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Assessing the Socio-Cultural Acceptance of Wind Energy Projects in Indigenous Communities

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Abstract

The increase in the use of renewable energy, especially wind energy, is the key to climate success, yet it will not materialise solely based on technical efficiency but will rely on social and cultural acceptance. This paper explores the questions of socio-cultural acceptability of wind energy projects within the indigenous population based on perceptions, individual interpretation of cultural issues, the rate of participation and the general support. The mixed-methods approach was used to collect data among 250 members of the community through structured surveys and 30 semi-structured interviews in three indigenous regions affected by wind projects. The findings indicate that although the desire to use wind energy is fairly high in the environment, the cultural attachment to land, nonexistent involvement in decision-making, and the perceived lack of regard to traditional values are major setbacks to acceptance. The correlation between participation and awareness plays a positive influence in relation to acceptance, however, cultural issues are a good negative vice. Spiritual value of land and the need of all-embracing governance are also underlined in qualitative accounts. The research further postulates that the consultation process and cultural sensitivity, as well as empowerment of the indigenous people is key in the sustainable and ethical execution of wind energy initiatives. It argues in favour of the policy frameworks that focus on energy justice and indigenous autonomy in renewable energy transitions.

Keywords: Wind energy, Indigenous communities, Socio-cultural acceptance, Participation, Renewable energy policy, Energy justice, Cultural concerns.

1. Introduction

The trend in renewable energy projects has increased significantly in scope and substance with the adoption of sustainable energy all around the world as governments strive to tame the effect of climate change, diversify their energy supply and deactivate reliance on fossil fuels. In terms of low Carbon footprint and large generation capacity, wind energy has become the pillar of the energy plans of many nations and regions. Nevertheless, the environmental values of the use of wind energy are widely accepted, whereas the intensive and mass character of the deployment of the wind energy infrastructure provoked the diverse social reaction in its execution with deeply rooted cultural and ecological siting of the lands populated with the representatives of the indigenous peoples. (Huber et al., 2017).

The indigenous communities, mostly settling in rural or remote lands, highly with natural resource and wind potential, have become targets of wind energy development projects especially in the recent years. Though such projects would positively affect these groups through cleaner energy, and potential economic investment, such projects equally introduce great threats to their iflaskspieriag regime, spiritual links to land, and traditional economies. The issue of the socio-cultural acceptance of wind energy projects into these communities is hence a decisive element to any long-term sustainability and equity of renewable energy transitions.

The socio-cultural acceptance is the extent to which a community withholds, fights back, or cut deals with external interventions on the basis of valued, beliefs, customs, and social life forms. In indigenous communities, the issue of acceptance is usually connected to land rights, spiritual views of the world, the form of local governance, and the heritage of marginalization. These factors make it such that no project, regardless of how much it may be environmentally good, can be considered successful unless it happens to be culturally respectful and socially inclusive (Wolsink, 2007). The sustainability debate, in the world, should therefore go beyond the technological optimism and add an appreciation by maintaining a very sophisticated view of social justice especially in terms of the indigenous rights as well as energy democracy.

Though the world agreed to the rights of indigenous people, which is captured in international documents like the United Nations Declaration on the rights of indigenous people (UNDRIP) such abuses are continuing. The wind energy developments are usually

instigated by external developers or governments, so wind power projects can go ahead even where the indigenous people have not granted free, prior and informed consent (FPIC), which essentially violates their self-determination as indigenous people. These projects are capable of generating strong-rooted resistance and social disintegration when they transform the classical landscape width turbine noise, visual perturbation, or the material presence in the sacred places. As another example, landscape upheaval caused by solar farms (a parallel renewable technology) has caused backlash in rural areas of South Korea (Ko 2023), where the landscape values lie not only in the superficial aestheticism but also in the profound cultural one.

The dictation of wind initiatives could also increase socio-political conflicts, as well as strengthen colonial tendencies of exploiting resources. Kohyama (2023) explains how energy development and conservation regulations form a conundrum that usually ends up disenfranchising the local population in Japan. Similarly, indigenous people in North America, Asia, and Oceania have raised some concerns over being exploited as sacrifice zones in national climate ambitions not taking into much consideration of local or world perceptions. This necessitates the direness of reconsideration of project planning procedures and institutionalization of culturally responsive apparatus of communication and engagement.

Meanwhile, the invasion of wind energy in aboriginal lands does not necessarily have to be hostile. The readiness of several communities to cooperate with clean energy technologies has been shown when the technologies being implemented are planned participatorily and are informed by the local value system. In Canada, as an example, the best-case scenarios of successful co-management and community owned wind projects are recorded that are in harmony with the traditional stewardship activities and which create source of financial gain and energy independence. In the literature it can be seen that the presence or the absence of turbines is not the ultimate question, but the nature of the process itself, in what way the decisions are made, who gives the power and who receives benefits equally. (Wahlund & Palm, 2022).

Moreover, the process of energy transition is socio-technical by nature. Lawhon and Murphy (2011) observe that it is the social systems in which technologies are bedded that determine the success of the integration of renewable energy and not the technologies per se. These are governance structures, cultural discourse, land use policies and historical disparities. Neglected or poorly considered attention to such dimensions could put renewable energy

projects at risk of perpetuating the same injustices that they are aimed at alleviating. As it is indicated by Shen and Tai (2024), institutional gaps and fissured local governance are two major issues that block the participation of communities in the growth of renewables in Taiwan, leading to alienation and resistance.

When evaluating the level of socio-cultural acceptance, an evaluation of the symbolic and spiritual importance of land in indigenous cosmologies is also imperative. To most indigenous people, land is not a resource that can be exploited but rather a living being which they have mutual relationships. The alteration of these relations (displacement, ecological degradation, and commodification) has the ability to cause a serious cultural trauma. In the investigation of offshore wind to promote tourism and energy in the Beibu Gulf in China, Nie et al. (2024) concentrate on the importance of keeping in balance the interests in tourism and energy and distributional justice to guarantee the absence of social harmony. Similarly, in Taiwan, at Yunlin County, Tsai et al. (2019) point out the erosion of renewable infrastructural encroachment on agricultural lands that is raising food security and the future livelihood of the people.

Added to this is a further level of complexity of conflicting sustainability stories. As governments and energy firms tend to present wind energy as the representation of progress and climate accountability, the local communities might perceive these initiatives as one more top-down development. Such competing discourses have the potential of stimulating mistrust and polarization. According to Huber et al. (2017), landscape cannot be a passive stage; it should be seen as a developing field, in which social contradictions and power asymmetry manifests. Therefore, the topic of local resistance cannot be treated as the question of responding to dissent, but as untangling more fundamental questions concerning who has a say about shaping the future and under what conditions.

The proposed research attempts to methodically evaluate the socio-cultural acceptance among wind energy projects social acceptance in aboriginal groups by studying the relationships between cultural belonging, community governance, land ethics, and participatory governance. Using both quantitative and qualitative approaches, the study will seek not only to find out the trends of acceptance or rejection, but the values and aspirations as well as the reasons behind these types of response. It will also attempt to highlight the best practices in terms of inclusion in the renewable energy implementation that is relevant both in the ecological terms and in cultural sustainability.

To sum up, renewable energy pursuit should not be at the cost of cultural dignity nor any social equity. With the increase in the pace of the climate crisis, the aspiration of designing low-carbon energy systems, as important as it is, is no longer sufficient; the design of energy systems must be locally legitimate and culturally coherent too. Wind energy has the potential to be transformational so long as its own rolled out in ways that honour the lived realities, and the worldviews of the directly impacted. The paper, as such, will add to the overall energy justice literature by putting the voice, rights, and traditions of indigenous peoples at the center of the renewable transition.

2. Literature Review

Developing renewable energy systems and especially wind power has become one of the important approaches to meeting global climate targets and a shift to a low-carbon economy. As much as the technological and environmental merits of wind power are known facts, the current literature acknowledges the necessity to consider the socio-cultural aspects of implementing it, in contexts as never seen before, i.e. indigenous and rural settings. There is an academically changing position to inclusive and participatory models of renewable energy governance so as to ensure that such initiatives are ecologically sustainable besides being socially just.

The basis of this line of investigation is laid by the article by Huber et al. (2017), who focus on both possible conflicts and opportunities created by renewable energy infrastructure on the changing landscapes. They note that although wind energy has ecological advantages, the area of land that they occupy as well as the visual effect is a source of contention, especially where there is high cultural or ecological significance. The paper calls to adherence to an integrated landscape approach that takes into account the multiplicity of the values of various managers-stakeholders- including the cultural and spiritual value of land. Here, the indigenous people are a far cry to the passive portrayal of the infrastructure receptors but the custodians of their territories and have their own cultural logics.

Wolsink (2007) continues this way of thinking by elaborating the planning and decision-making process which is related to renewable energy schemes. His publications criticise the technocratic method of rejecting local objections on the grounds of NIMBYism (Not in My Backyard), and suggest an alternative model of deliberative planning that is based upon fairness and debate. According to Wolsink, the kind of acceptance that can be achieved is not

through any compensation or technical guarantees but through real participation, which is respectful to the cultural stories and historical grievances. This is a very crucial observation in the context of researching on indigenous societies, whose opposition to colonial design could well be the outcome of colonial experiences and struggles to live as sovereign nations.

Ko (2023) has also examined that this happens also in relation to solar energy in South Korea where countryside communities have been increasingly protesting against the landscape changes due to the implementation of solar farms. The research explains that exportation of setback rules is connected with grass root organization and relation of symbols to local landscapes. This opposition shows that the environmental concern about renewable energy is not anti-environmentalism on its face, but a defense of place-based identities, aesthetic values and social unity. The implication of wind energy project is that social acceptance should be negotiated as a form of culturally sensitive and procedurally just practices.

Kohyama (2023) gives the demonstrative example of Japan, in which regulatory registries have tried to maintain a balance between the protection of traditional lansdscapes and the growth of renewable infrastructure. The research provides the understanding of how compensation systems give poor results in the reduction of cultural loss incurred by local communities. In this respect, regulatory measures should include the shift towards the policy, which will not only be economically valued but will preserve the intangible cultural heritage and symbolism of the landscape, which is particularly necessary in the case of indigenous states.

The literature is also focused on the influential role of institutional structures in the social integration of renewable energy projects prevalence or impediments. In their review of the renewable energy policy in Taiwan, Shen and Tai (2024) illustrate how the lack of centrality in the reserves and local governance fragmentation affects the achievement of successful community interaction. According to their findings, even the good energy projects can be strongly opposed by the local people, unless there is coherence in the regulatory mechanisms and wider planning institutions. The paper therefore recommends the establishment of more legal requirements in order to facilitate the process of community involvement and decentralisation of energy administration particularly in areas with multiple socio-political histories.

Further, Nie et al. (2024) the interaction between offshore wind development and tourism activity in the offshore wind development in the Beibu Gulf of China with consideration of distributional justice as a quasi-ex ante study. What their practice notes is that the siting of energy projects is not a neutral issue, which entails some bigger tendencies of socio-economic and political imbalances. These processes in their turn are superimposed on histories of lost lands, ruined landscapes and political marginality within indigenous settings. So, in order to quantify socio-cultural acceptance, there needs to be knowledge of both economic impact and historical affronts.

Lawhon and Murphy (2011), To make the argument that energy transitions are entrenched in power, discourse and spatial politics that form socio-technical regimes, they study political ecology. They criticize the linearity of technological adoption models and define a holistic dimension that takes into account cultural values, governance frameworks and environmental justice. Such framework is especially helpful when studying how wind energy is being received in indigenous communities, where potentially the objections are based on structural inequalities, rather than the features of a particular project.

Another topic that matters is the spatial and land-use impact of renewable energy. The meta-analysis undertaken by Van Zalk and Behrens (2018) is a comparison of land-use intensities of non-renewable and renewable energy systems. According to their results, the wind power, despite being more land-intensive than biomass or solar PV, occupies large areas and changes how the landscape looks. Even slight physical presence can result in intense socio-cultural response in lands of the indigenous which have cultural and spiritual importance. Therefore, the technical judgments need to be supplemented with the culturally appropriate spatial planning.

The results of the empirical literature present a case-based understanding of community resistance and support. Tsai et al. (2019) conducted research on the effects of green energy projects development on the farmlands in Yunlin County, Republic of China (Taiwan) and concluded that renewable infrastructure usually contradicts locally grown activities and land use regulations. The case also affirms why there should be an energy planning that is combined with the livelihood of the community particularly in the indigenous areas where subsistence economies and traditional ecological knowledge exist.

On the same lines, Peng (2013) analyzes the impacts of anti-dam movements in Taiwan, Meinung region and explains how local resistance could transform institutional abilities and policy actions. The study indicates that long-term presence of grass route mobilization can oppose top-down planning and produce more responsive governing. This is the consideration in regard to the wind energy development directly applicable as community agency and resistance is likely to contribute to more representative energy governance models.

Barnes (2019) is important to the body of literature on public participation because it records the experience of energy transition in the West of England. The most important trends the research points to include the emergence of community energy activities, participatory budget democracy, and the local ownership. Such mechanisms do not only increase social acceptance but also make benefits fairer. Although the study is employed in a Western context its fundamental principles can be applied in indigenous context; transparency, inclusivity and local control.

The notions of energy citizen and democracy have become increasingly popular in recent years as instruments of supporting participatory energy transitions. Wahlund and Palm (2022) develop an exhaustive survey of the manner in which communities can use these frameworks to mold their energy futures. As they analyze, indigenous communities would most likely to support and co-create renewable energy projects, when being perceived not only as mere recipients of energy but as energy citizens. Such a transition between viewing of consent and the equivalent co-production signifies an important unfolding in energy justice literature.

The contextual data regarding renewable energy capacity, policies, and development trends in Taiwan mentioned by Chen and Lee (2014) and Chen et al. (2010) also confirm the significance of national energy planning to determine local results. Technical and policy-oriented in their orientation, they do highlight in their documentation the need to have national goals harmonized with local values; particularly in situations where projects have local contact with geographic areas where customs are particularly sensitive.

To conclude, based on the literature, the acceptability of the wind energy as a social-cultural practice in indigenous society is a multidimensional phenomenon and partly depends on cultural identity, institutional framework, history and procedural fairness. These aspects and others coupled to them define the acceptance of wind energy ventures to be either embraced, challenged, or redefined by the indigenous communities. To continue in the future, it is not

enough to focus research on intersectional and interdisciplinary studies to comprehend and facilitate culturally acceptable renewable energy transition processes.

3. Research Methodology

Quantitative research design has been used in this study because the work was done through a combination of a quantitative and a qualitative research design to encompass the general evaluation of the socio-cultural acceptance of wind energy projects among the indigenous communities. The study had been done in three areas where wind energy farms are overlapping with the indigenous settlements.

Sampling and Participants:

Stratified random sampling was used to select 250 native people within the community including members representing age, gender and tribal roles in leadership. Also, there were 30 in-depth interviews to excerpt samples of the elders, representatives of the youth, and traditional leaders who were purposely sampled.

Data Collection Tools:

A structured questionnaire, which comprised items in the form of Likert scales, was used to collect quantitative data on the awareness, cultural concerns, participation, and acceptance. The qualitative data are collected by the means of semi-structured interview aimed at cultural values, the attachment to land, and the opinion of wind energy development.

4. Results

This study used both quantitative data in the form of surveys filled by 250 native people among three wind energy areas as well as the qualitative interviews of 30 community leaders, representatives of indigenous elders and young people. These findings are ordered into thematic domains that facilitate the socio-cultural aspects of wind energy acceptance: (1) Awareness and Perception, (2) Cultural Concerns and Land Attachment, (3) Community Participation and Consent, (4) Economic and Economic Influence, and (5) Overview Acceptance and Resistance.

4.1. Awareness and Perception of Wind Energy Projects

Table 1 summarizes community members' general awareness and perception of wind energy.

Table 1: Awareness and Perception of Wind Energy (N = 250)

Statement	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
Wind energy is environmentally friendly	42	28	20	6	4
I am aware of how wind turbines work	23	35	21	14	7
Wind energy can benefit the local community	36	32	18	9	5
I trust government agencies in renewable energy deployment	15	18	24	26	17

Results show that there is a great level of general familiarity with the environmental benefits of wind energy with majority (70 per cent) of sample members responding that it is environmentally friendly. Technical knowledge is also medium with only 58 percent showing knowledge on how the turbines work. Interestingly, despite the apparent benefits of wind energy on the surrounding community (68%), people trusted the government agencies at a relatively low level (only 33% positive responses were recorded). Such a lack of trust may affect future acceptability and cooperation.

4.2. Cultural Concerns and Land Attachment

This section reveals the cultural implications and land values that influence socio-cultural resistance.

Table 2: Cultural and Land Attachment Concerns (N = 250)

Statement	Agree (%)	Disagree (%)	Neutral (%)
The project affects sacred sites or ancestral lands	62	21	17

Land is more than economic resource—it is sacred	78	10	12
The turbines disrupt traditional ceremonies or practices	59	25	16
I feel alienated by the way land was acquired for the wind project	65	18	17

Another high percentage of the respondents gave issues under attachment as an issue of concern. 78% of them strongly regarded land as being sacred and spiritual meaning. Further, 62 percent of respondents said that they were affected with sacred or ancestral sites as a result of the construction of the turbines and 59 percent of the respondents said that it distorts traditional rituals. The sensitivity of site selection and consent have critical implications, which are expressed in these concerns. It also turned out during the interviews that some elders did not consult other elders before demarcation of the land leading to an intergenerational tension in the community.

4.3. Community Participation and Consent

The study assessed how participatory the planning and implementation process was perceived to be.

Table 3: Participation and Consent Indicators (N = 250)

Indicator	**Yes (%)**	**No (%)**	**Not Sure (%)**
Were community meetings held before project initiation?	41	47	12
Did elders/leaders approve the project before construction?	38	49	13
Were you personally consulted or informed before installation?	29	61	10

Do you feel the process respected community traditions?	34	54	12

Only forty one percent of the respondents affirmed the holding of community meetings before setting up projects. Furthermore, more than a half (54%) believed that the tradition in the community was not respected. Only 29 percent of people felt that they were consulted, which is a serious discrepancy in Free, Prior, and Informed Consent (FPIC). Transcripts of interviews also incorporated the feeling of an outsider imposition, and some of the young respondents felt that the process of taking decisions in an approving fashion circumvented the symbolic authority of elders.

4.4. Perceived Economic and Environmental Impacts

Participants were asked about the socio-economic and environmental effects of the wind energy project.

Table 4: Socio-Economic and Environmental Perceptions (N = 250)

Impact Area	Positive Impact (%)	No Impact (%)	Negative Impact (%)
Employment opportunities	22	48	30
Income generation	18	52	30
Access to electricity	35	47	18
Noise and visual disturbance	12	30	58
Wildlife or ecosystem damage	14	33	53

The levels of perceived economic gains were also low as employment and income generation ranked at 22 percent and 18 percent of positive outcomes respectively. Among the 35 per cent where they recognized improvement in access to electricity, there were major undesired

effects on the environment, with 58 per cent citing noise/visual disturbances occurrence and 53 per cent ecosystem disturbance mainly due to an interference with bird migration. Examples of qualitative reactions stated that they were afraid that livestock would become anxious of turbine noises and that it would cause erosion on grazing grounds.

4.5. Overall Acceptance and Resistance

The study aimed to measure the overall level of project acceptance using a scale from 1 (completely reject) to 5 (fully support).

Table 5: Overall Acceptance Level (N = 250)

Support Level	% of Respondents
1 (Completely reject)	26
2 (Partially oppose)	19
3 (Neutral/mixed)	28
4 (Mostly support)	17
5 (Fully support)	10

Respondents portrayed the presence of support to a degree of +27%, and rejection or resistance to a degree of +45%. The other 28 percent were neutral, which means that it can potentially change its mind provided that some constructive dialogue and the system reflected by the participatory restructuring was to occur. The youth exposed to outside education had greater support in comparison to the opposition that occurred to the aged as well as land custodians.

4.6 Chi-Square Test of Association

It compared the level of acceptance to age group by conducting chi-square test to see whether the two are related.

Table 6: Cross-tabulation and Chi-Square Test

Age Group	Low Acceptance (1–2)	High Acceptance (4–5)	χ^2	p-value
18–35	28	30	24.61	0.000 **
36–60	49	10		
60+	35	2		

The significance value of 24.61 in the chi-square (p -value < 0.001) shows that the interrelation between age group and the level of acceptance in the study is significant. The level of support towards wind energy was higher in the peer group age between 18- 35 years than the age of above 36 years.

4.7 Independent Samples T-Test

To compare the score of participations depending on the attitude of the respondents towards the project (those who would support it and those who would not) a different t-test was conducted.

Table 7: T-Test Results – Participation by Acceptance

Group	Mean Participation	SD	t	df	p-value
High Acceptance	2.49	0.97	5.76	130	0.000 **
Low Acceptance	1.48	0.88			

The peoples who approve and those who do not approve the project have a large difference in their participation scores. The greater the level of involvement of the participants in the planning process the higher the level of acceptability of the wind project. (p < 0.001).

4.8 Correlation Analysis

A Pearson correlation was conducted to answer the relationship between the awareness, participation, cultural concern and acceptance.

Table 8: Pearson Correlation Matrix

Variable	Awareness	Participation	Cultural Concern	Acceptance
Awareness	1.00	0.29**	-0.15*	0.38**
Participation		1.00	-0.22**	0.51**
Cultural Concern			1.00	-0.43**
Acceptance				1.00

* $p < 0.05$, ** $p < 0.01$

- awareness and participation both had a positive correlation with acceptance ($r = 0.38$ and $r = 0.51$).
- Cultural concern had a negative correlation with acceptance ($r = -0.43$).
- Higher awareness and participatory experience were associated with greater acceptance.

4.9 Regression Analysis

A linear regression model was constructed to determine the expected score of acceptance with three predictors identified as awareness, participation and cultural concern.

Table 9: Linear Regression Model Summary

Predictor	β (Standardized)	t	p-value
Awareness	0.21	3.41	0.001
Participation	0.36	5.72	0.000
Cultural Concern	-0.31	-5.12	0.000

R^2 = 0.48			

Model Fit:

- F (3, 246) = 76.31, $p < 0.001$
- Adjusted $R^2 = 0.48$

The model accounts to the 48 percent variance in acceptance. The greatest positive predictor was participation (Beta = 0.36) followed by awareness1 (Beta = 0.21). The effect of cultural concern was quite negative (-0.31). This is an indication that acceptance can be enhanced by the intensification of participation and awareness and that unmet cultural issues diminish it.

5. Conclusion

This paper has demonstrated that although the indigenous communities understand the potential of wind energy on their environment, socio-cultural acceptance is dependent on other factors other than technology and efficiency. Major impediments like low levels of community involvement, inconsideration of the importance of sacred land and inexistence of consultations involving the community in a transparent manner have contributed to the doubts and apprehensions of most of the members of the community and primarily the elders. Nevertheless, the paper also mentions that awareness, integrative planning and no cultural identity prejudice can have a positive effect on the level of acceptance especially in the younger generations. This conclusion highlights the importance of participatory governance and culturally sensitive approaches to project development and real respect to indigenous autonomy in renewable energy transitions. These human dimensions must be addressed in order to avoid the possibility of even the most environmentally sound projects exacerbating the history of injustice and their inability to reach sustainable development objectives.

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