Social Acceptance of Wind Turbines:

How Citizens' Subjective and Public Acceptance Influence Behavior

Bachelor's Thesis in fulfillment for the degree of Bachelor of Science

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submitted by

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Abstract

Public opinion polls reveal strong support for wind energy, yet the acceptance of local wind energy projects is noticeably lower. Recent research shows that local opposition significantly influences public opinion and shapes the perception of social dynamics. However, there is a lack of evidence regarding the behavioral consequences of social acceptance of wind turbines. The current study aims to examine the relation between subjective and perceived public acceptance and their impact on behavior. In an online survey and door-step interviews, 302 participants from three case communities were asked about their subjective acceptance, perception of public acceptance, information seeking and oppositional behavior. A paired t-Test showed that citizens significantly underestimate the extent of public acceptance perceiving fellow residents as mainly neutral to the proposed wind turbines. Response surface analyses were conducted for both information-seeking and oppositional behavior. These indicated that subjective acceptance has a greater influence on oppositional behavior, rather than public acceptance. Information seeking was explained mainly by public acceptance, while subjective acceptance had an influence in interaction with public acceptance. The current study contributes to the body of evidence by providing important insights into the dynamics of social acceptance and related behaviors, as well as methodological recommendations for future research. The study also provides practical implications for local authorities of communities affected by wind energy development.

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Social Acceptance of Wind Turbines: The Influence of Subjective and Public Acceptance on Behavior

In 2023, the German government established ambitious targets for the expansion of renewable energy through an amendment to the Renewable Energy Act (EEG 2023, 2024, §4, para. 1, p. 14). Germany aims to source at least 80 percent of its electricity consumption from renewable energies by the year 2030. Consequently, the designation process for solar systems and wind turbines must be accelerated in the coming years. According to the wind-on-shore law (WindBG, 2023, §3, para. 1, p. 2), the German federal states must designate two percent of the territory for wind energy by 2032 with individual state quotas. If these area targets won't be achieved, distance regulations that are determined by the federal states themselves will cease to apply. Thus, wind turbines could be built up in immediate vicinity of residential areas, which would increase the impact of wind turbines on citizens. As this would be contrary to the interests of citizens, missing the targets is to be prevented by the federal states. Nevertheless, the expansion of on-shore wind energy will continue to require overcoming both technical and social barriers.

Social acceptance is seen as one of the most important limiting factors that regularly delay the installation and operation of renewable energy plants (Segreto et al., 2020). A closer look into the topic of wind energy reveals an interesting interplay between local and more general perspectives. General surveys assessing social acceptance of onshore wind turbines in Germany have constantly reported high levels of approval in recent years (FA Wind, 2022). However, acceptance at the local level, particularly concerning turbines in close proximity to residential areas, can diverge significantly from this positive general attitude towards wind energy (Walter, 2014; Walter & Gutscher, 2013). Surveying the social acceptance of different sustainable energy technologies reveals that this gap between general and local acceptance is not unique to wind energy. According to Baur et al. (2022), public concerns such as visual impacts are associated with local acceptance rather than general acceptance of energy technologies. Consequently, resistance may emerge on a local level if there is a lack of transparent communication efforts and fair decision-making processes. Oppositional factions

can wield considerable influence, potentially hindering or blocking wind energy projects (Bell et al., 2013).

The appearance of opposing groups further impacts public opinion as there is a prevalent tendency to underestimate the extent of societal support for environmental measures (Geiger & Swim, 2016; Sparkman et al., 2022). Whether this also applies to the local acceptance of onshore wind energy is still a matter of research. It is important to understand the social processes of acceptance and resistance to wind energy projects at the local level and how these can influence an individual's attitudes and behaviors toward local wind energy. This study seeks to examine if public acceptance is perceived significantly lower than the subjective acceptance of a local wind energy project. Furthermore, it is aimed to explore how various combinations of subjective and public acceptance, in regard of congruence and incongruence, are related to information seeking and oppositional behavior towards these local wind energy projects.

First, an overview of the theoretical background concerning social acceptance of wind energy will be provided. Subsequently, the thesis will detail the methodology and design employed in the study. Results will be presented and analyzed, along with a discussion of their implications. Additionally, the thesis will address any limitations encountered during the research process and suggest avenues for future research in the field.

The Concept of Social Acceptance

In technology acceptance research, various terminologies are employed to describe the concept of acceptance. Huijts et al. (2016) propose to use the term *acceptance* to describe actual behavior in reaction to a technology. Meanwhile *acceptability* pertains to attitudes towards a technology and possible related behaviors. This differentiation between attitude and behavior is also advocated by Walter & Gutscher (2013). However, they define the term acceptance as spanning from support to rejection. Under this framework, acceptance is construed as an attitude which is defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1998, p. 269). If applying the definition of acceptance from Molin (2005) to wind energy technology, it can be described as an evaluative component denoting whether

a transition towards a renewable electricity supply from wind turbines is good or bad. This study differentiates acceptance as an attitude from its behavioral expressions of oppositional actions and information seeking.

According to Wüstenhagen et al. (2007), social acceptance can be distinguished into three dimensions, namely socio-political acceptance, community acceptance and market acceptance. Socio-political acceptance on the most general level concerns societal acceptance of technologies and policies by the public, including key stakeholders and policy actors. Socio-political acceptance is found to be at a high level in opinion polls (see e.g. European Union, 2023), as it is the broadest of the three acceptance dimensions. This positive undertone has misled policymakers to underestimate the issue of social acceptance in general (Wüstenhagen et al., 2007) ignoring many of the barriers for successfully implementing wind energy projects on a local level. Conversely, differences in implementation rates between countries cannot be attributed solely to geographical variables such as wind resources (Toke et al., 2008).

This is where community acceptance needs to be considered, which is defined as a specific acceptance of siting decisions and renewable energy projects by local stakeholders. It focuses on residents and local authorities and their relationship of trust and justice (Wüstenhagen et al., 2007). Community acceptance also contains a time dimension, as it tends to be lowest during siting phase. Following a typical U-curve, acceptance goes from high levels before a wind energy project is conceived to low levels during the siting phase. Usually, acceptance is still positive during this second phase. However, it returns to higher levels once the project is up and running (Wolsink, 2007). Complementary to Wüstenhagen's et al. (2007) community acceptance, we adopt the definition of Walter & Gutscher (2013) who further define local acceptance as a spectrum between support and rejection of renewable energy projects by the resident population in the municipality where the project is to be built or has been built.

Lastly, market acceptance especially regards the process of market adoption of an innovation such as small-scale renewables by consumers and investors as well as from an intra-firm perspective (Wüstenhagen et al., 2007).

The current study will focus on community acceptance by asking citizens about their acceptance of wind turbines near their communities. This investigation is further differentiated into citizens' subjective acceptance and the perception of public acceptance, thereby reflecting different levels of community acceptance as outlined in theoretical models of technology acceptance. In order to identify the factors that have an impact on the social acceptance of wind turbines, the following presents important theoretical frameworks.

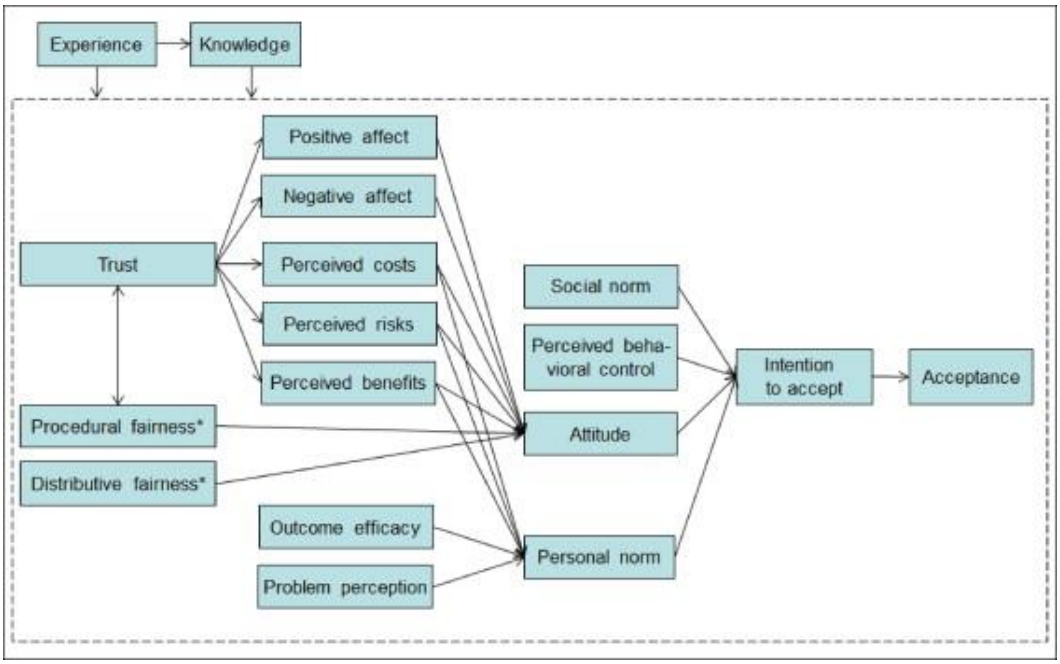
Theoretical Frameworks

To summarize the psychological factors that influence energy technology acceptance, Huijts et al. (2012) propose a comprehensive Technology Acceptance Framework (see Figure 1) that reviews psychological theories and empirical research. It is a synthesis of three commonly applied behavior models: the Theory of Planned Behavior, the Norm Activation Model and theories on affect. The Technology Acceptance Framework, supported by empirical findings, proposes that a compilation of these psychological models supplemented by effects of trust, fairness, experience and knowledge can help to understand citizen and consumer acceptance, local and market acceptance respectively. All three behavioral models incorporated into the Technology Acceptance Framework are introduced in the following sections.

According to the Theory of Planned Behavior (Ajzen, 1985, 1991), intentions to perform behavior can be predicted from attitudes to this behavior as well as from subjective norms and perceived behavioral control. The latter describes the extent of ease or difficulty experienced when performing the behavior. Subjective norms describe the perceived social pressure to behave in a certain way (synonymously depicted as social norm in the Technology Acceptance Framework). Attitudes are influenced by the subjective evaluation of costs, risks and benefits as outcomes of a sustainable energy technology. Conclusively, intentions to behave together with perceptions of behavioral control account for considerable variance in actual behavior (Ajzen, 1991). All of these factors described in the Theory of Planned Behavior are incorporated into the Technology Acceptance Framework (see Figure 1).

Figure 1

A Schematic Representation of the Technology Acceptance Framework



Note: Figure from Huijts et al. (2012). The two fairness types* are mainly relevant for citizen acceptance rather than consumer acceptance which suits the current study analyzing local citizen acceptance.

The Norm Activation Model posits that pro-social behavior, having a benefit to others, is primarily driven by feelings of moral obligations (personal norms) to act in a specific way. These personal norms are determined by being aware about the consequences of one's actions (problem perception) and one's contribution to effective solutions (outcome efficacy) (Schwartz, 1968, 1977). Both of these factors, problem perception and outcome efficacy, are included in the Technology Acceptance Framework directly influencing personal norm and indirectly affecting intentions to behave.

Finally, theories focused on affect or emotion suggest that people's attitudes and behavior are strongly determined by affect (Loewenstein & Lerner, 2003). Incorporated into the Theory of Planned Behavior, this means that positive and negative affect indirectly influence intention to act

through attitude. Therefore, both affect valences are incorporated into the Technology Acceptance Framework as direct factors of attitude that indirectly influence acceptance intentions.

Several of the psychological aspects mentioned above are relevant to research on wind energy technology, in particular. Kuik and Musall (2011) identified a set of influential factors for the local acceptance of wind energy such as perceived visual impacts, fairness and inclusiveness, which refer to the Technology Acceptance Model.. These local factors are strongly related with accompanying emotions and values (Wolsink, 2009), that are included in the Technology Acceptance Model as positive and negative effect. A literature review on the factors of wind energy acceptance found the following six categories of factors: technical, environmental, economic, societal, contextual and individual (Leiren et al., 2020). The subsequent survey of key stakeholders on these categories showed the very context-specific nature of community acceptance highlighting the impact of market characteristics and planning processes. This is reflected in the Technology Acceptance Model by problem perception, outcome efficacy and personal norm, as well as by the interplay of the magnitude of variables. Moreover, an experimental study on wind farm acceptance showed that support for wind farms increases with the highlighting of community benefits which is explained by elevated perceptions of collective rather than individual outcome favorability (Walker et al., 2014) highlighting the aspect of perceived benefits in the Technology Acceptance Model with evidence for a more community related perception. However, all of these factors focus on individual predictors of local acceptance. Subsequently, a closer look into the social dynamics of renewable energy acceptance will be examined.

However, the influence of social norms on the acceptance of sustainable energy technologies shows conflicting evidence. In the context of antinuclear activism, no relation between subjective norms and intentions to antinuclear behavior was found when attitudes were controlled for (Fox-Cardamone et al., 2000). In contrast, Yun and Lee (2015) found a significant positive affect for the relation between subjective norm and the intention to use renewable energy systems. In an examination of the Theory of Planned Behavior in the context of oppositional behavior to wind farm developments, Read et al. (2013) found subjective norms, out of the three predictors of behavioral

intentions, to be the only significant predictor of oppositional intentions in the final model. However, Sokoloski et al. (2018) state that there is a lack of studies analyzing the social drivers of public opinion on sustainable energy acceptance with social norms being one of the main influences outlined by previous research. Exploring contexts beyond mere descriptive insights holds particular importance in the field of wind energy. Therefore, this study aims to investigate the difference between subjective acceptance and the perception of public acceptance as a social norm and how they interact in relation to behavior.

As noted above, the survey of general acceptance of wind energy results in high levels of support for wind energy while local wind energy projects face citizen campaigns of opposition and rejection that affect perceptions of public acceptance (Ogilvie & Rootes, 2015). Either way, it is important to recognize that these oppositional groups don't reflect the whole spectrum of local acceptance of citizens. Moreover, when considering other environmental issues, there is a strong tendency in society to underestimate the extent of public support, referred to as pluralistic ignorance (Geiger & Swim, 2016; Sparkman et al., 2022), which will be examined in the following.

Pluralistic Ignorance

Pluralistic ignorance is defined as "a group-level phenomenon, wherein individuals belonging to a group mistakenly believe that others' cognitions and/or behaviors differ systematically from their own, regardless of how the misperception arises" (Sargent & Newman, 2021, p. 4). Due to the absence of direct access to others' thoughts, a discrepancy exists between social norms in a group and what individuals perceive the social norm to be (Sokoloski et al., 2018). For example, one could presume that whereas subjective acceptance for wind energy in a community is high, individuals perceive others to be opposed to the technology resulting in the perception of low public acceptance. This gap resulting in shared misperceptions about social reality can significantly influence one's attitudes and behaviors, irrespective of their accuracy (Snyder & Swann, 1978).

For instance, recent research revealed that support for popular climate policies in the USA was underestimated significantly (Sparkman et al., 2022). An analysis of nationally representative public opinion data revealed that supporters of U.S. climate policies outnumber opponents by a ratio

of two to one. This discrepancy contributes to what Sparkman et al. (2022) call a “false social reality”, wherein there is a near universal perception of public opinion that contradicts the actual public sentiment. Indeed, Sokoloski et al. (2018) identified pluralistic ignorance among supporters of offshore wind turbines surveying perceptions of acceptance among New England residents. Individuals supportive of offshore wind projects overestimated opposition, though an oppositive majority did not exist. Contributing to this underestimation of public support, opponents were subject to a false consensus bias perceiving their own group as a majority. False consensus bias refers to the tendency of individuals to overestimate the extent to which others share their own beliefs or behaviors (Ross et al., 1977), particularly prevalent among those who hold minority opinions (Sanders & Mullen, 1983).

In this study, misperceiving social norms in the case of pluralistic ignorance means that citizens themselves rate high levels of subjective acceptance but indicate low levels of perceived public acceptance. Conforming with the empirical findings of pluralistic ignorance, the following hypothesis is proposed.

H1: The subjective acceptance of a local wind energy project is higher than the perceived public acceptance.

The Social Gap in Wind Energy

The understanding of the misinterpretation of social norms also offers insights into the so-called social gap in wind farm siting decisions, proposed by Bell et al. (2005). The social gap describes the mismatch between high public support for wind energy surveyed and low success rates achieved in wind energy developments (Bell et al., 2005). It serves as a complement to the individual gap, also known as the ‘not in my backyard’ (NIMBY) syndrome. NIMBYism represents individuals that have a positive attitude towards wind energy in general while actively opposing a particular wind energy project. Bell et al. (2005) state that NIMBYism alone is insufficient to account for the social gap. Thus, they propose two additional explanations, namely the ‘Democratic Deficit’ Explanation and the ‘Qualified Support’ Explanation.

The ‘Democratic Deficit’ Hypothesis states that small oppositional groups actively offering resistance can have considerable influence on the planning processes of local wind energy projects. Controlled by a minority of opponents, the outcome of the permission process does not reflect the will of the majority (Bell et al., 2005, 2013). ‘Qualified supporters’ on the other hand encourage wind energy projects only when particular limits and controls are met. Typically, this includes qualifications regarding the impact on landscape, the environment, animals and humans (Pasqualetti, 2001; Rand & Clarke, 1991). When asked for their opinion in public surveys, qualified supporters are not able to express these constraints. Therefore, they seem to be in favor of wind energy in general but may discourage a particular wind energy project when it comes to siting decisions (Bell et al., 2005). Revisiting on their explanatory framework, Bell et al. (2013) find evidence of a diverse set of motives for opposing wind energy developments. Public opinion is found to be made up of a majority of qualified supporters, alongside various groups motivated by opposition. Despite being in the minority, these opposing voices can hold significant sway in local discussions and decision-making processes. Hence, a small group of well-resourced and nationally supported opponents can effectively hinder local wind energy projects. This framework aligns with the concept of pluralistic ignorance, as opposition may be perceived as more influential, making it appear like a larger or more potent segment of the community. The social gap in wind energy was found to have an impact on news reports and information processes. In the following, it will be examined how pluralistic ignorance and the interplay of subjective and public acceptance can affect the search of information.

Information Seeking

Media coverage can reinforce the representation of a potent opposition by displaying oppositional groups disproportionally. A media analysis of local news reports about onshore wind farm proposals in the UK found that project opponents are more active voicing their opinions (Bray, 2018). They are quoted more frequently in news reports as supportive residents are less willing to voluntarily talk to journalists about their own views. On one hand, journalistic discourse may exacerbate the perception of supporters’ minority position, thus amplifying false impressions of

public opinion and social norms. On the other hand, citizens themselves have an influence on what information they receive depending on their information seeking behavior.

Information seeking is mostly conceptualized as a linear process pursuing information needs or problem-solving which exists within context and upon different stages (Foster, 2004). In the context of wind energy projects, information seeking can be understood to satisfy citizens' needs of information about implementation plans in their communities. Applying the deficit model by Gross (1994) to renewable energy technologies, it suggests that public opposition towards new technologies occurs out of a lack of quality information. Low levels of subjective acceptance may therefore be associated with a lower extent of information seeking. Yet, there is little research on information seeking of citizens residing near proposed wind turbines. In addition, it is not clear how social acceptance and perceptions thereof can influence information seeking behavior. Therefore, different combinations of subjective and public acceptance will be examined in their relation to information seeking behavior.

Congruence between high subjective and perceived public acceptance could on one hand lead to high levels of information seeking as there is a social norm to stay informed (Neuberger, 2016). On the other hand, information seeking could as well be significantly low because there is no need to further inform oneself. Low levels of subjective and perceived public acceptance may rather be related to low information seeking because there is little motivation to engage in attitude-inconsistent information, as evidence suggests (Van Strien et al., 2016). However, strong negative attitudes and affect may as well be a driver for information seeking (Yang & Kahlor, 2013) leading opponents of wind turbines to show high levels of information seeking.

If subjective acceptance exceeds perceived public acceptance on an individual level, this deviance could contribute to pluralistic ignorance on a group-level. As pluralistic ignorance is found to inhibit behavior (Sargent & Newman, 2021), this kind of incongruence could lead to a diminished level of information seeking. A it is no yet clear, pluralistic ignorance may also intensify information seeking.

The relation between incongruence and behavior could also depend on the pole of acceptance as spanning from support to opposition. Thus, opponents may be more likely to increase information seeking behavior if their subjective acceptance is lower than they perceive public acceptance in order to satisfy their need to be current. Otherwise, information seeking could also recede as opponents may lack trust in media sources or interest in the topic. When subjective acceptance is higher than perceived public acceptance, the result may be reduced information seeking behavior because supporters perceive the social norm as less supportive.

In sum, it seems intriguing to explore how residents near proposed wind energy sites seek information from local news coverage. Given the limited research on information-seeking behavior concerning local acceptance of wind energy, our aim is to investigate various combinations of subjective acceptance and perceived public acceptance in their relationship to information seeking behavior.

Since information seeking is not the only interesting behavioral outcome of local acceptance, the influence of subjective and public acceptance on oppositional behavior will be further explored and explained below.

Oppositional Behavior

Pluralistic ignorance of social norms can significantly influence behavior, as seen in studies on alcohol use among students (Prentice & Miller, 1993; Schroeder & Prentice, 1998). The misjudging of social norms leads individuals to conform to behaviors they inaccurately believe to be widely accepted. Extending this phenomenon to attitudes towards wind energy projects exemplarily, public acceptance would still be perceived as dominated by opposition, even if a majority of supporters for the local wind turbine exists. This misperception of local oppositional norms could reduce overall support and related actions and even encourage oppositional behavior.

Moreover, Geiger & Swim (2016) discovered that overestimating the prevalence of climate change deniers can discourage individuals from discussing the issue with others, resulting in a self-silencing effect. In a first study, they observed that participants who believe in climate change but hold inaccurate perceptions of others' opinions (i.e. that most others doubt climate change) were

less willing to discuss climate change. A second study extended those findings of self-silencing experimentally manipulating perceptions of others' opinions. Concerned participants showed reduced willingness to discuss climate change due to fears of being perceived as less competent in conversations with those who disagree with them (Geiger & Swim, 2016). This may explain why individuals supportive of wind energy are less willing to express their opinion in news media as found in a media analysis mentioned above (Bray, 2018). Applied to the topic of wind energy, the silencing effect could significantly impact the acceptance of local wind projects as information and participation processes are important factors for community acceptance (Leiren et al., 2020).

Insufficient citizen community engagement caused by self-silencing, may further enable opposition to emerge and organize protests. An exemplary analysis of a specific local conflict about local wind energy showed that residents who felt marginalized and unheard expressed their opposition (Reusswig et al., 2016). By successfully shifting public opinion against wind power within the community, opponents were able to prevent the construction of wind turbines in the immediate area of the community.

In its relation to oppositional behavior, congruent low scores of subjective and perceived public acceptance may lead to high oppositional behavior as there is a social norm to actively oppose wind energy. At the same time, congruence of high subjective and public acceptance may be accompanied by low intentions to engage in oppositional behavior as both subjective as well as social norms refute oppositional behavior to local wind turbines.

When subjective acceptance exceeds perceived public acceptance, this form of pluralistic ignorance may inhibit oppositional behavior as found in studies of pluralistic ignorance on other issues (Sargent & Newman, 2021). As there is no clarification yet in the field of wind energy acceptance, pluralistic ignorance could also lead to an increased level of oppositional behavior.

Low levels of subjective acceptance are expected to be related to high levels of oppositional behavior, however, if they coincide with the perception of high public acceptance the intentions to perform oppositional behavior may decrease.

The current case study aims to explore the influence of perceived public acceptance on the emergence of oppositional behavior. Both subjective and public acceptance seem to influence the display of oppositional behavior. Therefore, various combinations of congruence or incongruence between individuals' personal acceptance and perceptions of public acceptance will be analyzed, examining how these factors relate to the expression of oppositional behavior.

To conclude, the research presented shows that the (mis)perception of social norms as combinations of subjective and perceived public acceptance may have an influence on either information seeking and oppositional behavior. However, it is not clear which direction of effects can be expected due to limited evidence. Therefore, this study seeks to explore different combinations of the two predictors subjective and perceived public acceptance on behavioral outcomes, namely information seeking and oppositional behavior. Summarizing the theoretical findings and research gaps, we formulate the following research question.

RQ1: How are different combinations (in terms of congruence and incongruence) of subjective acceptance and perceived public acceptance related to (a) information seeking and (b) oppositional behavior towards wind energy projects?

Method

Description of the Communities

The study was conducted in three exemplary communities in the south of Germany, located in the province of Baden-Württemberg, namely Bempflingen, Großbettlingen and Schlaitdorf. They have a total population of about 10.000 people, ranging from 2.000 to 4.000 residents per community. Belonging to the regional association of Stuttgart, priority areas for wind energy were just recently designated in the relevant communities. As it is a densely populated area with a high share of industry and agriculture, siting of wind turbines appears to be a difficult endeavor (Verband Region Stuttgart, 2024). The regional association of Stuttgart is therefore assigned to conduct a partial revision of the regional plan to include so called priority areas for wind turbines. The Wind-an-Land-Gesetz stipulates that at least 1.8 % of the province area must be designated as priority area for wind energy (WindBG, 2023, §3, Abs. 1, S. 2). Designating areas and controlling the planning process

is only possible if the federal state achieves the target set by the law. Otherwise, wind turbines can be constructed without further consideration of regional planning and distance regulations (e.g., the minimum allowable distance from a community).

Once the regional association of Stuttgart published the revision of the regional plan, the planning documents were made publicly available and a formal participation phase started. Municipalities, authorities, associations and the public were given the opportunity to submit statements on the revision of the regional plan. All three communities gave comments on the designated areas for wind energy. Two of them consent, whereas the municipality of Schlaitdorf voiced their concern regarding the proposed area. The formal participation phase of designating wind priority areas, along with the accompanying statements by the municipal councils, has already generated a certain degree of public interest in the topic of wind energy.

Recruiting

Participants of the study were recruited during April 2024, two months past participation phase of the designation process. Three sampling methods were used. First of all, a number of 1000 leaflets were distributed in local stores and directly into random mail boxes. The leaflets displayed important information of the study respectively its relevance for citizens and a link to the survey. Secondly, the same leaflet in digital form including a link to the study was published on the municipal websites and in the community gazettes twice. The length and content of the accompanying text, however, differed between communities implying more or less support of the mayor for the conducted study. Lastly, direct door-step interviews were carried out on two days for eight hours respectively in each community, with a total of six days. These were conducted at the end of the sampling period to include those who did not complete the online survey out of their own initiative. However, very few of the randomly selected residents had participated in the online survey prior to the door-step interviews. For the purpose of interviewing, a random sample of about 100 addresses per community was taken out of a list of all household addresses provided by the community administrations. If all 100 addresses had been approached and time was still left, more random addresses were retrieved. Door-step interviews followed the same questionnaire that online

participants filled out on their own. There was no script further than the text displayed in the questionnaire.

Sample

A total of 403 interviews (as of 30th of April, 23:59) was conducted of which 333 participants filled out the online questionnaire. Random-address door-step interviews obtained a response rate of 30 %, giving 70 responses. All participants of the study had to be residents in one of the three determined communities (Bempflingen, Großbettlingen, Schlaitdorf). Therefore, 47 people who indicated they lived elsewhere and four people who had already taken part in the survey were excluded. Nine participants denied consent. Another 41 participants didn't fill out the questionnaire completely, mostly dropping out before the items of interest were scored. Therefore, incomplete data sets were excluded which led to a final sample of 302 (176 male, 122 female, 4 NA) participants giving complete data. The mean age was 50.19 (SD = 15.88) ranging from the age of 18 to 87. The majority of participants had a university degree (49 %), followed by higher education qualifications (25 %). 132 participants indicated they lived in Bempflingen (43,7 %), 103 in Großbettlingen (34,1 %) and 67 in Schlaitdorf (22,2 %). The distribution of participants among the communities doesn't match their population sizes, with Großbettlingen having more residents than Bempflingen. Nonetheless, participants represent approximately 2 % to 3 % of the residents in each community, indicating that the absolute difference in numbers does not translate to a substantial relative difference. Computing a post-hoc sensitivity analysis revealed that the present sample can show effects in a one-sided paired t-test up to an effect size of 0.19 with a power of 0.95 and a significance level of 0.05. For response surface analyses, high power should be accomplished by recruiting two to three times as many participants as would be needed to detect linear main effects (Humberg et al., 2019). Therefore, the current sample of 302 participants is able to show an effect size of 0.11 with a power of 0.95 and a significance level of 0.05, as computed in a post-hoc sensitivity analysis.

Procedure

Participants of the survey were first given information about a hypothetical but probable wind energy project near their community. A map of the designated priority area for wind turbines

near the concerned community was shown using excerpts from the regional plan. The construction of two wind turbines in the designated area was implied but it was made clear that nothing had been decided yet. Respondents filled out the survey asking for their subjective acceptance, perceived public acceptance as well as information seeking and oppositional behavior. At last, participants were asked about their socio-demographics, including age, gender and education. There was a blank space to leave comments, which led to a set of suggestions, explanations and opinions by residents of the communities which will be provided to the local authorities.

Measures

Subjective Acceptance

Subjective acceptance was rated on a 5-point Likert scale answering three items. As multidimensional scales are suggested for measuring acceptance (Walter & Gutscher, 2013), three questions were selected from a set of items used by St. Clair (2022) who measured wind energy acceptance applying the Technology Acceptance Scale (Davis, 1989).

The items were worded as follows: “I am willing to accept these wind turbines in [community name].”; “Overall, I find these wind turbines good for [community name].”; “I support the construction of these wind turbines in [community name].”. The scale average for subjective acceptance was formed out of the three items having very high internal consistency with a Cronbach’s α of .98. High values of the variable indicate more positive attitudes towards local wind energy.

Perceived Public Acceptance

Similar items were used for the query of perceived public acceptance. The opinions of other residents of the relevant community were asked with the following three items: “Others in [community name] are willing to accept these wind turbines.”; “Overall, others in [community name] find these wind turbines good for the community.”; “Others in [community name] support the construction of these wind turbines.”. Scores across the three items for each variable were averaged in accordance to the scale of subjective acceptance. The three-item scale had very high internal consistency with a Cronbach’s α of .95.

Oppositional Behavior

To assess oppositional behavior, three items had to be rated on a 5-point Likert scale that were worded as follows: “I would sign a petition against the construction of the wind turbines.”; “I would take part in a demonstration against the wind turbines.”; “I would invest in the wind turbines.”. The polarity of the first two items was reversed prior to building the scale average. To keep consistency with the acceptance variables and information seeking, high values on the scale corresponding to high levels of acceptance indicate low intentions to show oppositional behavior. Vice versa, low values on the scale signify high intentions to indulge in oppositional behavior. The item scores showed high internal consistency with a Cronbach’s α of .87.

Information Seeking Behavior

Information seeking behavior was assessed using the following three items: “I would inform myself about the wind turbines in the local newspaper.”; “I would take part in an informational event about the wind turbines.”; “I would read articles about the wind turbines in the community gazette.”. The scale average was formed across the three items with high scores indicating a high motivation to seek information about the proposed wind energy project. The scale showed adequate internal consistency with a Cronbach’s α of .77.

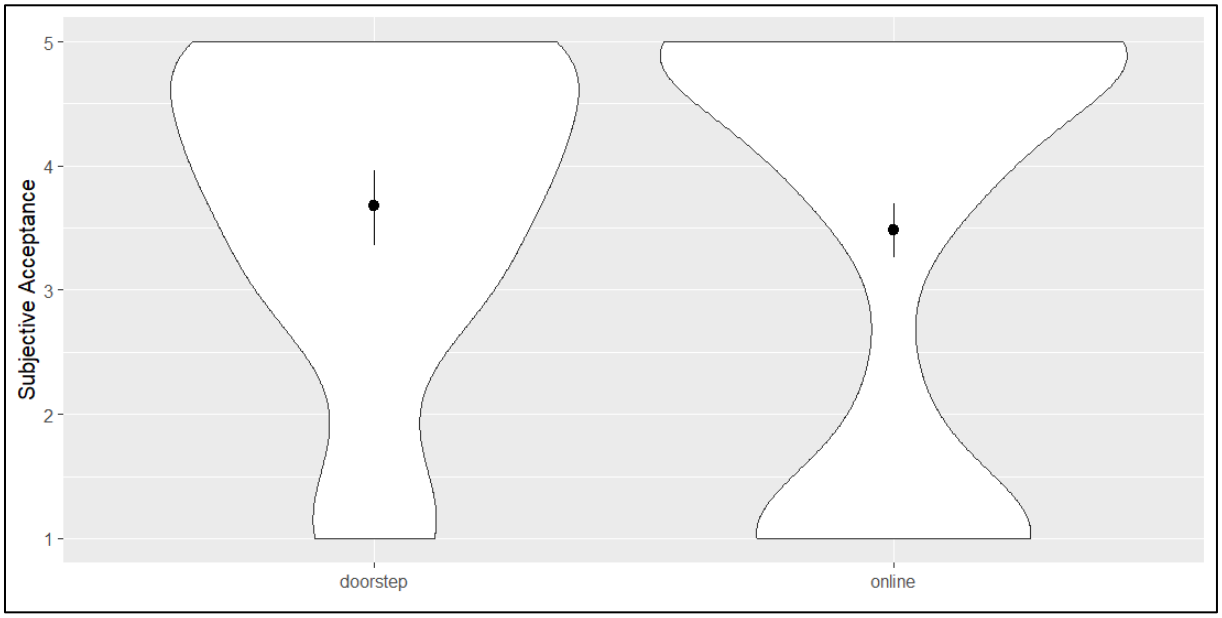
Results

Subjective and Perceived Public Acceptance

Subjective acceptance was majorly high within the sample (*M = 3.50, SD = 1.63*). 63 % of all respondents did slightly or strongly support the proposed wind turbines indicating an acceptance score of 3.5 or higher. On average, highest support was found in the community of Großbettlingen (*M = 3.75, SD = 1.51*) and lowest support in Bempflingen (*M = 3.26, SD = 1.73*). Though, differences between the municipalities are only small. Door-step interviews obtained descriptively higher values of subjective acceptance (*M = 3.68, SD = 1.28*) than the online questionnaire (*M = 3.48, SD = 1.72*), actually capturing a higher share of neutral voices in face-to-face interviews. The ratings as seen in Figure 2 show a majority of neutral and supportive participants in the door-step sample compared to more extreme values and a minority of neutral ratings in the online setting.

Figure 2

Violin Plots for Subjective Acceptance by Sampling Method



Perceived public acceptance accounted for a mean of *2.71* (*SD = 1.1*) over the whole sample. Neutral positions made up a major share with participants estimating others to hold neutral opinions about the proposed wind turbines. This tendency to perceive neutral public acceptance was descriptively highest among the door-step interviewees as can be seen in Figure 3. None of the door-step interviewees seized strong public support for the wind turbines with a maximum of perceived public acceptance at 4.33. Compared to a mean of *2.98* (*SD = 0.67*) in the door-step sample, the online questionnaire yielded a mean of *2.71* (*SD = 1.1*). Online participants rated a wider range of values and perceived stronger opposition and support. Nevertheless, a large part of online participants rated public acceptance to be neutral.

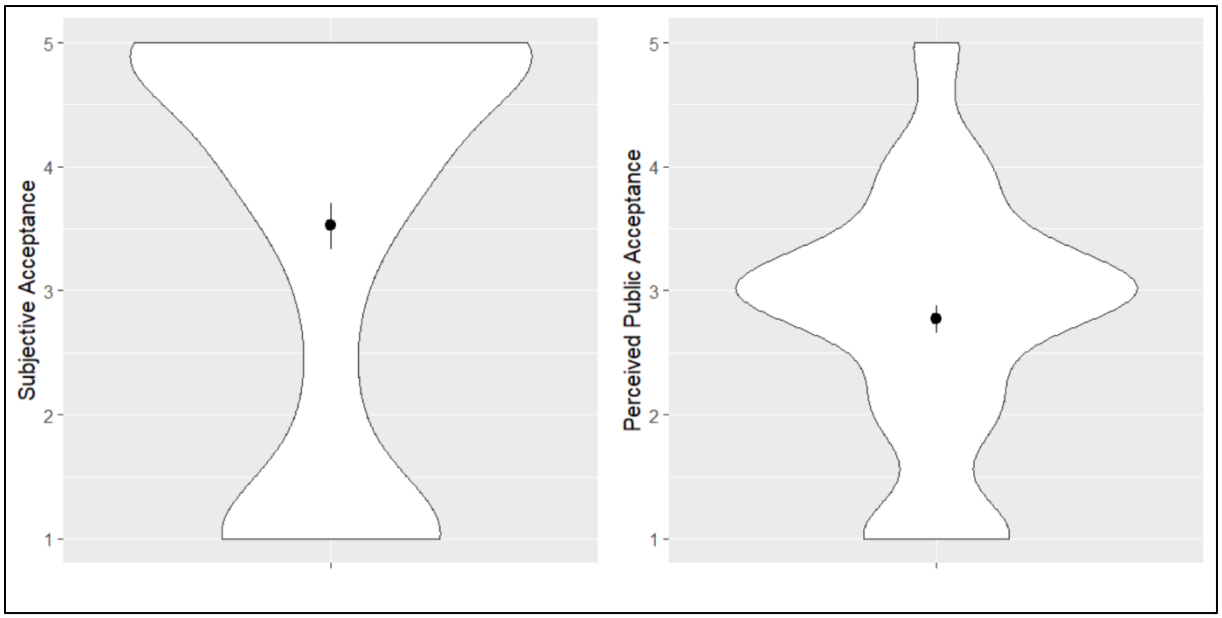
Figure 3

Violin Plots for Perception of Public Acceptance by Sampling Method

A one-sided paired sample t-test was conducted to test whether perceived public acceptance is significantly lower than subjective acceptance. While most citizens believe that others' in their municipality are neutral to opposing local wind turbines (*M = 2.77, SD = 1.02*), support is prevailing among citizens when subjective acceptance is surveyed for (*M = 3.50, SD = 1.63*), *t(301) = 11.685, d = 0.67, p < .001, CI = [0.65; Inf]*. These findings imply that individuals (erroneously) perceive themselves as more supportive than citizens around them concluding in pluralistic ignorance on the group-level. Thus, the null hypothesis can be rejected. Distribution of the surveyed data as seen in Figure 4 even suggests that individuals themselves are supportive whilst perceiving other citizens to have a neutral acceptance of the proposal of wind turbines. Nevertheless, ratings on subjective acceptance show a more extreme allocation with a small body of neutral voices in comparison to a wide center of perceived public acceptance. Conclusively, Figure 4 shows the contrariness of the two different measures of acceptance.

Figure 4

Violin Plots Comparing Ratings on Subjective Acceptance with Perception of Public Acceptance



Acceptance in Relation to Behavior

Another two variables were queried within this study, namely information seeking behavior and oppositional behavior. Information seeking was considerably high throughout the sample with a mean of *3.94* (*SD = 1.14*). Oppositional behavior showed a greater degree of variance averaging across the sample, such that the mean for oppositional behavior was near the center of the scale (*M = 3.50, SD = 1.44*).

To answer research question RQ 1, relations of acceptance and behavior were explored with the use of a Response Surface Analysis applying the RSA package (Schönbrodt, 2015) in the statistical environment R. The RSA package estimates a polynomial regression model based on the given data and displays a 3-dimensional plot that allows for a graphical interpretation of the effects on the outcome variable resulting from different combinations of the two predictors and their interactions. A response surface analysis overcomes the limitations of other statistical approaches such as correlating difference scores, which use mathematical operations on the predictor variables. These formulas distort or hide information that can be displayed by different variable combinations as presented in a response surface analysis.

In this study, response surface analyses were conducted for each information seeking and oppositional behavior separately. Subjective acceptance and perceived public acceptance both implied as predictors were centered on the scale midpoint subtracting 3 from all values.

Information Seeking

Results of the polynomial regression model for information seeking can be seen in Table 1. The global model was tested significant and explained 11 % of variance in information seeking behavior ($R^2 = 0.11$). With regard to the linear effects, participants perceiving higher public acceptance of wind turbines showed higher intentions of information seeking (*b = 0.200, SE = 0.100, p = .044, CI = [0.005; 0.395]*). However, higher subjective acceptance did not score significantly higher intentions of information seeking (*b = 0.099, SE = 0.075, p = .186, CI = [-0.048; 0.246]*). The negative interaction between subjective acceptance and public acceptance was found significant (*b = -0.155, SE = 0.068, p = 0.023, CI = [-0.289; -0.022]*) as well as the quadratic effect of public acceptance (*b = 0.132, SE = 0.066, p = .048, CI = [0.001; 0.262]*), which can be interpreted based on the 3-dimensional plot.

Table 1

Polynomial Regression Model Predicting Information Seeking Behavior

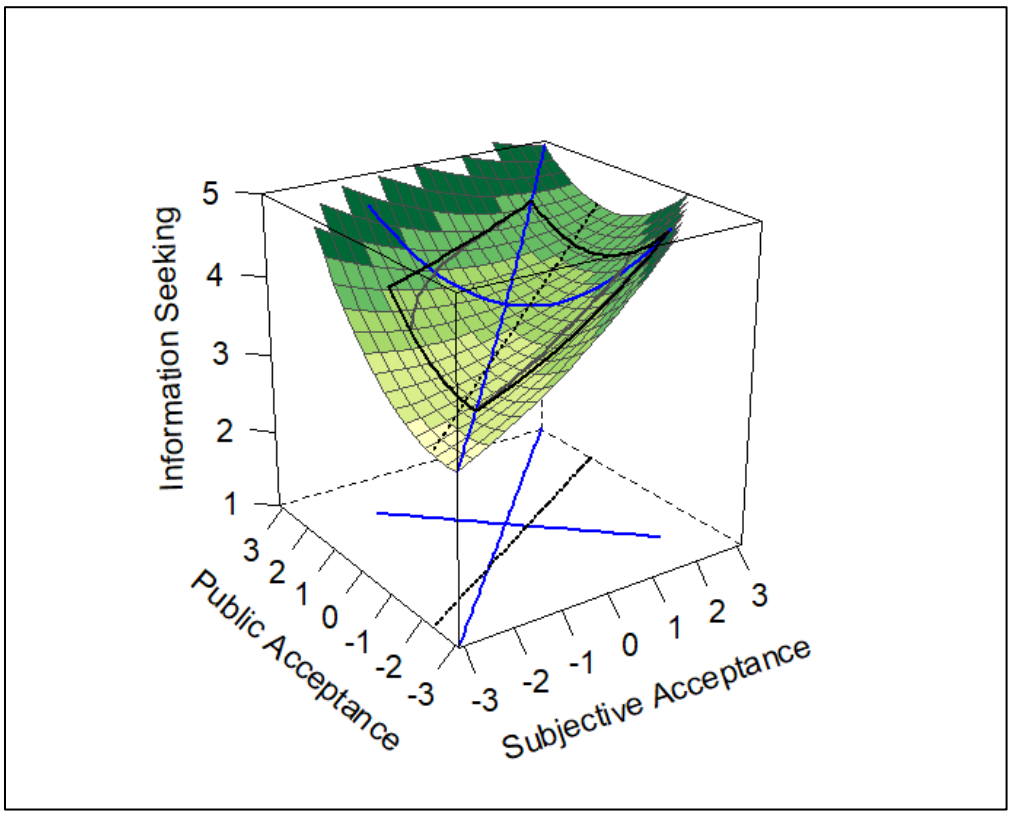
Predictors	b	SE	p	CI
Intercept	3.935	0.135	< .001	[3.670; 4.199]
Subjective acceptance	0.099	0.075	.186	[-0.048; 0.246]
Public acceptance	0.200	0.100	.044	[0.005; 0.395]
Subjective acceptance x public acceptance	-0.155	0.068	.023	[-0.289; -0.022]
Subjective acceptance^2	0.008	0.052	.883	[-0.094; 0.109]
Public acceptance^2	0.132	0.066	.048	[0.001; 0.262]

Figure 5 shows the plotted relation of congruence and incongruence between subjective and public acceptance with information seeking behavior. The three-dimensional model results in an inclined plain curved in a U-shape that is slightly rotated and flattens to the front. The outcome of information seeking scores high values in the back left vertex when both subjective and public acceptance are high. The same high level of information seeking was found when subjective acceptance is low and public acceptance is high as depicted in the front left vertex. If subjective

acceptance is high and public acceptance is low information seeking scores high values as well, seen at the back right vertex. The lowest outcome of information seeking was found at the front right vertex, which depicts low values for both predictors.

Figure 5

Response Surface Plot for Information Seeking Behavior as the Outcome



Note. The thickly framed box represents the range of actual data. Blue lines depict the Line of Congruence and the Line of Incongruence. Colors illustrate values of behavior.

The Line of Congruence (LOC) spanning from the front right vertex to the back left vertex contains all congruent predictor combinations meaning that subjective and public acceptance are equal in magnitude and sign. In Figure 5, the LOC is positively inclined and linear, which indicates that higher predictor combinations score higher outcomes in information seeking. The Line of Incongruence (LOIC), which contains all predictor combinations where subjective and public acceptance are equal in magnitude but opposite in sign, is curved in a U-shape. This suggests that the outcome of information seeking is higher the more the predictors deviate from one another.

Conclusively, the smaller the difference between subjective and public acceptance as seen in the middle of the LOIC, the lower the outcome.

Oppositional Behavior

Results for the polynomial regression model for oppositional behavior are shown in Table 2. The global model was significant explaining 83 % of variance in oppositional behavior ($R^2 = 0.83$). Here, the linear effect of subjective acceptance was tested significant suggesting that participants showing higher subjective acceptance have lower intentions to perform oppositional behavior (*b = 0.718, SE = 0.065, p < .001, CI = [0.059; 0.846]*). For public acceptance, the linear effect on oppositional behavior was not significant showing that perceptions of higher public acceptance did not result in lower intentions to show oppositional behavior (*b = 0.145, SE = 0.080, p = .069, CI = [-0.012; 0.302]*). As for the interaction effects, the quadratic effect of subjective acceptance was found significant (*b = -0.0142, SE = 0.037, p < .001, CI = [-0.214; -0.070]*). The direction of the interaction effect can be interpreted in the 3-dimensional plot.

Table 2

Polynomial Regression Model Predicting Oppositional Behavior

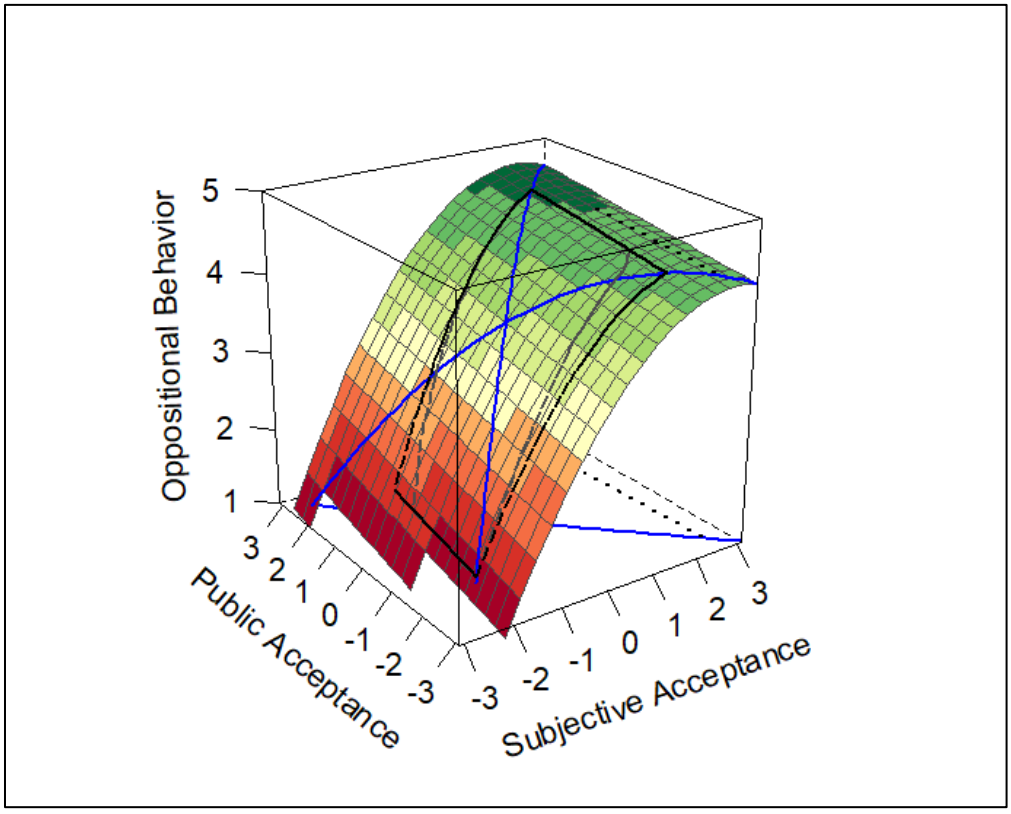
Predictors	b	SE	p	CI
Intercept	3.573	0.082	<.001	[3.413; 3.733]
Subjective acceptance	0.718	0.065	<.001	[0.059; 0.846]
Public acceptance	0.145	0.080	.069	[-0.012; 0.302]
Subjective acceptance x public acceptance	-0.075	0.056	.181	[-0.185; 0.035]
Subjective acceptance^2	-0.142	0.037	<.001	[-0.214; -0.070]
Public acceptance^2	0.067	0.044	.081	[-0.009; 0.162]

In Figure 6, congruence and incongruence of subjective and perceived public acceptance is plotted in relationship to oppositional behavior. The outcome in oppositional behavior is highest when both predictors score high values, as seen in the back left vertex. High values of oppositional behavior can be found in the back right vertex as well, where subjective acceptance is high and public acceptance is low. On the contrary, when subjective acceptance is low and public acceptance is high, as shown in the front left vertex, the score of oppositional behavior is lowest. Such low levels of oppositional behavior are also depicted in the front right vertex, where both predictors are low.

Conclusively, the higher subjective acceptance, the lower the intention to engage in oppositional behavior which is the graphical representation of the linear effect of subjective acceptance. In regard to its quadratic effect, there is a slight compression of oppositional behavior scores the more the subjective acceptance increases.

Figure 6

Response Surface Plot for Oppositional Behavior as the Outcome



Note. Higher values on the outcome variable signify lower intentions to show oppositional behavior and vice versa. The thickly framed box represents the range of actual data. Blue lines depict the Line of Congruence and the Line of Incongruence. Colors illustrate values of behavior.

In addition, the LOC including all congruent predictor combinations is positively inclined, showing an increase in outcomes with higher predictor scores. As it spans from the lower front right vertex to the higher back right vertex, the LOC indicates that the intention to engage in oppositional behavior decreases as both subjective and public acceptance increase. The LOIC, which depicts incongruent predictor combinations also shows a positive inclination spanning from the lower front

left vertex to the higher back right vertex. This suggests that intentions to engage in oppositional behavior are lower as subjective acceptance increases, even if the perception of public acceptance differs.

Discussion

The present study revealed two major findings regarding local acceptance of wind turbines and associated behavior in concern of social norms. First, results disclosed that public acceptance of local wind energy projects was significantly underestimated by citizens, rejecting the null hypothesis. Subjective acceptance scores showed a more favorable group-level acceptance of the proposed wind turbines than participants rated when asked to estimate public opinion. Fellow citizens were perceived mostly as neutral to the proposed wind turbines implying that others in the community are discerned not to have an opinion yet. There was a clear majority in favor of the wind energy project. However, citizens were unaware of the level of public support. They perceived others as either having no opinion (neutral acceptance of the public) or equally divided between opposition and support (balanced to neutral public acceptance). The queried sample was able to obtain strong effects with a high power, therefore exhibiting a high level of external validity.

Rejecting the null hypothesis is partly in line with the findings of Sokoloski et al. (2018) as it replicates pluralistic ignorance among supporters of wind turbines. The prevalence of a neutrally perceived opinion environment gives a new insight into the social dynamics of acceptance in communities. Further exploring citizens' motives and justifications for their perception of the public may provide a deeper insight into the underlying explanations for incorrect estimations of acceptance. Citizens may not have communicated the topic with each other yet or may believe that residents in their community are not interested in this topic. Local politics and provision of information by the local authorities may also have a large impact (Leiren et al., 2020). As the surveyed communities do not have a large amount of financial and personal capacities to invest in thorough participation formats, the topic of wind energy may not have reached citizens yet, which may lead to the perception of a neutral public opinion out of unawareness. Therefore, it seems important for local authorities to present and address public acceptance as supportive of local wind

energy developments. In this way, citizens may more aware about the positive opinion environment they can expect.

Interestingly, the use of two different methods of surveying, particularly door-step interviews and self-employed online questionnaire, showed further differences especially in the perception of public acceptance. Replicating the findings of Kenward (2023), door-step interviews exhibited increased neutrality on account of reduced opposition and support for both acceptance variables. Direct interviews can either be attributed with capturing a larger share of neutral residents motivating them to take part in the survey. Or, door-step interviews may be biased by interviewer effects that lead participants to state more neutral opinions because another person (the interviewer) is present. The leaflets distributed to recruit online participants were addressing people to express their opinion. This may appeal especially to those already holding strong opinions about the topic. Apart from that, higher response rates can account for a difference in results (Kenward, 2023). However, accurately calculating the response rate for online participants was challenging since the leaflets were not only distributed directly but also featured in community gazettes and on municipal websites. Response rate for the online questionnaire can be estimated to being below 30%, and thus lower than that for door-step interviews.

Second, the present research demonstrated different effects of subjective and perceived public acceptance on information seeking and oppositional behavior, respectively. Distinct response surface analyses revealed that public acceptance has a greater impact on information seeking behavior while subjective acceptance plays a larger role in the prediction of oppositional behavior. Information seeking was highest either when public acceptance was high irrespective of the score of subjective acceptance or when there was a great discrepancy between (high) subjective and (low) public acceptance. In summary, citizens indulge in information seeking more the higher they perceive public acceptance. Subjective acceptance does have an impact on information seeking in interaction with public acceptance as when they differ from one another. If both acceptance predictors scored similar values, implying that citizens perceived others to have a similar acceptance of the wind turbines, information seeking was low.

Social networks and support are important factors influencing information seeking behavior (Hargittai & Hinnant, 2006), omitting the question why subjective acceptance seems to be less relevant for information seeking covering the topic of wind turbines. Information seeking appears to be a socially desirable behavior, leading to potential overreporting of such behavior (Neuberger, 2016). This may explain the correlation between high scores for public acceptance and self-reported information seeking behavior, as the norm favors wind turbines and thus encourages seeking information. Yet, social desirability cannot account for high information seeking when there is an incongruence between the acceptance measures. Herein, citizens may seek dissonant information that are easily refutable in order to reduce cognitive dissonance by means of counter arguing (Festinger, 1964). Lowest levels of information seeking occurred when both acceptance measures were low or overall congruent, indicating a reduced need for information when there is little discrepancy between both predictors. These findings contradict the information-deficit model, which typically assumes that public opposition to technology stems from a lack of quality information (Bidwell, 2016). Instead, the response surface analysis suggested that information-seeking behavior regarding wind energy projects is based on a more complex and socially influenced set of motives.

Another interesting insight was given by results about oppositional behavior which was mainly influenced by subjective acceptance rather than perceived public acceptance. Citizens clearly intended to perform oppositional acts when their attitude towards the proposed wind turbine was oppositive and they did not do so when they advocated a supportive attitude. Either way, the perception of public acceptance did not influence the behavioral outcome to a great extent. Conclusively, respondents rely more on their own attitude of acceptance than their perception of public acceptance when intending to perform oppositional behavior. So, even if public opinion is perceived to be oppositional, supportive individuals will not show oppositional behavior. Similarly, citizens will indeed engage in oppositional behavior if they adopt an attitude of opposition toward the wind energy project, regardless of whether public acceptance is perceived to be high or low.

This finding actually contradicts the research on pluralistic ignorance claiming behavioral consequences of the misperception of social norms (Sargent & Newman, 2021). Beyond that, the

current study dissents the Technology Acceptance Framework proposing social norms being one of the predictors of intentions to accept and therefore being a predictor of acceptance behavior (Huijts et al., 2012). In this framework, acceptance is defined as "behavior that enables or promotes the use of a technology rather than inhibits or demotes the use of it" (Huijts et al., 2012, p. 526). As the present study examined oppositional behavior on a scale ranging from oppositional to supportive behavior, findings suggest that perceived public acceptance as a social norm does not exert an effect neither on oppositional nor on acceptive behavior. This also stands against empirical findings on social norms predicting individuals' oppositional intentions to act against wind energy projects (Read et al., 2013). Though, the present research polled for social norms of the whole community instead of a narrower social pressure from significant others, e.g. friends and family. Whether these contrary results to earlier findings are due to the social reference group needs to be further investigated.

Through employing a response surface analysis, the current study was able to display separate and joint effects of subjective and perceived public acceptance without encountering the limitations of difference scores. Both difference score and absolute difference score cannot reveal non-linear effects of (mis)matching predictors as response surface analysis does (Barranti et al., 2017). Offsetting the two acceptance variables would have resulted in a joint effect on oppositional behavior concealing the greater impact of subjective acceptance on the behavioral outcome. Likewise, the influence of public acceptance on information seeking would have been hidden in an analysis of difference scores whereas response surface analysis was able to depict different expressions of behavior with different matches of subjective and public acceptance. Both findings on behavioral outcomes are most relevant to researchers exploring relations of congruence and incongruence between different predictors on an outcome variable as conducting response surface analyses reveal more in-depth evaluations of these relations. Unlike difference scores, the conducted response surface analysis elaborated individual effects of subjective and public acceptance. It also allowed for the evaluation of interaction effects through graphical presentation of the results.

Taken together, the results suggest that citizens falsely perceive public acceptance as mainly neutral and more negative on average than the survey on subjective acceptance revealed. This

misperception indeed had an influence on information-seeking behavior but did not impact the show of oppositional behavior. The results may have implications for authorities and planners who wish to address opposition to wind farm projects. When targeting to prevent oppositional behavior, subjective acceptance can be an indicator to work on. Participation formats could be designed to address opposing individuals particularly. Another opportunity is to display support of the public and therein motivating citizens to search information about the local wind energy project as public acceptance does influence information seeking behavior. Finally, social norms and their impact on either acceptance as an attitude and behavioral outcomes should be investigated more thoroughly. There is only a small body of research on citizen behavior in regard of local wind energy projects which leads to wind farm developments without further consideration of public norms. Scientific research on acceptance in regard to the estimation of social norms can guide local authorities as well as citizens themselves throughout planning and implementation phases of wind energy projects.

However, the current study should be interpreted with consideration to the presence of several limitations and strengths. Although sample size was adequately high detecting strong effects, it cannot be framed as representative covering two to three percent of residents of the communities in interest. The average age of the participants was slightly higher than given by the state's statistical office (Statistisches Landesamt Baden-Württemberg, 2024) and the education level of the sample was quite high. Door-step interviews were conducted both on weekends and weekdays encountering particularly elder retired people or academics working from home. Leaflets and portrayal of the online questionnaire might have a greater appeal to people already holding a strong opinion or those who are already engaged in local politics which is dominated by the higher age groups.

Furthermore, this study employed multidimensional scales to measure pluralistic ignorance concerning local acceptance compared to previous research. Most studies on pluralistic ignorance in examination of wind energy acceptance (Sokoloski et al., 2018) or regarding climate change policies (Sparkman et al., 2022) are surveying just one item on subjective acceptance and one item on public acceptance to directly compare them. The present questionnaire used a set of items derived from the Technology Acceptance Scale (St. Clair, 2022) with high reliability scores. However, validity of the

items in regard to acceptance of local wind energy was not assessed although St. Clair (2022) showed high validity for all measured in relation to technology acceptance. However, local acceptance as defined by Walter & Gutscher (2013) does imply that the wind energy project is already decided upon and in the planning phase. Although areas for wind turbines were designated in each selected community, the actual construction and siting of turbines remained hypothetical. Participants were asked to consider a scenario where two wind turbines were intended to be built, but communities were still in an early stage of the process. Thus, acceptance levels could be found relatively high because the construction of wind turbines still appeared to be unrealistic or distant in terms of time, as reflected in the U-shaped trajectory of acceptance (Wolsink, 2007). Nevertheless, higher levels of acceptance would still be observed across the entire sample, preserving internal validity. Researchers should exercise caution when comparing these findings with results from more advanced stages of project implementation. Finally, the use of a multidimensional scale can improve the accuracy of the measurement of acceptance but future research should investigate construct validity of the items used in the present study in regard of wind energy.

Conclusion

This study conducted a citizen survey in three case communities in the south of Germany regarding local acceptance of wind energy projects and the underlying social processes with regard to behavioral consequences. Citizens significantly underestimate public acceptance presuming others in their community to have a neutral level of acceptance. Whereas the perception of public acceptance does have an impact on information-seeking behavior, it does not explain variance in oppositional behavior. The latter is predominantly determined by subjective acceptance. The present results highlight the importance of examining not only difference scores of two predictor variables but conducting analyses of the relations of congruence and incongruence of subjective and public acceptance and their influence on behavioral outcomes, as performed in the current study through response surface analyses. Taken together, the results suggest that subjective and public acceptance can have distinct effects on citizen’s behavior as they influence various types of actions differently but also interact as in the misperception of social norms.

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Eidesstattliche Eigenständigkeitserklärung

Hiermit erkläre ich, dass ich die vorliegende Arbeit selbständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt habe. Alle sinngemäß und wörtlich übernommenen Textstellen aus fremden Quellen wurden kenntlich gemacht. Die Arbeit wurde bisher keiner anderen Prüfungsbehörde vorgelegt und noch nicht veröffentlicht.

Landau in der Pfalz, den 30.06.2023

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