The Effects of Influence on Decision-Making and Environmentally Framed Communication on Public Acceptability: An Experimental Study

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Abstract

Due to the burning of fossil fuels for the production of electric power and the associated emissions of greenhouse gases, climate change is accelerating. Thus, reducing emissions is compelling to limit climate change, and renewable energies are needed for a successful transformation. This paper focuses on the acceptability of onshore wind turbines as those are essential for sustainable electricity power production, but protests and legal actions often hinder their construction. The research answers the question of to what extent public acceptability of the projects' final decision is associated with the publics' influence on decision-making and environmental framing effects. Researchers have suggested that influence on decision-making is crucial and that a higher level of influence improves acceptability more than a lower level. However, the ideal level is not yet determined. Furthermore, the framing theory suggests that a positive environmental framing of the communication with the affected residents also increases the acceptability. The hypotheses were tested by conducting an experimental study using a 2x2 design. Data of N=100 participants indicated that shared influence on decision-making significantly increases the acceptability of the final decision compared to little influence. Moreover, in comparison to the neutral frame, participants reading an environmental frame favouring wind turbines caused a higher acceptability of the final decision. However, an interacting effect of the two factors was not found. Besides, explorative analyses were performed to further investigate the effects of decision-making and frames. Explanations, implications, and limitations are discussed. These results imply that public participation is a valuable tool that should be considered in the decision-making phase of a project. In agreement with that is the recommendation to use positive environmental framing.

Keywords: wind turbines, influence on decision-making, environmental framing, public acceptability

The Effects of Influence on Decision-Making and Environmentally Framed Communication on Public Acceptability: An Experimental Study

The transition to renewable electricity can help combat the climate crisis and the rising temperatures that contain many environmental and societal risks. Therefore, in recent years, several countries set high goals to increase their share of renewable electricity. The Netherlands, for example, aims to produce 70 per cent of their electricity by 2030 emission-free, and Germany declared to reach a share of 65 per cent by 2030. To achieve lower or zero emissions in the sector, more renewable power plants are needed in the following years (Bundesministerium für Wirtschaft und Energie, 2019; Ministry of Economic Affairs and Climate Policy, 2019).

Traditional power plants emit greenhouse gases when producing electricity by burning oil, coal, or gas, thereby fuelling climate change. Nowadays, several technologies exist to produce renewable electricity emission-free, for instance, through solar power or hydropower. Moreover, wind turbines are essential for a shift in environmentally sustainable electricity production. Those wind turbines are placed either offshore, i.e. on water, or onshore, i.e. on land in rural areas. However, citizens perceive these two options differently. Usually, citizens' acceptance is lower for onshore wind turbines than for the ones placed offshore. This suggests a higher need to develop strategies to improve the acceptability of onshore wind turbines (Jones & Eiser, 2010; Ladenburg, 2008; Linnerud et al., 2022; Shukla et al., 2022). Because of that, the study concentrates exclusively on onshore wind turbines.

Previous research shows that projects concerning new energy sources are often opposed by negative attitudes, leading to displeasure among citizens and causing delays in the energy transition (Cohen et al., 2014; Janhunen et al., 2017). To tackle those issues, many planners consider public participation as a potential solution. The idea of public participation is that a more significant consideration of public opinion provides the stakeholders, such as planning

and building companies or authorities, with additional insights and fosters the planning (Perlaviciute et al., 2018). Moreover, this process is perceived as fairer and more transparent from the perspective of affected citizens (Firestone et al., 2017; Friedl & Reichl, 2016; Langer et al., 2017). Yet, even more, crucial is the positive effect of public participation on public acceptability, which is determined by the degree to which the citizens evaluate a project as either positive or negative (Perlaviciute et al., 2018). Richardson and Razzaque (2006) found that incorporating the concerns identified during public participation into the project planning increases the acceptability and forstalls conflicts.

There are also prominent examples of missing acceptability leading to the fall of the project, like the wind turbine park project on King Island or a biomass project in the UK, which suffered from a missing or insufficient strategy for approaching acceptance. As a consequence, the local citizens denied their permission for the projects (Colvin et al., 2016; Upreti & van der Horst, 2004). The strategies applied on King Island or in the biomass project in the UK turned out to be contra-productive for the projects. Consequently, it was suggested that projects of that size require a proper strategy during their public participation phase (Colvin et al., 2016; Upreti & van der Horst, 2004). An improved strategy should consider the aspects necessary to increase positive evaluations towards the project among citizens. However, it must be applied correctly and consider as many factors as possible (Richardson & Razzaque, 2006; Swofford & Slattery, 2010). In the past, some factors have shown to be significantly valuable during public participation as they influence the citizens' perception. The purpose of this study is thus to further investigate the factors that might be helpful to improve strategies as public participation is, in general, a valuable method (Perlaviciute & Squintani, 2020; Perlaviciute & Steg, 2014).

Influence on Decision-Making: Little Versus Shared Influence

One crucial factor in public participation represents the extent to which citizens are allowed to influence a project's outcome. In the past, Arnstein (1969) developed several stages

of public influence on decisions. He classified citizens' influence on eight rungs from no influence and the bare provision of information to full control over decisions by the citizens. Recent research showed that public participation must allow interaction between companies, authorities, and citizens (Langer et al., 2017). Thus, successful participation contains not only the bare contribution of knowledge but also the fulfilment of citizens' desire for a certain degree of power in decision-making (Aitken, 2010a; Aitken, 2010b). Additionally, it is suggested that good strategies can identify the citizens' needs and concerns, and effective communication would entail transmitting the benefits and consequences to the citizens (Jones & Eiser, 2010).

Nevertheless, the main question is how much influence by citizens is needed to achieve sufficient public acceptability. In the past, different levels of influence on decision-making have already been subject to research. Often it is assumed that more participation from affected citizens causes more public acceptability (Aitken et al., 2016). Liu et al. (2021) identified two categories of public participation based on Arnstein's (1969) ladder. Liu et al. (2021) focused on shared influence, i.e. decisions made in cooperation with experts, and full influence, i.e., citizens make all decisions. According to their results, full influence does not significantly increase the acceptability towards sustainable energy projects compared to shared influence. This contradicts the assumption that more public participation always leads to a higher level of public acceptability (Aitken et al., 2016). Also, citizens are not always inclined to influence decisions directly. Many mainly ask for their voices to be heard. In the first place, they want to express their opinion to the people in charge of the project and thereby hope or plan to influence the project indirectly (Smith & McDonough, 2001). Especially when the relationship between the people in charge and the citizens is good and trustful, the exchange of opinions and information can already have a significant impact on public acceptability (Perlaviciute & Steg, 2014).

The existing research still shows some contradictions and a lack of knowledge concerning the most appropriate level of influence on decision-making. Liu et al. (2021) recommended testing other levels of influence on decision-making in future research, such as little influence. Thus, it seems reasonable to investigate the impact that different levels of influence have on decision-making further.

Framed Communication

The communication between companies, authorities and citizens can differ for each project. How people in charge address affected citizens is unique for each project, and each has its own obstacles. However, a general framing of the message's content can affect citizens' perception of the project. According to Chong and Druckman (2007), framing during public discussions can create different perspectives for other stakeholders. Those framing effects aim to alter stakeholders' considerations or values and can lead to a specific shaping of attitudes and opinions influencing future decisions of the addressed stakeholders.

The study at hand focuses primarily on the environmental benefits of wind turbines. Those benefits are important to transmit to the citizens as there needs to be more knowledge among citizens about wind turbines and their importance for the future energy transformation (Klick & Smith, 2010; Perlaviciute et al., 2018). A first indication of a framing effect was found in 2010 by Klick and Smith. They found that the US society was not divided in their opinion about wind energy, which is usually the case for other topics. According to the researchers, this observation is because the Republican and Democratic parties both sent positive messages favouring wind turbines. This observation was remarkable since other public discussions were shaped by two political blocks sending different messages and thereby framing the block's opinion. Thus, the favouring opinion of the two parties is working as a positive framing effect for wind energy in the US.

Walker et al. (2014) found that communicating the benefits of wind turbine parks for the community could increase the public's acceptance. For instance, positive messages can be community benefits promising a financial gain from the newly installed wind turbines. However, researchers stressed that the framing of environmental benefits is more effective for increasing public acceptability than the financial gain from the project (Palomo-Vélez et al., 2021). Besides, the framing of environmental harms was proposed to be more effective than the framing of economic benefits regarding people's perception of energy sources. Thus, an emphasis on the absence of harm to the environment and environmental friendliness for the climate might influence the acceptability of the final decision positively (Ansolabehere & Konisky, 2009).

At the moment, however, there exists only little research about the effect of framing on public participation in the context of onshore wind turbines, and not much is known about effective frames in this specific context. Additionally, it is difficult to transfer a communication frame and its results into another setting, meaning that comparable ideas of past studies cannot easily be copied into this study as the prerequisites are deviating (Entman, 2004, as cited in Chong & Druckman, 2007). Moreover, Walker et al. (2014) acknowledged that the circumstances around the project might influence the effect of frames since situations might be too complex for simplistic solutions such as frames. Nonetheless, framing can represent a valuable and powerful tool in gaining public acceptability, and a deeper understanding of this tool can facilitate the process. Thus, it is essential to investigate to what extent such framing effects can influence the public acceptability of wind turbine parks during decision-making processes.

Interaction Between Influence on Decision-Making and Framed Communication

The two effects of influence on decision-making and environmental framing of wind turbines were outlined. Next to the individual importance of the two main factors, it is crucial

to understand how they interact. According to Nutt (1998), stakeholders who frame their interests and communicate them to decision-makers during the process can shape the decision-makers decision into a certain direction. Projecting these findings to the current study, the participants are seen as decision-makers who decide about the acceptability of the final decision.

To the authors' knowledge, it is not yet researched to what extent a neutral or environmentally friendly framing can affect the evaluation of the final decision in the context of onshore wind turbines. An environmental framing displaying wind turbines positively could emphasise the effect of the shared decision-making process, resulting in a higher level of acceptability. However, a neutral framing could have more impact on the participants receiving little influence than people with shared influence on decision-making. Thus, it must be researched how this interaction effect is behaving in the current model must be researched.

The Current Study

Existing literature about the role of framing and the amount of influence on decision-making cannot offer comprehensive advice for the best public participation strategy. Therefore, this study aims to answer the research question, 'To what extent is public acceptability associated with influence on decision-making and moderated by framing?'.

Due to previous research on influence on decision-making, two different levels of influence are used in the study. Liu et al. (2021) reported an overview of the current research and Arnsteins' (1969) ladder. In this study, their description of 'little influence' and 'shared influence' of decision-making will be used. According to Liu et al. (2021), Arnsteins' rung of 'Consultation' equals little influence, and Arnstein's proposed rung of 'Partnership' is shared influence with experts. Thus, little influence illustrates in the current research the scenario of citizens stating their opinion about projects and giving suggestions without having an actual influence on the decisions made. Shared influence describes how citizens are involved in

making the final decisions. However, they do not decide independently but together with experts familiar with wind turbine projects.

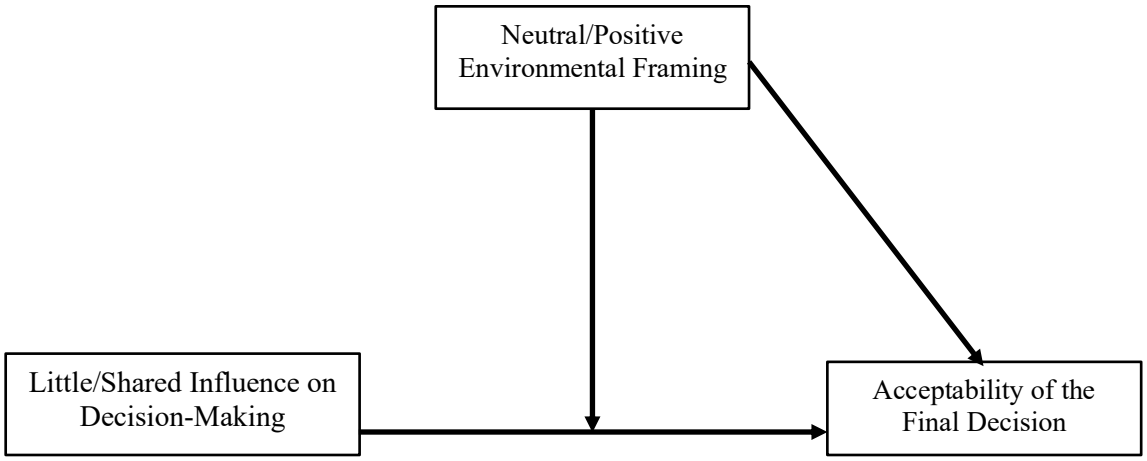
Furthermore, the study incorporates two different framings of the environmental effects of the wind turbine project. First, the project's benefits are presented neutrally, describing the hard facts of the wind turbines without emphasising specific aspects. The second condition underlines the effects positively and compares them with other units to provide a clearer image to the participants. Ultimately, the second condition aims to make the environmental effects seem more tangible and beneficial, consequently, more positive to the participants.

Thus, the study will research four conditions in an experimental setting to gain knowledge that can be applied in later onshore wind turbine projects. It is expected that citizens with shared influence on decision-making show greater acceptability than citizens with little influence. Secondly, citizens presented with a positive framing are expected to have higher acceptability than participants who read a neutral frame. Lastly, it is hypothesised that there is an interacting effect between framing and the influence on decision-making.

Next to the main analysis, four explorative dependent factors will be examined. Those are based on other analyses by Liu et al. (2021) and aim to compare the results within the two proposed independent factors and to look for commonalities and differences between the results of the two studies. These dependent factors focus on different aspects of the public participation process and the project in general. The four factors are the acceptability of the decision-making process, the evaluation of the wind energy project, the evaluation of the decision-making committee, and the resident's perception of their influence on decision-making. Ultimately, they could provide additional insights into understanding the current study.

Figure 1.

The Hypothesised Research Model



Hypothesis 1: Residents with shared influence on decision-making have higher public acceptability towards the wind turbine park than residents with little influence on decision-making.

Hypothesis 2: Residents addressed with an environmentally positive frame have higher public acceptability of the wind turbine park than residents addressed with a neutral frame.

Hypothesis 3: Residents with little influence on decision-making have less public acceptability when the environmental friendliness of wind turbines is positively emphasised, compared to residents with shared influence in neutrally framed communication.

Methods

Design

The experimental study was conducted as a 2x2 and a between-subject design. First, the influence on decision-making consisted of two levels: little and shared influence. Secondly, framed communication compromised two messages for the participants: a neutral or

environmentally positive framing. The dependent variable was the public acceptability of the final decision. In the explorative analysis, the dependent variables were the acceptability of the decision-making process, the evaluation of the wind energy project, the evaluation of the decision-making committee, and the resident's perception of their influence on decision-making.

Participants

Based on a preliminary G*Power analysis considering a power of $1\text{-}\beta \geq .80$ with a medium effect size ($f^2 \geq .25$) and an alpha of .05, at least N=128 were needed. Hence, each condition requires a minimum of 32 participants (Faul et al., 2009). However, the study aimed to reach more participants, as previous research showed that many participants dropped out due to a failed manipulation check (Liu et al., 2020).

The researcher contacted potential participants via social networks like Instagram, WhatsApp or Facebook. Furthermore, the researchers' social network was kindly asked to spread the survey at their workplaces as they are in more contact with people in older age classes who are more likely to be settled. The researcher did not address people working at companies with activities in the energy sectors or the production of necessary products like wind turbines as their business relations might have biased them.

In total, 134 responses were recorded. Participants who did not consent to the consent form, were younger than 18, withdrew from the ongoing study, or failed the attention check were excluded. Thus, three participants were removed from the data as they did not consent to process their data after reading the debriefing, resulting in 131 responses. Also, 31 participants failed the attention check reducing the valid participants to N=100. As participants were randomly assembled into one of the four conditions, the participants were distributed as follows: condition one (neg. framing/ little influence) contained n=28, condition two (neg.

framing/ shared inf.) *n*=22, condition three (pos. framing/ little inf.) *n*=24, and condition four *n*=26 (pos. framing/ shared inf.).

The valid responses included 68 persons identifying with the female gender, 30 persons indicating the male gender, and two indicated non-binary. Participants were, on average, 31.72 (*SD*=13.77) years old, with the youngest person being 18 and the oldest 82. Due to the broad range, the mean age might be distorted by outliers, and thus the median (25 years) was significantly lower than the mean. Furthermore, more than three-quarters of the participants hold a German nationality (79%), four Italian people (4.0%), three people from the Netherlands (3.0%), and three American participants (3.0%). The remaining 11% of participants hold various nationalities (see Appendix F). Next, more than one-third (36.0%) hold a bachelor's degree, and another 28.0% successfully achieved a vocational/trade school degree (see Appendix G).

Materials and Measures

The participants were introduced to their experimental condition by a written text. In the following, they answered questions concerning the previously read information about the condition. The questionnaires developed by Liu et al. (2021) were used to measure the dependent variables. Those were translated and adjusted to the context of wind turbines (see Appendix D). The questionnaire consisted of five different scales. The first scale dealt with three questions about the participant's acceptability of the decision-making process (α = .968). Secondly, four questions about the acceptability of the final decision were asked (α = .949). Another four questions asked participants about their opinion towards the wind energy project (α = .939). Fourthly, participants answered two questions about their evaluation of the decision-making committees' experience and knowledge (α = .897). The last question dealt with the perceived influence of the residents over the final decision. The scores of the questions were

recorded on a seven-point Likert scale and scored from -3 to 3. The total score per scale was obtained from the averaged item scores (see Appendix H).

Procedure

First, participants were asked to have a computer, phone or tablet to access the survey platform Qualtrics (https://www.qualtrics.com/). The survey was accessed using the provided link in an invitation text explaining essential information. After participants entered the study, they were asked to consent to participate in the study (see Appendix A). Afterwards, participants filled in demographics about their age, nationality, and education level. Next, the software divided the participants randomly into four experimental conditions (based on the 2x2 design with the independent variables framing and influence on decision-making). The idea of constructing different conditions originated from Liu et al.'s (2021) study. Before reading the allocated condition, participants were shortly instructed to imagine themselves as local resident who lives in the proximate area of a planned wind turbine project.

The conditions of the current study consisted of three sections (see Appendix B). First, a general introduction familiarised the participants with the project and offered basic information equal for all conditions (e.g. height, wind turbine in sight). Second, two differently framed messages were presented, which exclusively focused on the environmental aspect of the wind turbine. Other factors, such as economic benefits, were not mentioned as they could have interfered with the environmental focus and caused distortion. Both frames informed the participants about wind turbines' effects by addressing the carbon footprint and producing electricity. Specifically, the first frame dealt neutrally with the wind turbine project. It just presented the facts without comparisons and positively connotated words. The second frame emphasised the positive environmental impacts on the climate by using comparisons like "[…] equals burning more than 10.000 tons of coal […]" or "[…] can supply 7.100 households around the wind turbines […].". Furthermore, formulations like "green electricity" and

“significantly shrinking our local carbon footprint” in the context of wind turbines were used to frame the message for the receiver. The last section explained the decision-making processes to the participants. In the first situation, little influence was granted to the residents by offering them participation in an open event to share their concerns and give suggestions for the project. However, the final decision was taken by the authorities and planners. In the second situation, residents had an equal opportunity to influence decisions in cooperation with experts and authorities. While reading the framed message, a 30 second timer did not allow the participants to skip directly to the next page to ensure that the participant would engage with the text.

After reading the text, the participants answered two questions to guarantee they paid attention and understood the assigned condition. First, the participants answered one question regarding the ecological effect of implementing the wind turbines, and second, the resident's role in the decision-making process (see Appendix C). After the first days of data collection, there was a tendency for many participants to fail the attention check. Thus, the key messages were marked in bold to increase participants' awareness of the key message of the condition. Therefore, even when participants quickly scanned through the text without paying much attention, they could easily understand the central messages of the condition.

Following the attention check, the participants answered the scales outlined above to measure their perception and opinion about the decision-making process, overall acceptability of the decision made, thoughts on the project, their thoughts about the decision-makers committee, and finally, answering what they think about the resident's influence on the decision. After the survey was completed, participants received a debriefing about the actual purpose and methods of the survey. They were also offered the possibility to withdraw their data from the study (see Appendix E).

Data Analysis

The gathered data were analysed using IBM SPSS statistics 29. After closing the study, the collected data was prepared by excluding participants who did not fulfil all obligations, i.e. no consent given, younger than 18, failed attention check or withdrew participation. Furthermore, the final scale scores were calculated. A two-way ANOVA analysis was executed to calculate the effects of the independent variables on the dependent variable acceptability of the final decision by using the averaged scores. Lastly, the researcher performed a two-way ANOVA explorative analyses to examine the relationships of the other dependent variables.

Results

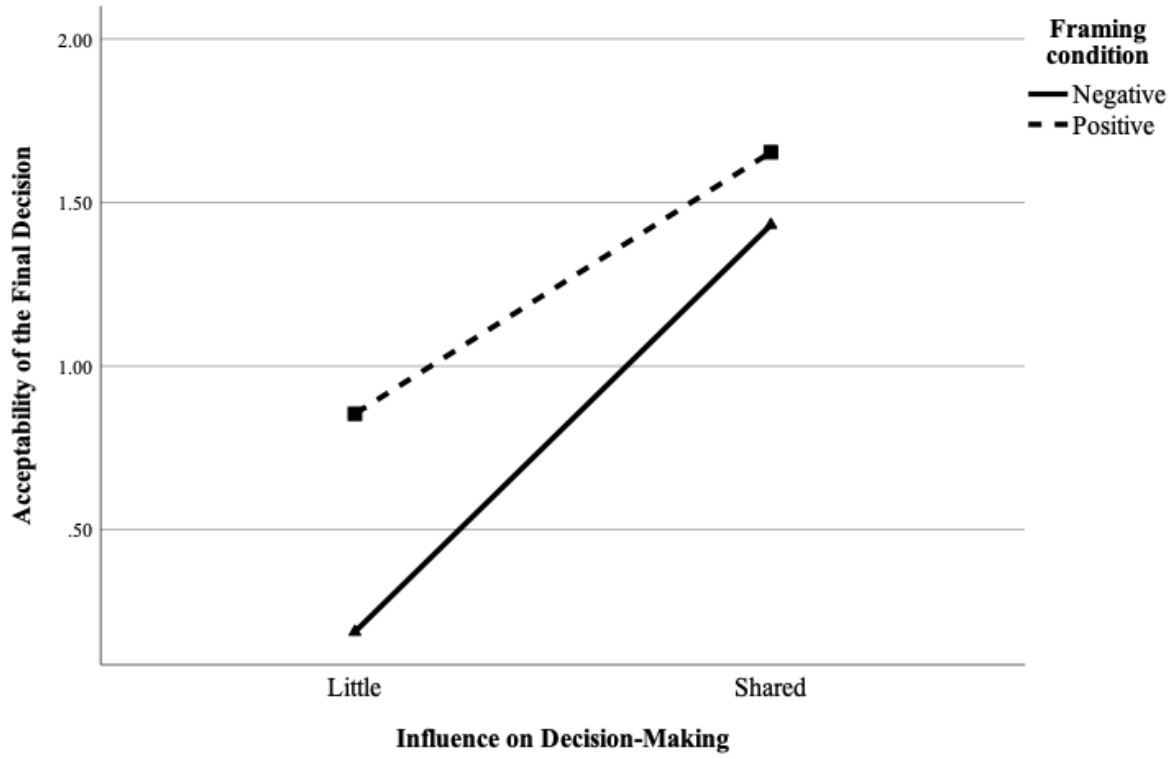
To test the hypothesised effects, the analysis started with performing a two-way ANOVA analysis to examine the possible effects of framing and influence on decision-making. Before starting the main analysis, the assumptions of a two-way ANOVA analysis were checked. The first assumption of independence was met as participants were sampled and allocated randomly to a condition. Second, Levene's equal variance test reported $p < .05$, which does not meet the requirements for homogeneity of variance, meaning that there are significant differences in variance between the samples. A further Welch test confirmed the unequal variance ($p > .001$). However, the conditions' largest and smallest samples did not differ more than 1.5 in their ratio. Thus, a violated homogeneity assumption can be neglected (Stevens, 2007). Last, in testing for normality, a Shapiro-Wilk test showed for condition 2 (neg. framing/shared influence) and 4 (pos. framing/shared influence) non-normality. Still, it confirmed normality for conditions 1 (neg. framing/little influence) and 3 (pos. framing/little influence). However, the visual inspection of the normal Q-Q plots showed satisfaction with normality for all combinations of influence on decision-making and framing. Furthermore, the analysis identified two outliers, but the participants' answers seemed reasonable after inspection and were thus included in the further analysis.

The analysis showed a significant effect for the primary effect of influence on decision-making, $F(1, 96) = 26.817$, $p < .001$, partial $\eta^2 = .218$. Consequently, shared influence is associated with a 1.022, 95% CI [.630, 1.414] higher mean score on the level of acceptability towards the final decision. Concludingly, participants provided with shared influence showed greater acceptability of the final decision, confirming hypothesis one.

The second main effect of framing proved a significant effect, too, $F(1, 96) = 5.069$, $p = .027$, partial $\eta^2 = .050$. The effect showed a .444, 95% CI [.053, .836] higher mean score for positively framed messages on the level of acceptability towards the final decision. This finding confirmed hypothesis two, as positive messages improved the acceptability of the final decision among the participants. The hypothesised interaction was not found, $F(1, 96) = 1.269$, $p = .236$, partial $\eta^2 = .013$. Thus, hypothesis three is rejected (Figure 2).

Figure 2

The plot of the Interaction between Message Framing and Influence on Decision-Making on the Level of Acceptability of the Final Decision.



Explorative Analysis

Next to questions concerning the overall acceptability of the final decision of the wind turbines, other aspects were addressed in the questionnaire. The normality assumption was tested for each dependent variable individually by analysing the test's Q-Q plots and Shapiro-Wilk tests. The independence assumption was confirmed, and homogeneity was assumed since the sample sizes of the conditions are about equal in all analyses.

The normality assumption was tested again for a two-way ANOVA analysis to examine the participants' acceptability of the decision-making process. The normality assumption was met after performing a Q-Q plot. The analysis showed a significant contribution of influence on decision-making to the residents' perception, $F(1, 96) = 32.054$, $p < .001$, partial $\eta^2 = .250$. This leads to the observation that participants indicated better acceptability of the decision-making process when they read the case description providing them with shared influence. Furthermore, the analysis indicated no significant difference between people confronted with a neutral or positive framing, $F(1, 96) = 3.309$, $p = .072$, partial $\eta^2 = .033$. The ANOVA analysis also revealed no significant interaction between influence on decision-making and framing for the acceptability of the decision-making process, $F(1, 96) = .090$, $p = .765$, partial $\eta^2 = .001$ (see Appendix Table I1).

Participants were also asked about their evaluation of the wind turbine project. The variable was examined for the assumption of normality, which held in conditions 1 and 2 but failed for conditions 3 and 4 in a Shapiro-Wilk test. The additionally performed Q-Q plotting showed a good distribution. Furthermore, the analysis could not show a significant difference in people’s perceptions due to a different level of influence $F(1, 96) = 2.755$, $p = .100$, partial $\eta^2 = .028$. Thus, people did not perceive the project differently, although they influenced it differently during decision-making. However, an analysis found a main effect of framing $F(1, 96) = 37.024$, $p < .001$, partial $\eta^2 = .278$. Thus, a pairwise comparison was run with Bonferroni

adjusted for multiple comparisons. The result indicated that positive framing is associated with a mean score of 1.094, 95% CI [.737, 1.451] higher than a participant confronted by a neutral frame. Therefore, an emphasis on environmental friendliness positively influenced the project's perception. Lastly, an interaction analysis revealed a non-significant effect on the evaluation of the wind turbine project, $F(1, 96) = .104$, $p = .748$, partial $\eta^2 = .001$ (see Appendix Table I2).

Furthermore, questions were asked regarding the evaluation of the decision-making committee. A Shapiro-Wilk test showed a failing of all conditions in normality, especially condition 3, indicating one outlier, which seemed unrealistic. However, an exclusion of the outlier did not help to reach a significantly better normal distribution but improved normality. Nonetheless, the analysis proceeded with 99 participants. A Q-Q plot proved the normality of the data. Testing the main effect of influence on decision-making revealed an effect on the opinion towards the committee, $F(1, 95) = 6.769$, $p = .011$, partial $\eta^2 = .067$. A Bonferroni adjusted pairwise comparison indicated that participants assessed the committee on average .477, 95% CI [.113, .840] points higher when they had shared influence. Thus, participants with more influence were more likely to have a better opinion of the decision-making committee than those with less influence. The ANOVA analysis, run for the main effect framing, showed an effect, $F(1, 95) = 15.433$, $p < .001$, partial $\eta^2 = .140$. Another pairwise comparison indicated a mean acceptability of about .720, 95% CI [.356, 1.083] higher than the neutral framed messages. Concludingly, if a wind turbine project were portrayed neutrally, the opinion of the residents would be impaired compared to a positively framed project. The testing of the interaction effect did not show a present effect, $F(1, 95) = .495$, $p = .484$, partial $\eta^2 = .005$ (see Appendix Table I3).

Lastly, participants were asked to assess the residents' influence on the decision. A normality test failed for all cases. However, normal plotted Q-Q plots displayed satisfying results. The main effect of influence on decision-making showed significance,

$F(1, 96) = 41.591$, $p < .001$ partial $\eta^2 = .302$. This effect causes a 1.681, 95% CI [1.164, 2.199] higher score on the scale judging the participant's influence. Accordingly, residents perceived their influence as greater when granted more influence. On the other hand framing showed insignificance $F(1, 96) = 1.247$, $p < .267$ partial $\eta^2 = .302$. So, an effect of framing is absent. Thirdly, examining the interaction effect evidenced a non-significant effect on the resident's perception of their influence, $F(1, 96) = .298$, $p = .586$ (see Appendix Table I4).

Discussion

The study examined the effects of residents' influence on decision-making and the framing of messages on the acceptability of a wind turbine project. The results indicate that depending on the conditions the participants were assigned to, they differ in their level of acceptability towards the project's final decision. Participants granted little influence had a significantly lower level of acceptability of the final decision than their co-participants in groups who made the final decisions together with experts and authorities. Next to that result, the study showed that messages designed with an environmentally positive frame led to more acceptability of the final decision among participants than neutrally designed messages. Those findings are in accordance with the proposed hypotheses one and two. However, no interaction effect between influence on decision-making and framing was found, thus leading to a rejection of hypothesis three.

Influence on Decision-Making

The study's results confirm the first hypothesis and match the widely known theories and study results, arguing that more influence is associated with higher acceptability of the final decision. However, the study of Liu et al. (2021), which used the same scales, also showed that more influence is not indefinitely increasing the public's acceptability but could also decrease the acceptability. Nevertheless, no influence is worse for acceptability than a shared or full

influence on decision-making, suggesting an inverted U-shaped pattern of acceptability for the final decision.

In line with that, Liu (2022) argued that minor influence, declaring the possibility to make decisions which are not of great importance, is not as valuable as having power over major decisions. Although this study's conditions descriptions are deviating, they show commonalities. For instance, the research at hand provided the residents with a level of little influence, similar to Liu et al. (2021). Furthermore, the shared influence on decision-making condition of Liu et al. (2021) contains consultation and a joint agreement between the stakeholders in both studies. However, they described to their participants precisely what they were allowed to decide on instead of more general instruction. Nonetheless, the current study confirms previous research, although it provided less specific power to participants.

The question remains, how much influence is enough to run a project without encountering much resistance like legal actions or protests. The results showed a large effect size of influence on decision-making, verifying the importance of residents' influence on decision-making (Schuele & Justice, 2006). Since many studies examined those effects, they often used different levels of influence, which are barely comparable to each other. Despite that, they commonly demonstrated improved acceptability among residents when given more influence (Aitken et al., 2016; Liu et al., 2021). Thus, although increasing the opportunity to influence decisions seems like a suitable strategy when wanting to attain a higher level of acceptability, and the effect size supports this finding, the question of which level of influence is appropriate still exists.

In the future, as in the past, it will be a balancing act on identifying how much influence wind turbine planners and authorities can grant to residents and how much participation is required to achieve the successful execution of plans. Because in reality, authorities and planners will be limited in their scope of action by policies and financial aspects. Thus, limited

influence on decision-making for residents is not necessarily caused by the preference of authorities and planners but by legislation and feasibility (Pepermans & Loots, 2013; Perlaviciute et al., 2018; Walker et al., 2010). Nevertheless, a well-designed strategy to gain public acceptability will probably outweigh the costs of legal actions when local resistance is not handled carefully.

Framed Communication

The abovementioned results confirmed the hypothesised effect of framing on the public acceptability of wind turbines. The analysis supports the theory that a positive framing causes a higher acceptability of the project's final decision compared to a neutral framing. Unfortunately, to this point, there is not much research investigating the effect of framing within the communication of wind turbines. Nevertheless, the framing theory proposed by Chong and Druckman (2007) seems applicable to the results as they argue that a framed message causes a change in the participant's weighting of his or her acceptability of the final decision. In line with that, the framing theory has previously demonstrated its role in increasing the public acceptability of wind turbines in different contexts and factors. Bayulgen and Benegal (2019) and Walker et al. (2014) demonstrated in their studies that perceptions of renewable energies are malleable by economically framed messages. Even though economic factors have a different character and importance to residents than environmental factors, environmental framing effects are likely to affect the public's acceptability too. Palomo-Vélez et al. (2021) even proposed that environmental frames show a larger impact than economic frames on acceptability, independently of personal values.

Environmental benefits are often described as abstract and little tangible (Hübner et al., 2020; Hübner et al., 2023). This is an issue because many people have a lack of knowledge or a distorted perception of renewable energies in general (Ansolabehere & Konisky, 2016). Thus, if people are barely provided with information about wind turbines, the effect of the information

would probably be low because people are not always able to put the information into a broader context. The study at hand tried to make the environmental benefits of wind turbines tangible in its positively framed conditions by providing examples like "[…] equals burning more than 10.000 tons of coal […]" or "[…] can supply 7.100 households around the wind turbines […].". This positive framing and conceptualisation was revealed to have a medium effect size. Those results indicate a potential of the factor that is not yet fully developed but could be further looked at in future research (Schuele & Justice, 2006). In practice, this means that projects should use environmental frames as they have proven to be useful. Furthermore, designing them as tangible as possible for the public is suggested.

Interaction Effect

The present research could not find an interaction effect between framing and influence on decision-making for the dependent variable acceptability of the final decision. Previous theories could explain an interaction well (Nutt, 1998), but beyond that paper, only little research has been done concerning the environmental frame. Other papers considered framing as a mediator with different factors, leaving out the power to make decisions (Walker et al., 2014). Therefore, it can be assumed that the main factors depend on each other. Further analysis of other measured factors could shed light on the relationships and construct a theoretical framework, as other studies suggest that there might be an interplay between those two factors in a different setting, considering other factors. Unfortunately, this would have extended the scope of this research.

Explorative Findings

Besides the tested effects examining the proposed hypotheses, four other dependent variables were tested for their relationship with influence on decision-making and framing.

Acceptability of the Decision-Making Process

First, participants were asked to evaluate the acceptability of the decision-making process. The analysis results argue that shared influence causes higher acceptability among the participants than participants with little influence, even having a large effect size. These findings are in line with the majority of the present research. Liu et al. (2021), for example, found similar results. Nonetheless, it must be acknowledged that they used different levels of influence on decision-making. However, their results also indicated higher acceptability when participants have a higher level of influence. Furthermore, Aitken et al. (2016) proposed that public participation, offering much decision shaping, will empower the citizens and cause higher acceptability of the process and decision.

An effect of framing was not found. However, this is perhaps due to the design of the questions as they evaluated the specific acceptability of the process during public participation. Therefore, the information concerning wind turbines' environmental detriments and benefits may be immaterial to the questions.

Evaluation of the Wind Energy Project

Second, participants indicated how they evaluate the wind energy project itself. Results yield that people who read a positive frame evaluate the project as more positive and acceptable than people who read neutrally framed information. Those observations confirm the proposed framing theory (Chong & Druckman, 2007). In contrast to the large effect size of framing, an influence on decision-making was not evident. The construction of the scale might have caused this as the questions focused on the project and did not consider the decision-making process, making the factor irrelevant to the questions.

Evaluation of the Decision-Making Committee

Third, the participants expressed their thoughts about the decision-making committee, introduced during the condition description. For that evaluation, the participants indicated their

thoughts on the knowledge and experience of the committee. The results revealed a significant positive effect of a higher level of influence on decision-making on the evaluation of the decision-making committee. Previously, Liu et al. (2021) also found that a larger influence on decision-making causes a better committee evaluation. However, they concluded that more influence on decision-making for citizens did not increase the positive evaluation of the committee endlessly and was highest when residents and experts had shared influence on the project. It might be that residents considered themselves an asset to the project in the field of local knowledge and expertise. Besides, participating residents expanded their knowledge during the participation process and became more familiar with the technology when having the possibility. This would be in accordance with frameworks suggesting that people with more knowledge and expertise are likely to evaluate technologies better (Huijts et al., 2012).

Besides, the positively framed environmental communication also demonstrated a significant effect on the committee's evaluation. Unfortunately, there is little research on the association between the two variables at the moment. Nevertheless, a possible explanation could be that much detailed information about the environmental effects of wind turbines was given in the positive framing condition. That detailed information could have convinced participants that there are experts who are able to provide understandable comparisons and thus, reducing the abstractness of benefits. However, those are just potential explanations, and future research must examine those in more detail.

Residents' Perception of the Influence on Decision-Making

Lastly, participants expressed their perception of the residents' influence. Since the question aimed directly at their perception of influence, the influence on decision-making was a large significant effect, whereas framing showed none. The results imply that participants estimated the resident's influence higher if they had the possibility to take part in public participation and shape decisions. Hence, the results confirm the participant's understanding of

the manipulation, and secondly, they reflect their awareness of the entrusted influence on the final decision.

Limitations and Future Research

The research at hand shows some limitations. It was proposed that 128 participants satisfy the need for a sufficient sample. Unfortunately, the sample was reduced to *N*=100 due to the exclusion of participants, mainly based on a not passed attention check following the condition description. Thus, the manipulation succeeded in 76.34% of the cases. In comparison, the study of Liu et al. (2021) achieved a higher degree of people passing the manipulation check with over 90.00%. The higher drop-out rate of participants reduced the sample size, significantly impairing its validity. The reasons for the lower manipulation pass rate are open for discussion. One possible explanation could be that participants had little language proficiency or a too complex construction of the condition description, causing uncertainty about the exact message. Instead, in Liu et al. (2021), bullet points were used to describe situations, a simplified version compared to a condensed but full text. A future study could switch to different manipulation methods. For instance, information could be illustrated by figures, graphs or pictures. Perhaps, this would increase the ratio of successful manipulations. A side effect is improved external validity, as those figures, illustrations and pictures are usually used in practice when projects are presented to the public by the planners. Future research could examine the effects by conducting qualitative analysis or field studies to improve and refine those messages currently used in practice.

The study's data collection succeeded in reaching a broad range of people. However, some demographic aspects of the current sample suggest a distorted sample. Especially the participant's age is important to mention. The analysis showed that the mean and median age of the sample is younger than the average population in the Netherlands or Germany. This distortion is an issue, especially because young people generally have a more positive attitude

towards onshore wind turbines than older people (Crowe, 2020; Devine-Wright, 2007; Ladenburg, 2008). Additionally, new wind turbines often affect middle-aged and older people more because they have settled down. Therefore, people with property in an area affected by new wind turbines might have a different opinion since their living places are more proximate to newly built wind turbines than those with property in cities. Therefore, the current housing situation of an individual may mediate the acceptability of wind turbines. Especially because past research demonstrated ambivalent results of the effect of proximity to wind turbines (Graham et al., 2009; Jones & Eiser, 2009; Langer et al., 2018). Future research should therefore take more account of the age and living conditions of local residents.

Another outstanding characteristic of the sample is the unequal distribution of gender, as more than two third of the participants identified as female, which is an overrepresentation compared to the average population. This sample characteristic constitutes a limitation because research showed that gender affects the acceptability of renewable energies (Crowe, 2020; Klick & Smith, 2010). Therefore, such a gender disparity could bias the results and effects of measurements. Lastly, our sample's distribution of educational degrees differs from the usual population in the Netherlands or Germany. For instance, more than 50% of the people in Germany have a vocational or trade school degree, compared to 28% in the present study (Bundeszentrale für politische Bildung, 2021). As outlined, the sample does not match the population and especially not the population affected by new wind turbines. This should be considered when applying the findings of this research.

Implications

The study examined the effect of influence on decision-making and framed messages in an experimental design, allowing the conclusion of causal relationships. Results proved an effect of residents' influence on decision-making, replicating the results of previous studies. Again, the advantage of shared influence on increasing public acceptability was confirmed, as

it causes higher acceptability of decisions than procedures which offer lower levels of power for residents. The confirmatory results of other previous studies are helpful for the design of future interventions or public hearings (Liu et al., 2021). Concludingly, shared influence on a decision is a good opportunity to let participants take part and increase the public acceptability of the decision. Hence, it is a tool planners should apply more often during public participation processes.

Next to that, it is also shown that it is crucial how messages, determined for public relations, are formulated. Foremost, the research shed light on the benefits of positively framed environmental communication in the context of wind turbines. Notably, framing can effectively attract people to the project and gain the acceptability of the final decision. Besides that effect, the researcher expanded the knowledge of other effects in this context. The explorative analysis showed that the influence on decision-making does not only shape the acceptability of the final decision but also the 'what' of the decision-making process. The opinion towards the general perception of the wind energy project is according to the results determined by the presentation of the project. Furthermore, opinion towards the decision-making committee is also improvable by using positively framed environmental communication. Concluding, residents who are generally sceptical towards wind turbines can be convinced at an early stage when information is presented tangibly to make clear that they have a visible and real impact on the landscape and climate change. Lastly, an emphasis on the assets of emission-neutral wind turbines is also a cheap and easily implementable measure, thus possessing an enormous potential for better communication.

Conclusion

To conclude, the results of this experimental study confirmed past findings but also revealed yet to research aspects. According to the data, the level of influence on decision-making determines the level of acceptability of the final decision. The study at hand and

previous research suggest that with increasing influence, the public is more satisfied with the final decision, although the public acceptability is not increasing infinitely with more provided power over decisions. Furthermore, the evaluation of the final decision is improved, as well as the acceptability of the decision-making process and the resident's perception of the decision-making committee.

Another crucial outcome of the study is that communication which is environmentally positively framed can increase the public's acceptability of a project's final decision. Further analysis also demonstrated that framing is valuable for promoting the project or improving the public's perception of the decision-making committee. However, especially the framing effect of messages emphasising the environmental advantages of wind turbines requires more attention as there is a lack of knowledge about the effect of frames in favour of the environmental friendliness of wind turbines. More research could identify which environmental aspects are especially useful to convince the public and at which point environmental framing is inappropriate and overused. Lastly, incorporating other explored factors, a holistic framework might greatly extend the current research and improve current strategies used to improve public acceptability. This should be pursued in the future.

References

Aitken, M. (2010a). A three-dimensional view of public participation in Scottish land-use planning: Empowerment or social control? *Planning Theory*, *9*(3), 248–264. https://doi.org/10.1177/1473095210366193

Aitken, M. (2010b). Why we still don't understand the social aspects of wind power: A critique of key assumptions within the literature. *Energy Policy*, *38*(4), 1834–1841. https://doi.org/10.1016/j.enpol.2009.11.060

Aitken, M., Haggett, C., & Rudolph, D. (2016). Practices and rationales of community engagement with wind farms: Awareness Raising, consultation, empowerment. *Planning Theory & Practice*, *17*(4), 557–576. https://doi.org/10.1080/14649357.2016.1218919

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, *35*(4), 216–224. https://doi.org/10.1080/01944366908977225

Ansolabehere, S., & Konisky, D. M. (2009). Public attitudes toward construction of New Power Plants. *Public Opinion Quarterly*, *73*(3), 566–577. https://doi.org/10.1093/poq/nfp041

Ansolabehere, S., & Konisky, D. M. (2016). *Cheap and Clean: How Americans Think about Energy in the Age of Global Warming*. The MIT Press.

Bayulgen, O., & Benegal, S. (2019). Green priorities: How economic frames affect perceptions of renewable energy in the United States. *Energy Research & Social Science*, *47*, 28–36. https://doi.org/10.1016/j.erss.2018.08.017

Bundesministerium für Wirtschaft und Energie. (2019). *Integrierter Nationaler Energie- und Klimaplan.* https://energy.ec.europa.eu/system/files/2020-06/de_final_necp_main_de_0.pdf

Bundeszentrale für politische Bildung. (2021). *Datenreport 2021: Ein Sozialbericht für die Bundesrepublik Deutschland*. https://www.destatis.de/DE/Service/Statistik-Campus/Datenreport/Downloads/datenreport-2021.pdf?__blob=publicationFile

Chong, D., & Druckman, J. N. (2007). Framing theory. *Annual Review of Political Science*, *10*(1), 103–126. https://doi.org/10.1146/annurev.polisci.10.072805.103054

Cohen, J. J., Reichl, J., & Schmidthaler, M. (2014). Re-focussing research efforts on the public acceptance of energy infrastructure: A critical review. *Energy*, *76*, 4–9. https://doi.org/10.1016/j.energy.2013.12.056

Colvin, R., Witt, G., & Lacey, J. (2016). How wind became a four-letter word: Lessons for community engagement from a wind energy conflict in King Island, Australia. *Energy Policy, 98*, 483-494. https://doi.org/10.1016/j.enpol.2016.09.022

Crowe, J. (2020). Explaining popular support for wind energy in the united states. *Journal of Rural Social Sciences*, *35*(2). https://egrove.olemiss.edu/jrss/vol35/iss2/2/

Devine-Wright, P. (2007). *Reconsidering public attitudes and public acceptance of renewable energy technologies: a critical review* [Working paper No. 1.4]. Manchester Architecture Research Centre, University of Manchester. https://geography.exeter.ac.uk/beyond_nimbyism/deliverables/bn_wp1_4.pdf

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical Power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/brm.41.4.1149

Firestone, J., Hoen, B., Rand, J., Elliott, D., Hübner, G., & Pohl, J. (2017). Reconsidering barriers to wind power projects: Community engagement, developer transparency and place. *Journal of Environmental Policy & Planning*, *20*(3), 370–386. https://doi.org/10.1080/1523908x.2017.1418656

Friedl, C., & Reichl, J. (2016). Realizing Energy Infrastructure Projects – a qualitative empirical analysis of local practices to address social acceptance. *Energy Policy*, *89*, 184–193. https://doi.org/10.1016/j.enpol.2015.11.027

Graham, J. B., Stephenson, J. R., & Smith, I. J. (2009). Public perceptions of wind energy developments: Case studies from New Zealand. *Energy Policy*, *37*(9), 3348–3357. https://doi.org/10.1016/j.enpol.2008.12.035

Huijts, N., Molin, E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance: A review-based comprehensive framework. *Renewable and Sustainable Energy Reviews*, *16*(1), 525-531. https://doi.org/10.1016/j.rser.2011.08.018

Hübner, G., Leschinger, V., Müller, F. J. Y., & Pohl, J. (2023). Broadening the social acceptance of wind energy – an integrated acceptance model. *Energy Policy*, *173*, 113360. https://doi.org/10.1016/j.enpol.2022.113360

Hübner, G., Pohl, J., Warode, J., Gotchev, B., Ohlhorst, D., Krug, M., Salecki, S., & Peters, W. (2020). *Akzeptanzfördernde Faktoren erneuerbarer Energien*. Bundesamt für Naturschutz. https://bfn.bszbw.de/frontdoor/deliver/index/docId/27/file/Skript_551.pdf

Janhunen, S., Hujala, M., & Pätäri, S. (2017). The acceptability of wind farms: The impact of public participation. *Journal of Environmental Policy & Planning*, *20*(2), 214–235. https://doi.org/10.1080/1523908x.2017.1398638

Jones, C. R., & Eiser, J. R. (2009). Identifying predictors of attitudes towards local onshore wind development with reference to an English case study. *Energy Policy*, *37*(11), 4604–4614. https://doi.org/10.1016/j.enpol.2009.06.015

Jones, C. R., & Eiser, J. R. (2010). Understanding 'local' opposition to wind development in the UK: How big is a backyard? *Energy Policy*, *38*(6), 3106-3117. https://doi.org/10.1016/j.enpol.2010.01.051

Klick, H., & Smith, E. R. (2010). Public understanding of and support for wind power in the United States. *Renewable Energy*, *35*(7), 1585-1591. https://doi.org/10.1016/j.renene.2009.11.028

Ladenburg, J. (2008). Attitudes towards on-land and offshore wind power development in Denmark; choice of development strategy. *Renewable Energy*, *33*(1), 111–118. https://doi.org/10.1016/j.renene.2007.01.011

Langer, K., Decker, T., Roosen, J., & Menrad, K. (2018). Factors influencing citizens' acceptance and non-acceptance of wind energy in Germany. *Journal of Cleaner Production*, *175*, 133–144. https://doi.org/10.1016/j.jclepro.2017.11.221

Langer, K., Decker, T., & Menrad, K. (2017). Public participation in wind energy projects located in Germany: Which form of participation is the key to acceptance? *Renewable Energy*, *112*, 63-73. https://doi.org/10.1016/j.renene.2017.05.021

Linnerud, K., Dugstad, A., & Rygg, B. (2022). Do people prefer offshore to onshore wind energy? The role of ownership and intended use. *Renewable and Sustainable Energy Reviews*, *168*, 112732. https://doi.org/10.1016/j.rser.2022.112732

Liu, L. (2022). *Public participation in decision making on sustainable energy transitions.* [Thesis fully internal (DIV), University of Groningen] University of Groningen. https://doi.org/10.33612/diss.195943533

Liu, L., Bouman, T., Perlaviciute, G., & Steg, L. (2020). Public participation in decision making, perceived procedural fairness and public acceptability of renewable energy projects. *Energy and Climate Change*, *1*, 100013. https://doi.org/10.1016/j.egycc.2020.100013

Liu, L., Bouman, T., Perlaviciute, G., & Steg, L. (2021). The more public influence, the better? the effects of full versus shared influence on public acceptability of energy projects in the Netherlands and China. *Energy Research & Social Science*, *81*, Article 102286.https://doi.org/10.1016/j.erss.2021.102286

Nutt, P. C. (1998). Framing strategic decisions. *Organization Science*, *9*(2), 195–216. https://doi.org/10.1287/orsc.9.2.195

Ministry of Economic Affairs and Climate Policy. (2019, November). *Integrated National Energy and Climate Plan 2021-2030*. https://energy.ec.europa.eu/system/files/2020-03/nl_final_necp_main_en_0.pdf

Palomo-Vélez, G., Perlaviciute, G., Contzen, N., & Steg, L. (2021). Promoting energy sources as environmentally friendly: Does it increase public acceptability? *Environmental Research Communications*, *3*(11), 115004. https://doi.org/10.1088/2515-7620/ac32a8

Pepermans, Y., & Loots, I. (2013). Wind Farm struggles in Flanders Fields: A sociological perspective. *Energy Policy*, *59*, 321–328. https://doi.org/10.1016/j.enpol.2013.03.044

Perlaviciute, G., Schuitema, G., Devine-Wright, P., & Ram, B. (2018). At the heart of a sustainable energy transition: The public acceptability of energy projects. *IEEE Power and Energy Magazine*, *16*(1), 49-55. https://doi.org/10.1109/mpe.2017.2759918

Perlaviciute, G., & Squintani, L. (2020). Public participation in climate policy making: Toward reconciling public preferences and legal frameworks. *One Earth*, *2*(4), 341–348. https://doi.org/10.1016/j.oneear.2020.03.009

Perlaviciute, G., & Steg, L. (2014). Contextual and psychological factors shaping evaluations and acceptability of energy alternatives: Integrated review and research agenda.

Renewable and Sustainable Energy Reviews, *35*, 361-381. https://doi.org/10.1016/j.rser.2014.04.003

Richardson, B. J., & Razzaque, J. (2006). Public participation in environmental decision-making. *Environmental Law for Sustainability*, *6*, 165-194.

Schuele, C. M., & Justice, L. M. (2006). The importance of effect sizes in the interpretation of research. *The ASHA Leader*, *11*(10), 14–27. https://doi.org/10.1044/leader.ftr4.11102006.14

Shukla, P. R., Skea, J., Vyas, P., Some, S., McCollum, D., Malley, J., Luz, S., Lisboa, G., Hasija, A., van Diemen, R., Belkacemi, M., Khourdajie, A. A., Pathak, M., Fradera, R., Slade, R., & Reisinger, A. (Eds.). (2022). IPCC, 2022: Summary for Policymakers. *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. https://doi.org/10.1017/9781009157926.001

Smith, P. D., & McDonough, M. H. (2001). Beyond public participation: Fairness in Natural Resource Decision making. *Society & Natural Resources: An International Journal*, *14*(3), 239–249. https://doi.org/10.1080/08941920120140

Stevens, J. P. (2007). *Intermediate statistics: A modern approach* (3rd ed.). Lawrence Erlbaum Assicuates.

Swofford, J., & Slattery, M. (2010). Public attitudes of wind energy in Texas: Local communities in close proximity to wind farms and their effect on decision-making. *Energy Policy*, *38*(5), 2508–2519. https://doi.org/10.1016/j.enpol.2009.12.046

Upreti, B. R., & van der Horst, D. (2004). National renewable energy policy and local opposition in the UK: the failed development of a biomass electricity plant. *Biomass and Bioenergy*, *26*(1), 61-69. https://doi.org/10.1016/S0961-9534(03)00099-0

Walker, G., Devine-Wright, P., Hunter, S., High, H., & Evans, B. (2010). Trust and community: Exploring the meanings, contexts and dynamics of Community Renewable Energy. *Energy Policy*, *38*(6), 2655–2663. https://doi.org/10.1016/j.enpol.2009.05.055

Walker, B. J. A., Wiersma, B., & Bailey, E. (2014). Community benefits, framing and the social acceptance of offshore wind farms: An experimental study in England. *Energy Research & Social Science*, *3*, 46–54. https://doi.org/10.1016/j.erss.2014.07.003

Appendix A

Consent Form

INFORMATION ABOUT THE RESEARCH

VERSION FOR PARTICIPANTS

The Effects of Influence on Decision-Making and framed Communication on Public Acceptance.

Dear participant,

Thank you for being interested in participating in the study about the acceptability of wind turbines focusing on the level of influence on decision-making and framed communication. The research is conducted by Fabian Niemann, a master's student in Environmental Psychology and approved by the Psychology Department of the University of Groningen. If you have remaining questions after reading the below information, you can contact Fabian Niemann (f.niemann@student.rug.nl).

Participation in the research is voluntary. However, your consent is needed. Therefore, please read this information carefully. Ask all the questions you might have, for example, because you do not understand something. Only afterwards do you decide if you want to participate. If you decide not to participate, you do not need to explain why, and there will be no negative consequences for you. You have this right at all times, including after you have consented to participate in the research.

In recent and upcoming decades, wind turbines have become relevant and necessary to reduce the carbon footprint of electricity production. Since more wind turbines will be built to reach a carbon-neutral society, it is crucial to ensure the acceptability of such projects among

citizens. Therefore, the research aims to examine the effects of influence on decision-making and communication framing in turbine projects to develop better interventions.

What will be asked of you during this study?

First, you will be asked to consent to participate in this study. Furthermore, you will be asked for some demographic information such as gender, age, nationality and level of education. Thirdly, you are asked to read a case of a wind turbine project and be asked your opinion.

What are the consequences of your participation?

Your participation contributes to more knowledge on this topic. There are no risks involved in this study, but in case you experience any discomfort as a result of this study, please inform Fabian Niemann directly (f.niemann@student.rug.nl).

How will your data be handled?

Your responses will be stored on a secure network of the University of Groningen, which can only be accessed by Fabian Niemann and his supervisor, Therre van Blerck (t.van.blerck@rug.nl).

The results of this study will be published in a research report and presented during a presentation. If you are curious about the research report's outcome, you can email f.niemann@student.rug.nl.

Be aware that your data cannot be removed from the dataset once your data has been submitted as your responses cannot be linked back to you.

You may always ask questions about the research: now, during the research, and after the end of the research. You can do so by either emailing Fabian Niemann (f.niemann@student.rug.nl) or Therre van Blerck as his supervisor (t.van.blerck@rug.nl).

Do you have questions/concerns about your rights as a research participant or the conduct of the research? You may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: ec-bss@rug.nl.

Do you have questions or concerns regarding the handling of your personal data? You may also contact the University of Groningen Data Protection Officer: privacy@rug.nl.

As a research participant, you have the right to a copy of this research information.

I have read and understood the study information.

o Yes

o No

This questionnaire contains questions about personal information, such as age, gender, and level of education. This data is used to understand more about the perspectives of different population groups (e.g. young versus older participants). Do we have permission to process your personal data?

o Yes, I consent to my personal data being processed

o No

The data obtained may be valuable for future research, such as comparison with other cultures. Do we have permission to use your data for future research?

o Yes, I consent that my data may be used in the future for similar research questions.

o No

This study only includes participants aged 18 years or older. Please confirm that you are 18 years or older.

o Yes, I am 18 years or older

o No

I consent voluntarily to participate in this study and understand that I can refuse to answer questions and withdraw from the study at any time without giving a reason.

o Yes

o No

Appendix B

Table 1

Description of the Four Conditions

	Environmental neutral framing	Environmental positive framing
Little influence on decision-making	Last week a public consultation was launched on plans for wind turbines in the sight of your neighbourhood. The developer, Jan de Vries, proposed four wind turbines. Each wind turbine is planned to have a maximum blade height of 175m and fulfils all government requirements in terms of distance to the nearest neighbourhoods and noise emissions. The developer expects an annual production of 27,1 million kWh of the four wind turbines. Jan de Vries emphasised that the produced electricity corresponds only to a minimum of conventional power plants and is thus only able to supply a four-digit number of households. Furthermore, he stated that emission-neutral produced electricity **will not significantly reduce the local carbon footprint of the citizens.** Looking at the decision-making, you, as a resident, will share your opinion during an official hearing to express	Last week a public consultation was launched on plans for wind turbines in the sight of your neighbourhood. The developer, Jan de Vries, proposed four wind turbines. Each wind turbine is planned to have a maximum blade height of 175m and fulfils all government requirements in terms of distance to the nearest neighbourhoods and noise emissions. The developer expects an annual production of 27,1 million kWh of the four wind turbines able to supply 7.100 households around the wind turbines with green electricity. Furthermore, greener electricity production would save 20,4 million kg of CO2 per year compared to conventional production. This massive amount of CO2 equals burning more than 10.000 tons of coal in a traditional coal plant. Developing those new wind turbines contributes to the

	your opinion if you want, yet **the planning company and authorities will take the final decisions.**	energy transformation necessary to decrease our carbon footprint. Especially during the crisis in which currently more fossils are burned, wind turbines are a proper replacement. The average Dutch person has a carbon footprint of 8520 kg of CO2 per year (2021), and the average German person produces 8060 kg of CO2 per year (2021), incorporating electricity production. **Installing those wind turbines means significantly shrinking our local carbon footprint** and proceeding towards sustainable production, helping us tackle climate change. Looking at the decision-making, you, as a resident, will **share your opinion during an official hearing** to express your opinion if you want, yet **the planning company and authorities will take the final decisions.**
Shared influence on decision-making	Last week a public consultation was launched on plans for wind turbines in the sight of your neighbourhood. The developer, Jan de Vries, proposed four wind turbines. Each wind turbine is planned to have a maximum blade height of 175m and fulfils all	Last week a public consultation was launched on plans for wind turbines in the sight of your neighbourhood. The developer, Jan de Vries, proposed four wind turbines. Each wind turbine is planned to have a maximum blade

government requirements in terms of distance to the nearest neighbourhoods and noise emissions.

The developer expects an annual production of 27,1 million kWh of the four wind turbines. Jan de Vries emphasised that the produced electricity corresponds only to a minimum of conventional power plants and is thus only able to supply a four-digit number of households. Furthermore, he stated that emission-neutral produced electricity **will not significantly reduce the local carbon footprint of the citizens.**

The planning company and the concerned authorities plan to invite you and your neighbours to discuss all aspects of the project. Three meetings are scheduled where different aspects of the wind turbines are discussed. During the meetings, the planning of the turbines but also the building phase, will be addressed. Your participation is essential as your concerns are significant for the project since you might be aware of local specialities. Your insights and knowledge can be valuable during the planning process. **Participating residents will make final decisions in collaboration with experienced**

height of 175m and fulfils all government requirements in terms of distance to the nearest neighbourhoods and noise emissions.

The developer expects an annual production of 27,1 million kWh of the four wind turbines able to supply 7.100 households around the wind turbines with green electricity. Furthermore, greener electricity production would save 20,4 million kg of CO2 per year compared to conventional production. This massive amount of CO2 equals burning more than 10.000 tons of coal in a traditional coal plant. Developing those new wind turbines contributes to the energy transformation necessary to decrease our carbon footprint. Especially during the crisis in which currently more fossils are burned, wind turbines are a proper replacement. The average Dutch person has a carbon footprint of 8520 kg of CO2 per year (2021), and the average German person produces 8060 kg of CO2 per year (2021), incorporating electricity production. **Installing those wind turbines means significantly**

experts and the authorities on long-ranging aspects of the project.	**shrinking our local carbon footprint** and proceeding towards sustainable production, helping us tackle climate change. The planning company and the concerned authorities plan to invite you and your neighbours to discuss all aspects of the project. Three meetings are scheduled where different aspects of the wind turbines are discussed. During the meetings, the planning of the turbines but also the building phase, will be addressed. Your participation is essential as your concerns are significant for the project since you might be aware of local specialities. Your insights and knowledge can be valuable during the planning process. **Participating residents will make final decisions in collaboration with experienced experts and the authorities on long-ranging aspects of the project.**

Appendix C

Table 1

Attention Check Questions to Check whether the Described Condition Was Understood

1. According to the text you have read, who will make the final decision on the wind energy project? ○ The authorities and planning company ○ The residents, authorities and experienced experts ○ The residents and the planning company
2. According to the text you have read, will the development of the proposed wind energy project make a significant difference in reducing our local carbon footprint? ○ The wind energy project **WILL NOT** make a significant difference. ○ The wind energy project **WILL** make a significant difference.

Appendix D

Table 1

The Seven-Point Likert Scales Questionnaires Ranging from -3 to 3

Scale 6 How do you evaluate the decision-making process of this wind energy project?		Very unacceptable – Very acceptable Very bad – Very good Very negative – Very positive
Scale 7 All things considered, I believe that the decision-makers final decision on the wind power project would…		Be very unacceptable – be very acceptable Be very bad – be very good Be very negative – be very positive Be of very low quality – be of very high quality
Scale 8 How do you evaluate the wind energy project?		Very unacceptable - Very acceptable Very bad – Very good Very negative – Very positive Very unnecessary – Very necessary
Scale 9 To what extent do you think the decision-making committee...	has sufficient experience with wind energy projects	Not at all - A great deal
	has sufficient knowledge about wind energy projects	None at all – A great deal
Scale 10 Residents have…		No influence at all – Very much influence

Appendix E

Debriefing

Dear participant,

You finished the survey!

Thank you for taking the time to fill in these questionnaires!

The reason for not disclosing the full scope of this study at the start was to prevent the possibility of influencing your responses. Therefore, I want to clear up the study's purpose. The study aims to learn more about the effects of communication framing and the resident's influence on decision-making. To examine for a potential effect, participants were shown one of four descriptions of the case. Those four groups originated from two factors explained in the following. The two factors, communication framing and the resident's influence on decision-making have been combined to, for example, a case in which residents are addressed with a positive frame but only little influence on decision-making (2x2 design).

The case you read thus contained either a frame emphasising the positive impacts of wind turbines (positive) or mentioning their adverse consequences (negative). The frame is intended to influence your values and opinion towards this wind turbine project. It is expected that participants reading the positive frame have a higher acceptance towards the planned project.

The second factor examined during the survey is the resident's influence on decision-making. On the one hand, participating residents were asked to share their opinion in a public hearing but were not allowed to make decisions (little influence). Contractionary, the other group was given the responsibility of making decisions together with authorities and experts (major

influence). It is hypothesised that participants having more influence on decision-making show a higher acceptance than participants with little influence.

Since you are now aware of the study's construction, we ask your permission to process your fully anonymised data by indicating below.

o I **allow** the researcher to process my fully anonymised data.
o I **do not allow** the researcher to process my fully anonymised data.

If you have any questions concerning your participation or are curious about the study's results, please contact f.niemann@student.rug.nl or my supervisor, t.van.blerck@rug.nl.

Do you have any remaining questions or concerns about your rights or about the conduct of the research? You may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: ec-bss@rug.nl

Appendix F

Table 1

Nationality of the Participants (N=100)

Nationality	Number of participants
German	79
Italian	4
Dutch	3
USA	3
Spanish	2
Indian	2
British	1
Croatian	1
Greek	1
Indian	1
Pakistani	1
Turkish	1
Unknown	1

Appendix G

Table 1

Highest Educational Degree Achieved so far

Educational degree (highest degree achieved)	Number of graduates
Secondary education	13
Vocational/Trade school	28
Bachelor's	36
Master's	22
PhD/Dr.	1

Appendix H

Table 1

Averaged Means per Scale and Condition

	Condition 1		Condition 2		Condition 3		Condition 4	
	Mean	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**	**Mean**	**Std. dev.**
Acceptability Decision-Making Process	.029	1.308	1.363	.803	.500	1.400	1.705	.785
Acceptability of the Final Decision	.188	1.289	1.431	.777	.854	1.110	1.653	.525
Evaluation of the Wind Turbine Project	.598	1.307	.954	.815	1.750	.703	1.990	.466
Evaluation of the Decision-Making Committee	.304	1.308	.909	.811	1.063	.711	1.500	.663
Perceived Influence of the Residents	-.857	1.353	.681	1.210	-.708	1.366	1.115	1.243

Appendix I

Figure I 1

Interaction between Message Framing and Influence on Decision-Making on the Acceptability of the Decision-Making Process

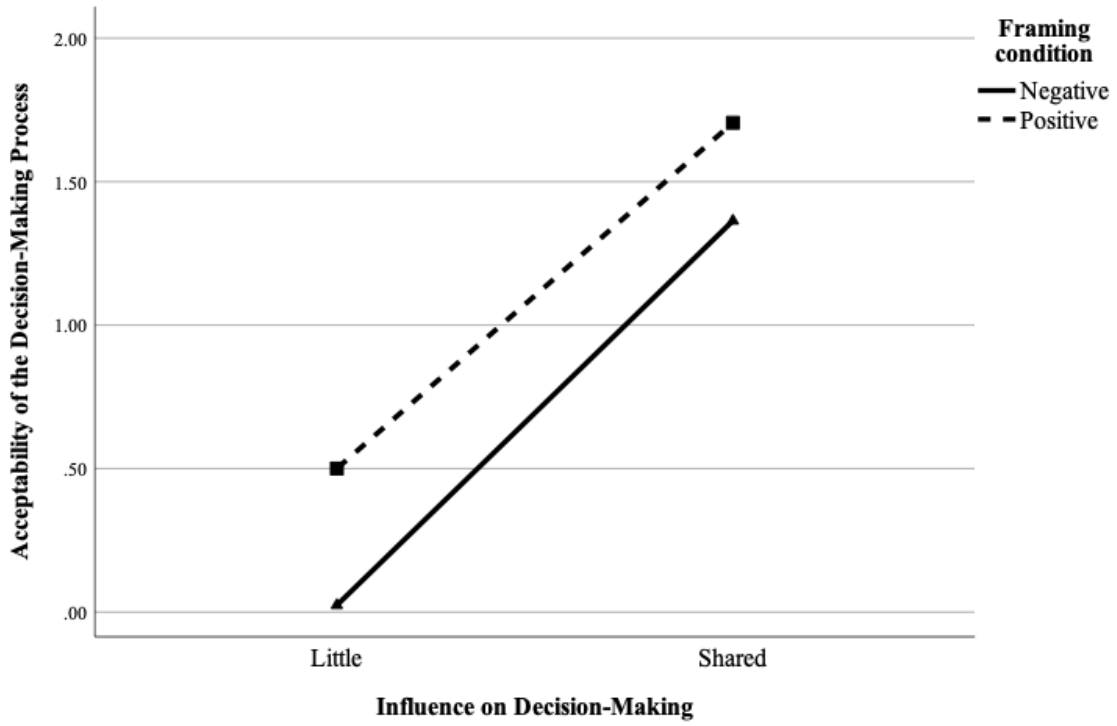


Figure I 2

Interaction between Message Framing and Influence on Decision-Making on the Evaluation of the Wind Turbine Project

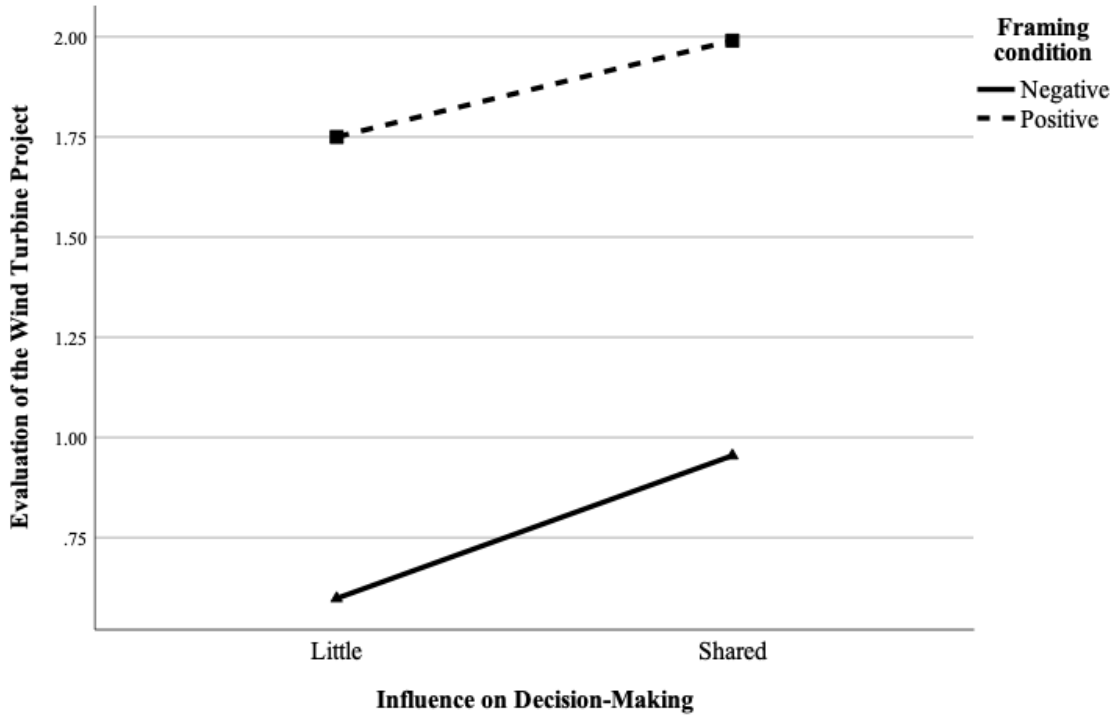


Figure I 3

Interaction between Message Framing and Influence on Decision-Making on the Evaluation of the Decision-Making Committee

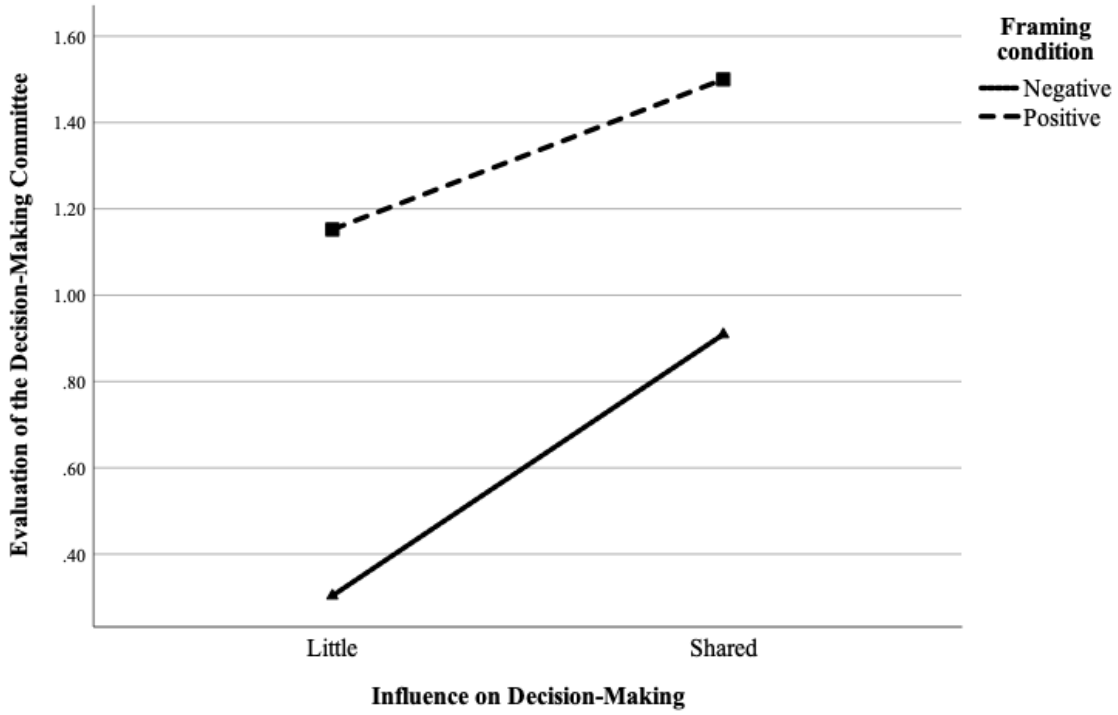


Figure I 4

Interaction between Message Framing and Influence on Decision-Making on Residents' Perceived Influence