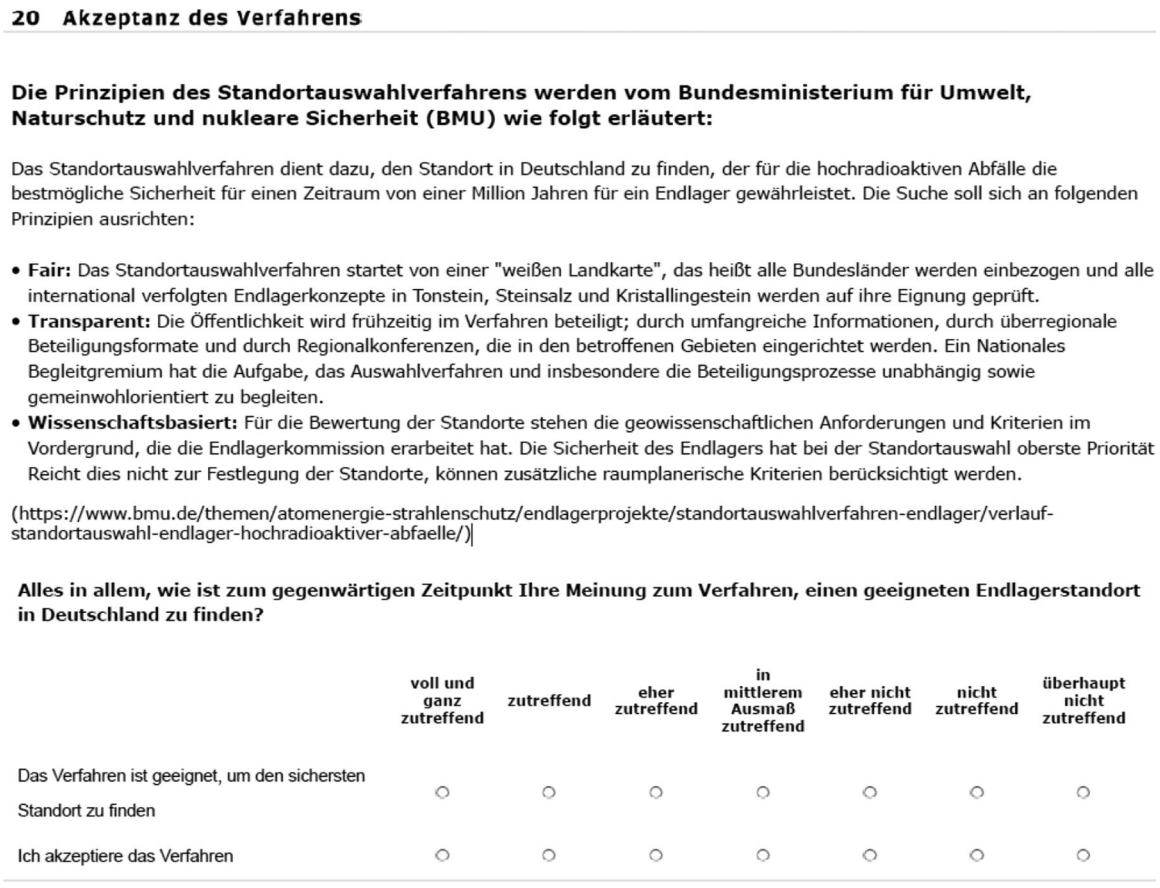
Note: Only social media and friends and family load on the second factor elusively. For this reason, these two items were not used for calculation of the scale later used in the path analysis. All values < 0.34 were omitted for simplicity; see (Costello & Osborne, 2005).
Extraction method: alpha factoring. rotation method: Varimax with Kaiser normalization.
[a]Rotation converged in three iterations.
Explained variance (rotation sums of squared loadings): 60%.

TABLE AVII Factor analysis over all benefit and risk items. Risks and benefits can clearly be separated

Rotated Factor Matrix[a]

	Factor	
	Risks	**Benefits**
Health risks for future generations	0.879	
Pollution of groundwater	0.840	
Uncontrollable consequences due to radioactive waste	0.837	
Health risks for myself	0.802	
Social protests due to planning and construction of a facility	0.433	
Improvement of the infrastructure in the region		0.796
Economic stimuli for local trade and industry		0.783
Promotion of sustainable development in the siting region		0.740
Improved sales opportunities for real estate		0.734

Extraction Method: Alpha Factoring.
Rotation Method: Varimax with Kaiser Normalization.
[a]Rotation converged in 3 iterations.



20 Akzeptanz des Verfahrens

Die Prinzipien des Standortauswahlverfahrens werden vom Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit (BMU) wie folgt erläutert:

Das Standortauswahlverfahren dient dazu, den Standort in Deutschland zu finden, der für die hochradioaktiven Abfälle die bestmögliche Sicherheit für einen Zeitraum von einer Million Jahren für ein Endlager gewährleistet. Die Suche soll sich an folgenden Prinzipien ausrichten:

- **Fair:** Das Standortauswahlverfahren startet von einer "weißen Landkarte", das heißt alle Bundesländer werden einbezogen und alle international verfolgten Endlagerkonzepte in Tonstein, Steinsalz und Kristallingestein werden auf ihre Eignung geprüft.
- **Transparent:** Die Öffentlichkeit wird frühzeitig im Verfahren beteiligt; durch umfangreiche Informationen, durch überregionale Beteiligungsformate und durch Regionalkonferenzen, die in den betroffenen Gebieten eingerichtet werden. Ein Nationales Begleitgremium hat die Aufgabe, das Auswahlverfahren und insbesondere die Beteiligungsprozesse unabhängig sowie gemeinwohlorientiert zu begleiten.
- **Wissenschaftsbasiert:** Für die Bewertung der Standorte stehen die geowissenschaftlichen Anforderungen und Kriterien im Vordergrund, die die Endlagerkommission erarbeitet hat. Die Sicherheit des Endlagers hat bei der Standortauswahl oberste Priorität Reicht dies nicht zur Festlegung der Standorte, können zusätzliche raumplanerische Kriterien berücksichtigt werden.

(https://www.bmu.de/themen/atomenergie-strahlenschutz/endlagerprojekte/standortauswahlverfahren-endlager/verlauf-standortauswahl-endlager-hochradioaktiver-abfaelle/)

Alles in allem, wie ist zum gegenwärtigen Zeitpunkt Ihre Meinung zum Verfahren, einen geeigneten Endlagerstandort in Deutschland zu finden?

	voll und ganz zutreffend	zutreffend	eher zutreffend	in mittlerem Ausmaß zutreffend	eher nicht zutreffend	nicht zutreffend	überhaupt nicht zutreffend
Das Verfahren ist geeignet, um den sichersten Standort zu finden	○	○	○	○	○	○	○
Ich akzeptiere das Verfahren	○	○	○	○	○	○	○

FIGURE AII Results from the path analysis for each cluster