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Quantitative Evaluation on Community Acceptance of Offshore Wind Farms: Evidence from Questionnaire Survey of Iki City

by

Kengo IWATA, Ph.D. Student, Graduate School of Global Environmental Studies,
Kyoto University
(Phone: +81-75-753-9167 /Email: iwata.kengo.66r@st.kyoto-u.ac.jp)
Yoshiaki USHIFUSA, Professor, Faculty of Economics, The University of Kitakyushu

1. Introduction

Iwata et al. (2022) mainly analyzed the preferences of Japanese citizens for offshore wind farms (OWF). Using a mixed logit model, we analyzed whether an antagonistic structure, such as that seen in the green vs. green debate, emerged. However, no evidence of such a structure was found based on survey data used in Iwata et al. It is not sufficient to analyze the general public's preferences for OWF in Japan in order to understand the social acceptance of OWF. Rather, it is necessary to analyze the attitudes and values, i.e., *community acceptance*, toward OWF in the regions where OWF projects are being considered. Furthermore, in order to understand the determinants of these preferences from multiple perspectives, hypotheses testing is needed to clarify the reasons for the public's preferences for OWF. The objective for the research was to understand the reasons for citizens' preferences for OWF from multiple perspectives, including the determinants of the preference. The result of conducting a questionnaire survey of the citizens of *Iki City* and analyzing the data obtained suggests that citizens were mainly concerned about "marine pollution due to collapse and oil leakage caused by typhoons and tsunamis"; "impact on local industries such as fishing"; and "removal of wind turbines after the project is completed", with "*procedural justice*" and "*trust*" among community acceptance being important factors for these concerns. Additionally, it was revealed that local residents' expectations and concerns about OWF may not be motivated by NIMBYism, but may take public interest into account in a broader sense.

The remainder of this paper is organized as follows: Section 2 provides a literature review related to this study and establishes research questions and hypotheses based on the review. Section 3 provides an

overview of Iki City, the study site. Section 4 provides an overview of the questionnaire survey. Section 5 presents the results obtained from the data analysis. The final section concludes with a discussion of the results and policy implications.

2. Literature Review

In this section, we review the literature related to this paper and accordingly set the questions and hypotheses for this study.

2.1 NIMBYism, Place Attachment

NIMBY(ism) is an abbreviation of “Not-In-My-Backyard”, which means that people acknowledge the need for renewable energy facilities for social and public benefits, but do not want them in their own backyards (i.e., their residential areas or living areas). The concept acknowledges the need for facilities for social and public benefits, but rejects installation in one's own backyard (i.e., one's residential or living area) (Kumazawa, 2017).

However, previous studies have shown that NIMBY alone do not fully explain local receptivity to wind farms (Jones and Eiser 2009; Swofford and Slattery 2010; Wolsink 2006; Devine-Wright 2005; Ek 2005). Since NIMBY is based on so-called *Self-Interest* motives, even if suitable sites for wind power facilities are identified from a social perspective, individuals or communities may vote against the project and thus prevent it from being realized if they are disadvantaged. However, there is an emerging academic consensus that local opposition to wind power cannot be explained solely by self-interest-based motivations.

This line of argument is called Beyond-NIMBYism, and one representative argument is that it is the result of considering broader social opportunity costs, rather than simple self-interest. For example, Söderholm et al. (2007) found in a Swedish study that citizens who preferred "environmental benefits" over "economic benefits" had more positive attitudes toward wind power than those who resisted subsidies or taxes on wind power. These studies indicate that opposition to wind power is not only based on self-interested consequences of local events (e.g., landscape, ecosystem, noise), but that citizens consider social opportunity costs with respect to wind power planning and implementation in the process of forming their preferences.

As another perspective of Beyond-NIMBYism, Devine-Wright and Howes (2010) developed an argument using the concept of “*Place Attachment*”. Place attachment can be defined as a complex

phenomenon involving emotional ties between individuals or groups and the familiar places they live in or have visited, such as their homes or neighborhoods (Low &, Altman 1992). the region compared the reactions/attitudes to an OWF that arose in a coastal town with the responses/attitudes of neighboring cities to a parallel development. Llandudno is a well-known seaside town with a thriving tourism industry, a site of geological/archaeological importance, and a famous scenic spot. Colwyn Bay, on the other hand, is a town that is not well received by the local population and considered “run-down” and “forgotten”. These differing values of place were important determinants in shaping reactions and attitudes toward offshore wind turbines. The majority of Llandudno residents considered offshore wind turbines to be a major threat to the town and “incredibly harmful”. Meanwhile, the residents of Colwyn Bay did not perceive the "industrialization" brought about by the offshore wind turbines so negatively. In other words, this study demonstrated that "place attachment" and social acceptance are inversely correlated. This is an important point of view that cannot be interpreted only through the conventional simple analytical lens of NIMBYism. However, a case study in Pennsylvania, USA, showed that "place attachment" was largely uncorrelated with wind power acceptance (Jacquet and Stedman 2013). No academic consensus has yet been reached on the relationship between "place attachment" and social acceptability. Further research on the influence of "place attachment" on acceptance will be needed in the future.

2.2 Triangle of Social Acceptance

Next, the three dimensions (triangles) of social acceptance proposed by Wüstenhagen et al. and *“Community acceptance”* in particular are explained in detail, as they are important for this study.

Although "social acceptance" is a term frequently used in academic and practical contexts, it has not been clearly defined. Therefore, Wüstenhagen et al. distinguish three dimensions of social acceptance as shown in Figure 1: socio-political acceptance; community acceptance; and market acceptance. The distinction between socio-political acceptance, community acceptance, and market acceptance has contributed to the clarification of the definition of social acceptance (Wüstenhagen et al. 2007).

Figure 1 The triangle of social acceptance of renewable energy innovation.
(Wüstenhagen et al. 2007)

Since this study targets the citizens of Iki City, we consider the issue of community acceptance to be the most important of the three dimensions of social acceptance. Community acceptance refers to the decision-making and specific acceptability of the installation of renewable energy projects by local stakeholders, especially residents and municipalities (Ibid., pp 2685). Wüstenhagen et al. also emphasize three factors and their relative importance in this community acceptance: *procedural justice*, *distributive justice*, and *trust*.

"Procedural justice" refers to fair procedures for conducting business. Here, it is important whether there is a fair decision-making process that gives diverse stakeholders the opportunity to participate. In some areas, it is possible to proceed with the project in collaboration with local stakeholders, but in other areas, the project may face opposition from the beginning of the planning process, so it is often not a straightforward process. Even when what is implemented in a wind power project is highly beneficial to the community, there may be unintended consequences if the appropriate steps are not taken (Motosu, 2016).

"Distributive justice" is the question of how costs/risks and benefits are distributed. Taking wind power generation facilities as an example, while there is concern about the environmental impact of facility construction, wind power generation offers benefits to the global environment in terms of electricity

sales and reduction of greenhouse gas emissions. However, these benefits tend to be enjoyed by companies outside the region. As a result, the costs/risks are borne by the region while the benefits flow out of the region, creating an unreasonable and unconvincing situation for the region (Motosu, 2016). Problems of distributive justice within a region can also be pointed out, i.e., when decisions are made that are perceived to benefit some people in the community and victimize others. Thus leading to protests, deterioration of relationships, and community division (Gross, 2007).

"Trust" is the degree to which local citizens and residents trust the information and decisions communicated by investors and extra-regional actors. Trust is an important issue in all facility location issues (Wüstenhagen et al. 2007, pp 2687). Perceived justice (fairness) depends largely on how potential risks are defined, how information about those risks is provided, and who and how they are managed (Owens, 2004). Openness in the business process, flexibility in the decision-making process, and thorough disclosure of information are important to enhance trust, especially when the entity pursuing the project is external to the community (Wüstenhagen et al. 2007, pp 2687). Furthermore, risk research has identified the "asymmetry principle". This suggests that trust is fragile because it usually grows slowly but can be destroyed rapidly (Slovic, 1993).

2.3 Research Questions and Hypotheses

Based on the above, the research questions for this study are the following. Are citizens' preferences for OWF due to NIMBYism or are they related to "place attachment"? Furthermore, does it have much to do with the issues of "procedural justice", "distributive justice", and "trust" included in community acceptance? In response to this research question, the hypotheses were formulated as follows.

Local residents' preferences for OWF are mainly based on
(1) *NIMBYism*.
(2) "*Place attachment*"
(3) "*Procedural justice*"
(4) "*Distributive justice*"
(5) "*Trust*"

3. Surveyed sites

This section provides an overview of Iki City, the survey site. Iki City was established on March 1, 2004 through the merger of four towns: Gonoura, Katsumoto, Ashibe, and Ishida. Facing the Genkai Sea, Iki City is located 76 kilometers northwest of the Port of Hakata in Fukuoka City, with the local port being

the Gonoura Port (Figures 2 and 3). The current population is 25,060 and the number of households is 11,582 (as of September 2022). The climate is warm and maritime, influenced by the warm Tsushima Current. Compared to northern Fukuoka Prefecture at the same latitude, it is cooler in summer and slightly milder in winter (Iki City, Nagasaki Prefecture, 2022).

Figure 2 Geography of Iki City (Iki City, Nagasaki Prefecture, 2022)

Figure 3 Geography of Iki City (Iki City, Nagasaki Prefecture, 2022)

Iki Island is located in the Genkai Sea, and is rich in sea urchin, turban shell, tuna, and yellowtail. On land are mainly produced agriculture, rice, strawberries, asparagus, leaf tobacco, and beef cattle (Iki beef). Iki also has a thriving tourism industry. Because of its easy accessibility, which is only about 60 minutes by high-speed boat from the Port of Hakata in Fukuoka Prefecture, many tourists visit Iki throughout the year. Especially in summer, many parents, children, and young people visit from all over Japan, including northern Kyushu. Iki is also described as "Iki Island", the fifth birthplace in the myth of the creation of the country in Kojiki, and there are more than 150 shrines scattered around the island, so the entire island is said to be a power spot (Iki Sightseeing Navi, 2022). “Sakyo-bana” at the end of the Hachiman Peninsula located on the east coast (Figure 4) and “Saru-iwa” at the tip of the Kurosaki

Peninsula (Figure 5) are famous as representative scenic spots of Iki.

Figure 4 Sakyo-bana (photo by author)

Figure 5 Saru-Iwa (photo by author)

4. Methodology

In this section, the outline of the questionnaire survey is described with reference to Iki City (2021). The survey was conducted in September 2021 by the Iki City SDGs Future Division, which is the main body of the survey, commissioned by Kokusai Kogyo Co. The survey targets citizens of Iki City, aged 20 to 80, who are registered as residents of Iki City by the end of August 2021. The number of respondents was 1,008, and citizens were sampled by random sampling from the Basic Resident Ledger. The survey period was from September 17 to October 5, 2021, and data were collected by mail distribution and collection. 455 cases were collected out of 1,008 distributed, resulting in a collection rate of 45.1%. In this study, in order to verify the research questions and hypotheses presented in section 2.3, we used the data from the questionnaire survey conducted in Iki City and conducted a cross tabulation analysis.

5. Results

5.1 Individual Attributes

Table 1 shows the results of the gender tabulation. The male-female ratio of the respondents was approximately 50% each, indicating that there is almost no gender bias in the sample collection. Table 2 shows the results by age. The largest proportion of respondents were in their 60s (20%) and the smallest proportion of respondents were in their 20s (9.89%). Overall, however, there is not much variation among the age groups, and the sample was able to be drawn from all age groups.

Table 1. Gender tabulation

Q12	Freq.	Percent
Female	229	50.33
Male	223	49.01
Invalid responses	3	0.66
Total	455	100

Table 2. Composition by Age Group

Q11	Freq.	Percent	Cum.
20s	45	9.89	9.89
30s	73	16.04	25.93
40s	83	18.24	44.18
50s	78	17.14	61.32
60s	91	20	81.32
70s	82	18.02	99.34
Invalid responses	3	0.66	100
Total	455	100	

Table 3 shows the results for residential areas. The largest percentage of households is in Gonoura Town, at 38.46%. The lowest percentage is 14.07% in Ishida Town. Overall, however, there is no significant variation among the residential districts, and the sample is drawn from all districts. Table 4 summarizes the number of years of residence of the households. The largest share (46.37%) of the respondents had

lived in their households for more than 20 years, while 38.02% had lived in their households "since birth". The total of "less than 1 year" and "more than 1 year to less than 10 years" was 9.01%, indicating that many households have remained in Iki City for a long time. Since place attachment is known to correlate with the length of residence (Brown & Perkins, 1992), we use this residence duration data as a proxy to test hypothesis 2). Table 5 summarizes the data by occupation. Salaried workers in the private sector (company employees, company directors, etc.) accounted for the largest share (27.25%), followed by part-time workers (12.75%), government employees and teachers (9.89%), and farmers (9.89%). Although there was some variation by occupation, this is not considered to be a major problem in this survey.

Table 3. Results for residential areas

Q13	Freq.	Percent
Katsumoto-cho	101	22.2
Ishida-cho	64	14.07
Ashibe-cho	113	24.84
Gonoura-cho	175	38.46
Invalid responses	2	0.44
Total	455	100

Table 4. Duration of residence in Iki City

Q14	Freq.	Percent
Less than 1 year	6	1.32
More than 1 year to less than 5 years	24	5.27
More than 5 years to less than 10 years	11	2.42
10 years to less than 20 years	28	6.15
More than 20 years	211	46.37
Since birth	173	38.02
Invalid responses	2	0.44
Total	455	100

Table 5. Composition by occupation

Q15	Freq.	Percent
Company employee, company director, etc.	124	27.25
Part-time job	58	12.75

Public employee, teacher	45	9.89
Agriculture	45	9.89
Pensioner	39	8.57
Self-employed	38	8.35
Housewife/Househusband	29	6.37
Unemployed	27	5.93
Fishing industry	19	4.18
Student	5	1.1

5.2 Awareness of OWF

Question 3 of the survey asked about awareness of OWF. The question asked, “Do you know about offshore wind power generation, in which wind turbines are installed not on land but on the sea?”, and 9.23% of respondents answered "Well aware", while 24.62% answered "Aware", for a total of 33.85% (Table 6, Figure 6). In contrast, 38.9% had "Somewhat aware" and 24.18% had "Don't know", for a total of 63.08%.

Table 6. Awareness of OWF

Q31	Freq.	Percent
Well aware	42	9.23
Aware	112	24.62
Somewhat aware	177	38.9
Don’t know	110	24.18
No answers	14	3.08
Total	455	100

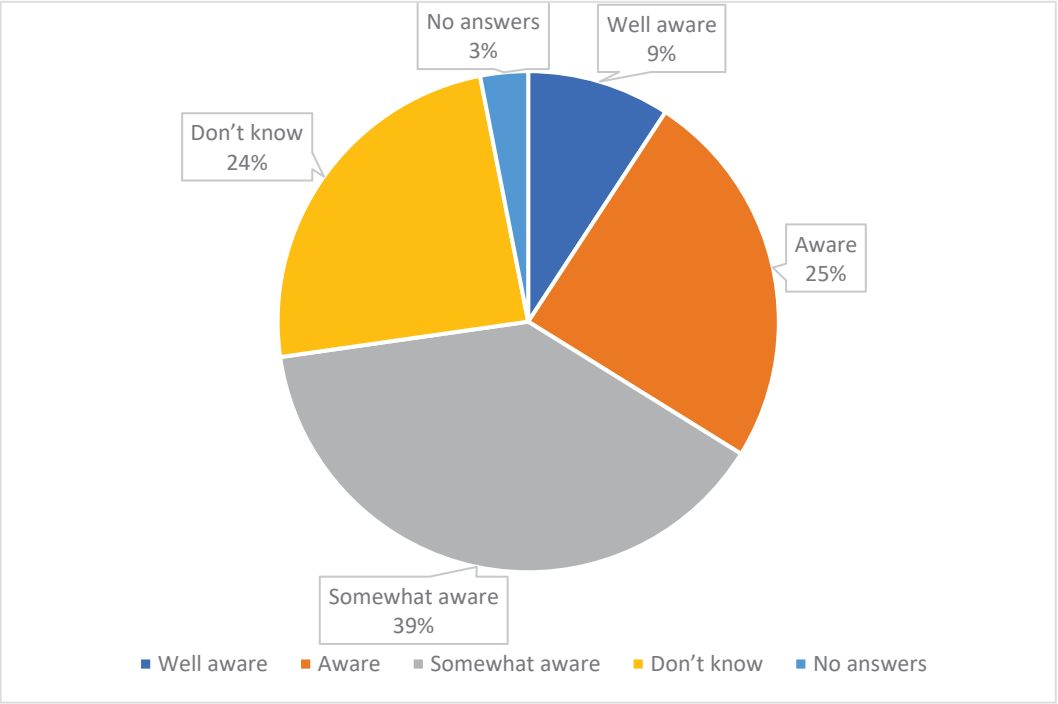

Figure 6. Awareness of OWF

Next, a crosstabulation analysis of OWF awareness and age structure revealed that the largest percentage of respondents in their 70s (15.85%) answered that they were "familiar" with it, while the largest percentage of respondents in their 60s (38.46%) answered that they were "mostly familiar" with it. In contrast, those in their 20s (46.67%) were the most likely to say they did not know about it (Table 7 in Appendix). Next, a crosstabulation analysis of the relationship between the level of awareness of OWF and gender revealed that a higher percentage of males (15.25% and 33.63%, respectively) were familiar with OWF, while females (34.5%) were the most likely to respond "don't know" (Table 8 in Appendix). Furthermore, a crosstabulation analysis of the degree of awareness of OWF and the length of residence revealed that the percentages of respondents who answered they were familiar with OWF were relatively high for "since birth" and "20 years or more" (10.4% and 9.48%, respectively), while those who answered "don't know" were higher for "less than 1 year" and "1 to 5 years" (50% and 9.48%, respectively). The percentages of respondents who answered "don't know" were higher for those who had been in the "less than 1 year" and "1-5 years" categories (50% and 41.67%, respectively) (Table 9 in Appendix). These results suggest that gender (male), older age, and longer length of residency in the area imply a higher level of awareness of OWF power generation.

5.3 Expectations from the introduction of OWF

In Q4-1, we asked what is expected from the introduction of OWF power generation. When asked, “What do you think is expected from the introduction of OWF?”, most expected a "(1) contribution to

global warming countermeasures and CO_2 emission reduction", with a total of 77.58% of the respondents selecting “high expectations” or “expectations”. This was followed by "(8) can be used as a subject for environmental education" (67.48%), "(2) securing an energy supply source that does not rely on imports" (64.4%), and "(10) lowering electricity rates for local residents" (48.13%). In contrast, the least expected was "(7) expansion of human and material exchange with other regions through electricity" at 31.42% (Figure 7).

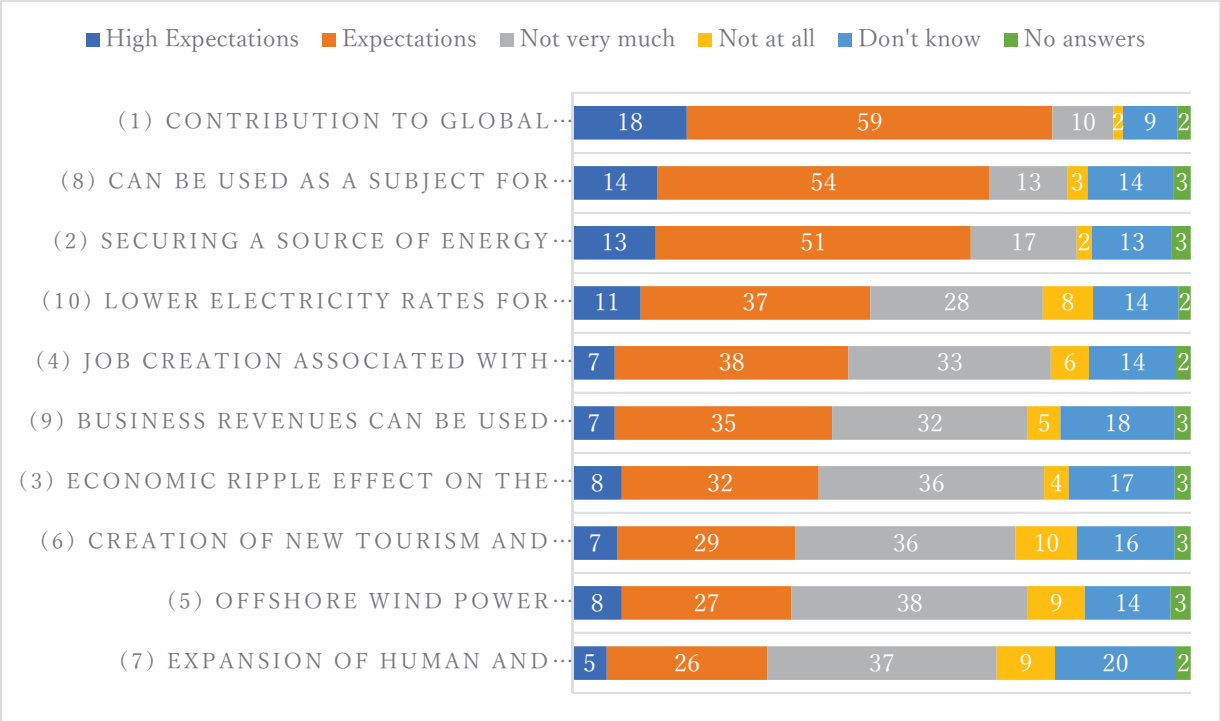

Figure 7. Expectations for OWF (%)

A cross tabulation analysis of "contribution to global warming countermeasures and CO_2 emission reduction" and "age", "gender", "place of residence", and "years of residence" was conducted. The results showed that "age", "place of residence", and "years of residence" had no influence on "contribution to global warming countermeasures and CO_2 emission reduction", but there were some characteristics in terms of “gender” (Table 10 in Appendix). Males had a relatively high percentage of "very high expectations", but at the same time, the percentage of "low expectations" was also high. Next, we conducted a cross tabulation analysis of "securing energy supply sources that do not rely on imports" and "age", "gender", "place of residence", and "years of residence" respectively. The results showed that "age", "place of residence", and "years of residence" had no effect on "securing an energy supply source that does not rely on imports", but "gender" had a characteristic: males tended to expect “securing an energy supply source that does not rely on imports” (Table 11 in Appendix). Next, we conducted a cross

tabulation analysis of "creation of jobs associated with installation and maintenance of wind turbines" and "age", "gender", "place of residence", and "years of residence" respectively. The results showed that the younger the age of the respondents, the more they expect the creation of jobs (Table 12 in Appendix). Furthermore, the results showed that the younger the respondents were, the more they expected the OWF to be used as a tourist resource (Table 13 in Appendix). Young women were more likely to have high expectations for the “use as a subject for environmental education” (Table 14 in Appendix). Lastly, "reduction of electricity rates for local residents" was characterized by "gender" and "length of residence" (Table 15 in Appendix). The fact that 12.1% of the respondents chose "no expectations" indicates that men tend to have lower expectations for the reduction of local electricity rates than women. The tendency of households with shorter residence periods to expect lower electricity rates was also found.

5.4 Concerns about the introduction of OWF

Question 4-2 asked respondents about their concerns regarding the introduction of OWF (Figure 8). When asked, “What are your concerns and worries about the introduction of OWF?”, the most common concern was "(7) Marine pollution due to collapse or oil leakage caused by typhoons or tsunamis" accounting for 79.2% of the total of "Very concerned" and "Somewhat concerned" responses. This was followed by "(6) Impact on local industries such as fishing" (64.62%), "(8) Removal of wind turbines after project completion" (63.29%), and "(10) Increase in electricity rates" (61.98%). In contrast, "(2) Loss of the existing landscape" was a relatively low concern, with a total of 40.22% of respondents selecting “Very concerned” or “Somewhat concerned”.

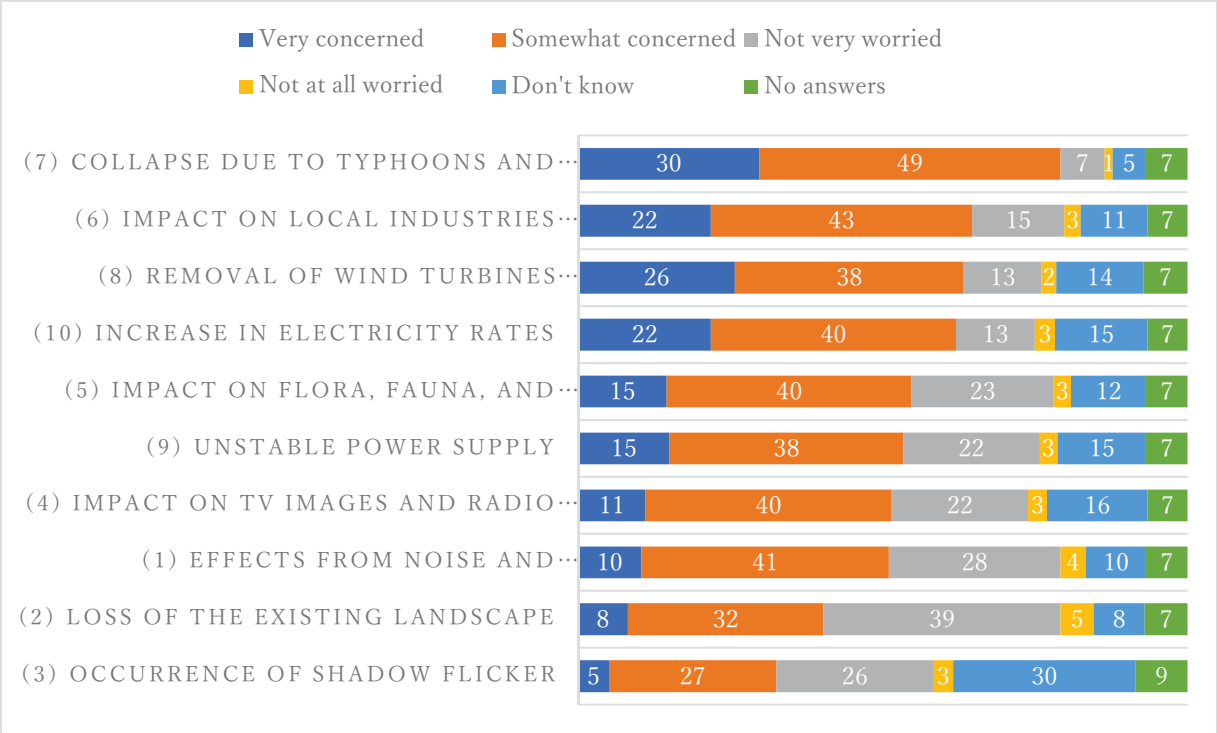

Figure 8. Concerns about OWF (%)

Next, a crosstab analysis was conducted on the relationship between "will damage the existing landscape" and "age", "gender", "place of residence", and "years of residence", respectively. The results showed that "age", "gender", and "place of residence" had no effect on the "loss of the existing landscape", but it is possible that those who have lived in the area for shorter periods of time are more concerned about the loss of the landscape (Table 16 in Appendix). The highest percentage of "very concerned" was 33.33% for respondents who had lived in the house for less than one year. However, the sample size of the respondents who had lived in the area for a short period of time was small, so a more detailed survey is needed to clarify this issue. Next, a cross tabulation analysis of "impact on flora and fauna such as birds and ecosystems" and "age", "gender", "place of residence", and "years of residence" revealed that respondents in their 30s, female respondents, and those with shorter residence periods tended to be more concerned about the impact on ecosystems (Table 17 in Appendix). Next, a cross tabulation analysis was conducted between "impact on local industries such as fishing" and "age", "gender", "place of residence", and "years of residence", respectively. The results showed that those in their 30s who lived in Katsumoto-cho and Ashibe-cho and had lived in Iki City for a longer period of time tended to be more concerned about the impact on the fishing industry (Table 18 in Appendix). Next, we conducted a cross tabulation analysis of "marine pollution due to collapse and oil leakage caused by typhoons and tsunamis" and "age", "gender", "place of residence", and "years of residence", respectively. The results showed that there was no effect of "age", "place of residence", and "length of residence" on

"marine pollution due to collapses and oil leaks caused by typhoons and tsunamis", but women tended to be very concerned about the effects of these factors (Table 19 in Appendix). Next, analysis of the relationship between "removal of wind turbines after the project" and "age", "gender", "place of residence", and "length of residence" indicated that the respondents in Katsumoto and Ashibe tended to be concerned about it (Table 20 in Appendix). Since both Katsumoto-cho and Ashibe-cho are areas with a thriving fishing industry, it is possible that they may be concerned about whether wind turbines will be responsibly removed in the future. Finally, a crosstab analysis of the relationship between the "increase in electricity prices" and each individual's attributes revealed that the younger the respondents were, the more concerned they tended to be (Table 21 in Appendix).

6. Discussion and Conclusion

This study aimed to understand citizens' preferences for OWF, including their determinants, by analyzing the questionnaire data from multiple perspectives. The following is a summary of the results of the crosstabulation analysis and a discussion based on the results.

First, regarding the level of awareness of OWF, the total of "well aware" and " aware" was about 34%, which is high compared to the level of awareness in Japan (Iwata et al. 2022). Furthermore, the crosstabulation results suggest that gender (male), older age, and longer length of residency in the area, the higher their awareness of OWF generation tends to be. This seems to be a result of increased awareness as a stakeholder due to the possibility of offshore wind turbines being constructed around the island. This may be the result of a sense of worry as a concerned party as well as an intrinsic motivation to obtain correct knowledge. In addition, it is highly likely that "place attachment" and "awareness of being a party" are correlated with each other.

Next, the most expected was "contribution to global warming countermeasures and CO_2 emission reduction", which was selected by 77.6% of the respondents when "high expectations" and "expectations" were combined. This result cannot be explained by NIMBYism, which is based on self-interest as a basic motivation. This result indicates that the citizens living on the islands are as conscious of the global and macro-public interests as the general Japanese public, or even more so. In the cross tabulation, a distinctive feature of the results is found in the "gender" category, where a high percentage of males answered "high expectations" while a high percentage answered "no expectations", showing a polarization of opinions. This may be explained by the "skepticism caused by new technologies" argument (Assefa and Frostell 2007). With regard to new energy technologies, a "lack of familiarity" may lead to skepticism. That is, there may be a split between interest in offshore wind as a new

technology and the perception that, because it is a new technology, the extent to which it can contribute to CO_2 reduction is still completely unknown.

The second item of expectation is "can be used as a subject for environmental education". The total of "very promising" and "promising" was 67.4%. The crosstabulation showed that young female respondents were more likely to have high expectations. This result is also interesting. Iki City has a high awareness of environmental policy, as evidenced by the establishment of a council in 2009 as part of the "Iki City Global Warming Prevention Measures" and the issuance of a "climate emergency declaration" in 2019. This background might also have influenced the results. The fact that young women have higher expectations may also indicate their awareness of the importance of environmental education as part of their children's education.

The third expectation is "securing energy supply sources that do not rely on imports". The total of "very hopeful" and "hopeful" was 64.4%. The results also showed that males tended to have higher expectations for this item. This is because this survey was conducted in September 2021, but if a similar survey had been conducted in November 2022, when a global situation such as the Ukraine crisis and the depreciation of the yen are in progress, it might have become the most important issue of concern. In the current unstable international situation, energy self-sufficiency will become more important.

Next, regarding "concerns about the introduction of OWF" the most common concern was "marine pollution due to collapse or oil leakage caused by typhoons or tsunamis" accounting for 79.2% of the total of "very concerned" and "concerned". The crosstabulation revealed that women tend to be very concerned. The fact that Japan has more disasters such as typhoons and earthquakes than other countries and that disasters are becoming more severe due to the effects of climate change can be cited as the context or reason for this result.

The second most important concern is the "impact on local industries such as fishing" with a total of 64.7% of the respondents selecting "very concerned" or "somewhat concerned". As expected, the main stakeholders in OWF are fishermen, and it is understandable that they are concerned about the impact of the construction of offshore wind turbines on the fishing industry. Although research has shown that the construction of offshore wind turbines will not affect fish catches (Shimada et al. 2022), further research, discussion, and consensus-building will be essential to this. The crosstabulation results also show that residents of working age in their 30s who live in Katsumoto-cho and Ashibe-cho and who have lived in Iki City for a longer period of time tend to be more concerned about the effects on the fishing industry. The fact that both Katsumoto-cho and Ashibe-cho have a thriving fishing industry and that the working-age residents in their 30s are more concerned does not contradict our prediction.

The third concern is the "removal of wind turbines after the project is completed" with 63.3% of the respondents selecting "very concerned" or “somewhat concerned”. Considering that "impact on local industries such as fishing" was selected by 21.8% of the respondents, it can be said that the respondents are very concerned about the "removal of wind turbines after the completion of the project". This result suggests that many citizens are concerned about safety and procedural justice in the long-term operation of the wind turbines, in addition to the worries regarding “collapse due to typhoons and tsunamis” and “marine pollution due to oil leakage”. As mentioned above, both of these areas have a thriving fishing industry, so it is possible that many citizens are concerned about whether the wind turbines will be removed responsibly in the future.

In contrast, the item of relatively low concern was "damage to the landscape" with a combined total of 40.2% of the respondents being “very concerned” or “somewhat concerned”. Since landscape and distance from wind turbines are always the top topics of concern regarding social acceptance and consensus building for OWF overseas, this result does not support the prediction or previous studies. For local Iki residents, the priority of concern about the possibility of the landscape around the island being altered by offshore wind turbines is not very high, but this does not mean that the landscape or the distance to build offshore wind turbines can be neglected. A similar survey of tourists would likely yield different results. Also, if a more realistic image of how the wind turbines will be constructed is obtained, this result may change. Further regional surveys will be required in the future. The crosstabulation results suggest that residents who have lived in the area for a shorter period of time may be more concerned about the destruction of the landscape, but if there is a positive correlation between the length of residence and concern about the landscape, it may be due to place attachment. However, in this study, no relationship that could be considered "place attachment" was found.

The results of the hypothesis testing were as follows:

Hypothesis (1) is rejected: It is highly likely that local citizens consider the broad public interest rather than represent NIMBYism.

Hypothesis (2) is rejected: No distinctive differences were found between the time of residence, which is a proxy variable for "place attachment", and the various items, based on the results of the crosstabulations.

Hypothesis (3) is supported: The results indicate that citizens place importance on the fairness of procedures and project processes.

Hypothesis (4) is not clear: The survey data did not reveal justice (fairness) in terms of cost and risk/benefit.

Hypothesis (5) is supported: The results indicate that communication and trust between the project

proponent/municipality and citizens are very important for the construction of offshore wind turbines and for the long-term perspective after the construction of the turbines.

When discussing community acceptance of wind power generation, it should be emphasized that in Japan, local residents consider not only NIMBYism but also public benefits and social opportunity costs in a broader sense. A trend, which have also been observed in preference studies in other countries. However, this study is the result of a case study in Iki City, and further research is needed to determine the external validity, i.e., whether the results are similar in other regions where offshore wind turbines may be built.

Finally, as for policy and practical implications, we would like to highlight the following two points. First, the cross-tabulation analysis of the level of awareness revealed that the level of awareness among young people is low. Since OWF has the potential to become the next generation energy source, the government needs to promote efforts to make the younger generation aware of it. Second, if "trust" and "procedural justice" in community acceptance are lacking, it is highly likely that consensus building will not progress and OWF projects will not succeed. It is clear that citizens place particular importance on "trust", and it is therefore critical for government and project proponents to carefully communicate and disclose information to the citizens to foster a sense of trust/security, taking into consideration the long-term effects after the offshore wind turbines are constructed.

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Appendix

Table 7. Awareness of OWF × Age

	Well aware	Aware	Somewhat aware	Don't know	Invalid responses	Total
20s	2	3	19	21	0	45
(%)	4.44	6.67	42.22	46.67	0	100
30s	3	17	26	26	1	73
(%)	4.11	23.29	35.62	35.62	1.37	100
40s	8	12	42	20	1	83
(%)	9.64	14.46	50.6	24.1	1.2	100
50s	5	21	34	15	3	78
(%)	6.41	26.92	43.59	19.23	3.85	100
60s	11	35	32	9	4	91
(%)	12.09	38.46	35.16	9.89	4.4	100
70s	13	23	22	19	5	82
(%)	15.85	28.05	26.83	23.17	6.1	100
Invalid responses	0	1	2	0	0	3
(%)	0	33.33	66.67	0	0	100
Total	42	112	177	110	14	455
(%)	9.23	24.62	38.9	24.18	3.08	100

Table 8. Awareness of OWF × Gender

	Well aware	Aware	Somewhat aware	Don't know	Invalid responses	Total
Female	8	36	101	79	5	229
(%)	3.49	15.72	44.1	34.5	2.18	100
Male	34	75	74	31	9	223
(%)	15.25	33.63	33.18	13.9	4.04	100
Invalid responses	0	1	2	0	0	3
(%)	0	33.33	66.67	0	0	100
Total	42	112	177	110	14	455
(%)	9.23	24.62	38.9	24.18	3.08	100

Table 9. Awareness of OWF × Duration of residence in Iki

	Well aware	Aware	Somewhat aware	Don't know	Invalid responses	Total
Less than 1 year	0	1	2	3	0	6
(%)	0	16.67	33.33	50	0	100
More than 1 year to less than 5 years	2	4	7	10	1	24
(%)	8.33	16.67	29.17	41.67	4.17	100
More than 5 years to less than 10 years	0	5	3	3	0	11
(%)	0	45.45	27.27	27.27	0	100
10 years to less than 20 years	2	3	12	11	0	28
(%)	7.14	10.71	42.86	39.29	0	100
More than 20 years	20	52	87	47	5	211
(%)	9.48	24.64	41.23	22.27	2.37	100
Since birth	18	47	64	36	8	173
(%)	10.4	27.17	36.99	20.81	4.62	100
Invalid responses	0	0	2	0	0	2
(%)	0	0	100	0	0	100
Total	42	112	177	110	14	455
(%)	9.23	24.62	38.9	24.18	3.08	100

Table 10. Contribution to global warming countermeasures × Gender

	High expectations	Not very much	Don't know	Not at all	Expectations	No answers	Total
Female	30	16	27	2	148	6	229
(%)	13.1	6.99	11.79	0.87	64.63	2.62	100
Male	53	28	12	5	121	4	223
(%)	23.77	12.56	5.38	2.24	54.26	1.79	100
Invalid responses	1	1	1	0	0	0	3
(%)	33.33	33.33	33.33	0.00	0.00	0	100
Total	84	45	40	7	269	10	455
(%)	18.46	9.89	8.79	1.54	59.12	2.2	100

Table 11. Securing an energy supply source × Gender

	High expectations	Not very much	Don't know	Not at all	Expectations	No answers	Total
Female	22	45	39	3	113	7	229
(%)	9.61	19.65	17.03	1.31	49.34	3.06	100
Male	39	32	19	8	119	6	223
(%)	17.49	14.35	8.52	3.59	53.36	2.69	100
Invalid responses(%)	0	33.33	33.33	0.00	0.00	33.33	100
Total	61	78	59	11	232	14	455
(%)	13.41	17.14	12.97	2.42	50.99	3.08	100

Table 12. Job creation × Age

	High expectations	Expectations	Not very much	Not at all	Don't know	No answers	Total
20s	5	20	11	1	8	0	45
(%)	11.11	44.44	24.44	2.22	17.78	0	100
30s	3	33	19	6	10	2	73
(%)	4.11	45.21	26.03	8.22	13.7	2.74	100
40s	6	29	35	2	11	0	83
(%)	7.23	34.94	42.17	2.41	13.25	0	100
50s	7	31	24	4	10	2	78
(%)	8.97	39.74	30.77	5.13	12.82	2.56	100
60s	4	34	30	11	12	0	91
(%)	4.4	37.36	32.97	12.09	13.19	0	100
70s	6	24	29	4	12	7	82
(%)	7.32	29.27	35.37	4.88	14.63	8.54	100
Invalid responses	0	1	1	0	1	0	3
(%)	0	33.33	33.33	0	33.33	0	100
Total	31	172	149	28	64	11	455
(%)	6.81	37.8	32.75	6.15	14.07	2.42	100

Table 13. OWF landscape will become tourism resource × Gender

	High expectations	Not very much	Don't know	Not at all	Expectations	No answers	Total
Female	20	80	38	13	70	8	229
(%)	8.73	34.93	16.59	5.68	30.57	3.49	100
Male	16	93	24	29	55	6	223
(%)	7.17	41.7	10.76	13.00	24.66	2.69	100
Invalid responses	0	1	1	0	0	1	3
(%)	0	33.33	33.33	0.00	0.00	33.33	100
Total	36	174	63	42	125	15	455
(%)	7.91	38.24	13.85	9.23	27.47	3.3	100

Table 14. For environmental education × Age

	High expectations	Not very much	Don't know	Not at all	Expectations	No answers	Total
20s	10	3	8	0	24	0	45
(%)	22.22	6.67	17.78	0.00	53.33	0	100
30s	16	5	6	1	43	2	73
(%)	21.92	6.85	8.22	1.37	58.90	2.74	100
40s	12	6	13	4	48	0	83
(%)	14.46	7.23	15.66	4.82	57.83	0	100
50s	9	12	11	0	44	2	78
(%)	11.54	15.38	14.1	0.00	56.41	2.56	100
60s	9	17	10	6	49	0	91
(%)	9.89	18.68	10.99	6.59	53.85	0	100
70s	6	13	14	4	37	8	82
(%)	7.32	15.85	17.07	4.88	45.12	9.76	100
Invalid responses	0	1	1	0	0	1	3
(%)	0	33.33	33.33	0.00	0.00	33.33	100
Total	62	57	63	15	245	13	455
(%)	13.63	12.53	13.85	3.30	53.85	2.86	100

Table 15. Lower electricity rates × Gender

	High expectations	Not very much	Don't know	Not at all	Expectations	No answers	Total
Female	28	60	35	10	92	4	229
(%)	12.23	26.2	15.28	4.37	40.17	1.75	100
Male	22	66	27	27	77	4	223
(%)	9.87	29.6	12.11	12.11	34.53	1.79	100
Invalid responses	0	1	1	0	0	1	3
(%)	0	33.33	33.33	0.00	0.00	33.33	100
Total	50	127	63	37	169	9	455
(%)	10.99	27.91	13.85	8.13	37.14	1.98	100

Table 16. Loss of the existing landscape × Duration of residence in Iki

	Very concerned	Somewhat concerned	Not very worried	Not at all worried	Don't know	No answers	Total
Less than 1 year	2	1	2	0	1	0	6
(%)	33.33	16.67	33.33	0	16.67	0	100
More than 1 year to less than 5 years	2	10	8	1	3	0	24
(%)	8.33	41.67	33.33	4.17	12.5	0	100
More than 5 years to less than 10 years	0	4	4	2	1	0	11
(%)	0	36.36	36.36	18.18	9.09	0	100
10 years to less than 20 years	1	10	11	2	3	1	28
(%)	3.57	35.71	39.29	7.14	10.71	3.57	100
More than 20 years	21	65	92	9	13	11	211
(%)	9.95	30.81	43.6	4.27	6.16	5.21	100
Since birth	11	55	60	11	17	19	173
(%)	6.36	31.79	34.68	6.36	9.83	10.98	100
Invalid responses	0	1	0	0	0	1	2
(%)	0	50	0	0	0	50	100
Total	37	146	177	25	38	32	455
(%)	8.13	32.09	38.9	5.49	8.35	7.03	100

Table 17. Impact on ecosystems × Duration of residence in Iki

	Very concerned	Somewhat concerned	Not very worried	Not at all worried	Don't know	No answers	Total
Less than 1 year	2	3	0	0	1	0	6
(%)	33.33	50	0	0	16.67	0	100
More than 1 year to less than 5 years	4	14	3	0	3	0	24
(%)	16.67	58.33	12.5	0	12.5	0	100
More than 5 years to less than 10 years	3	4	2	1	1	0	11
(%)	27.27	36.36	18.18	9.09	9.09	0	100
10 years to less than 20 years	5	11	7	0	4	1	28
(%)	17.86	39.29	25	0	14.29	3.57	100
More than 20 years	31	89	53	3	23	12	211
(%)	14.69	42.18	25.12	1.42	10.9	5.69	100
Since birth	21	61	41	9	24	17	173
(%)	12.14	35.26	23.7	5.2	13.87	9.83	100
Invalid responses	0	1	0	0	0	1	2
(%)	0	50	0	0	0	50	100
Total	66	183	106	13	56	31	455
(%)	14.51	40.22	23.3	2.86	12.31	6.81	100

Table 18. Impact on local industries such as fishery × Residential areas

	Very concerned	Not very worried	Don't know	Not at all worried	Somewhat concerned	No answers	Total
Katsumoto-cho	30	15	9	1	37	9	101
	29.7	14.85	8.91	0.99	36.63	8.91	100
Ishida-cho	12	15	8	3	22	4	64
	18.75	23.44	12.5	4.69	34.38	6.25	100
Ashibe-cho	18	14	15	4	58	4	113
	15.93	12.39	13.27	3.54	51.33	3.54	100
Gonoura-cho	38	25	18	4	78	12	175
	21.71	14.29	10.29	2.29	44.57	6.86	100
Invalid responses	1	0	0	0	0	1	2
	50	0	0	0.00	0.00	50	100
Total	99	69	50	12	195	30	455
	21.76	15.16	10.99	2.64	42.86	6.59	100

Table 19. Marine pollution × Gender

	Very concerned	Not very worried	Don't know	Not at all worried	Somewhat concerned	No answers	Total
Female	74	9	13	2	113	18	229
(%)	32.31	3.93	5.68	0.87	49.34	7.86	100
Male	60	24	12	4	112	11	223
(%)	26.91	10.76	5.38	1.79	50.22	4.93	100
Invalid responses	1	0	0	0	0	2	3
(%)	33.33	0	0	0.00	0.00	66.67	100
Total	135	33	25	6	225	31	455
(%)	29.67	7.25	5.49	1.32	49.45	6.81	100

Table 20. Removal of wind turbines × Residential areas

	Very concerned	Not very worried	Don't know	Not at all worried	Somewhat concerned	No answers	Total
Katsumoto-cho	32	8	11	0	40	10	101
(%)	31.68	7.92	10.89	0.00	39.60	9.9	100
Ishida-cho	14	13	11	3	19	4	64
(%)	21.88	20.31	17.19	4.69	29.69	6.25	100
Ashibe-cho	28	14	14	5	47	5	113
(%)	24.78	12.39	12.39	4.42	41.59	4.42	100
Gonoura-cho	43	22	29	3	65	13	175
(%)	24.57	12.57	16.57	1.71	37.14	7.43	100
Invalid responses	0	1	0	0	0	1	2
(%)	0	50	0	0.00	0.00	50	100
Total	117	58	65	11	171	33	455
(%)	25.71	12.75	14.29	2.42	37.58	7.25	100

Table 21. Increase in electricity rates × Age

	Very concerned	Not very worried	Don't know	Not at all worried	Somewhat concerned	No answers	Total
20s	12	5	8	4	16	0	45
(%)	26.67	11.11	17.78	8.89	35.56	0	100
30s	19	14	7	0	31	2	73
(%)	26.03	19.18	9.59	0.00	42.47	2.74	100
40s	20	13	18	2	29	1	83
(%)	24.1	15.66	21.69	2.41	34.94	1.2	100
50s	17	6	8	1	38	8	78
(%)	21.79	7.69	10.26	1.28	48.72	10.26	100
60s	16	11	13	2	45	4	91
(%)	17.58	12.09	14.29	2.20	49.45	4.4	100
70s	14	10	15	6	24	13	82
(%)	17.07	12.2	18.29	7.32	29.27	15.85	100
Invalid responses	1	0	0	0	0	2	3
(%)	33.33	0	0	0.00	0.00	66.67	100
Total	99	59	69	15	183	30	455
(%)	21.76	12.97	15.16	3.30	40.22	6.59	100