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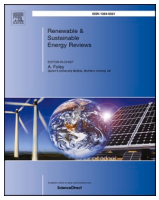

Public dialogue as a collaborative planning process for offshore wind energy projects: Implications from a text analysis of a South Korean case

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ABSTRACT

Local opposition to renewable energy projects reflects the competition among various ideas and values in the energy transition process. Offshore wind farms (OWFs), which are one of the most promising renewable energy generation facilities, are still not free from conflict. This study aimed to enrich the knowledge of the use of public dialogue for collaborative planning in OWF conflict situations. The spatial context on the case was Tongyeong-si, South Korea, where we hosted public dialogue programs. The main purpose of the program was to gather local opinion leaders and enable them to participate in a voluntary discussion on the most important issues related to the OWF project. The post-text and factor analyses could allow the identification of the three most important factors for residents regarding the siting of an OWF: resident participation in the siting process, consideration of damage to fisheries, and sufficient information for judgment. The degree to which the three factors were considered important was different for stakeholders: fishers emphasized the consideration of damage to fisheries, while environmental groups stressed sufficient judgment evidence, but all actors regarded citizen participation in the siting process as necessary. The findings of public dialogue can be interpreted within the local context to indicate that many aspects of the sociotechnical system should be changed to solve renewable energy conflicts. Furthermore, public dialogue can serve as an effective transition strategy to overcome confrontations through the co-production of knowledge and constructing an agenda together with the public.

1. Introduction

Efforts to scale up renewable energy facilities in response to climate change are being made worldwide alongside attempts to resolve conflicts around the siting of renewable energy projects. Given that offshore wind farms (OWFs) are located further from the host community than other renewable energy sources, it may be presumed that they will face less public resistance [1,2]. However, local opposition to OWFs, especially from fishers, take various forms worldwide for various reasons [3-5].

There is a pertinent need to seriously reflect on social aspects in the energy facilities location process, which has been dominated by technology and economic logic. There is also a growing need to engage stakeholders in research for resolving conflicts [6-8]. According to McGookin et al. [9], the participatory approach has two drivers. One is the need at the research level to understand the energy transition in a socio-political context, and the other is the need at the social level to democratize the core decision-making process.

Research methods involving stakeholders have also been used in offshore wind location studies [10-14]. However, existing studies have mainly examined these workshops as a means of investigation. Therefore, in this study, based on the cooperative planning perspective, we evaluated the case of public dialogue regarding the location of offshore wind power. The collaborative planning perspective considers the interaction between planning and social value systems and changes in interaction with learning and execution as important as the planning process, which involves making value judgments while interacting with various stakeholders [15].

Another limitation of existing studies is that they do not fully consider the content specificity of opinions expressed in workshops.

abbreviations: (OWF), Offshore wind farm; (DCC), Damage Countermeasure Committee; (MOTIE), Ministry of Trade, Industry, and Energy.

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Since the conclusions of the workshop may vary depending on the participants, care should be taken to obtain a sample that is representative of all stakeholders. The content-specificity that the final opinion is the result of interaction rather than the simple sum of individual opinions should also be considered. This study intends to enhance the understanding of stakeholders' concerns and wishes in connection with social characteristics through text analysis of the workshop results.

This study was conducted in Tongyeong-si, South Korea, which is known for its local opposition to OWFs. It was not until 2011 that the government published a large-scale OWF project in which full-fledged offshore wind energy projects were established in Korea. Unfortunately, nearly all projects were aborted or delayed for ten years until 2021. Strong opposition between fishers and residents is cited as the greatest obstacle to OWF projects [1]. At the institutional level, the procedures associated with wind power projects often cause local conflict, and lack conflict management processes when it occurs [16,17]. Since offshore wind power is still in its infancy in Korea, the social experiment of public dialogue has important implications. This is because the energy agenda, which used to be the exclusive domain of a group of experts, is gradually becoming more significant and relevant to ordinary citizens through the national deliberation program on nuclear power plants in Korea [18,19].[1]

This study aims to explain public dialogue as a participatory and deliberative arena under the venue of collaborative planning. Section 2 discusses the meaning of collaborative planning in renewable energy location conflict research and explores an apt research method. Section 3 describes the case's context and situation of the public dialogue case, in which we held a program with local opinion leaders and representatives of the fisheries. Section 4 shows how a text network analysis was conducted on the participants' opinions and the results were recorded. Section 5 discusses what to amend in OWF location procedures and why public dialogue can be effective in collaborative planning.

2. Methodological approach

2.1. Earlier concepts of renewable energy conflicts

'Acceptance' has been the most used concept to describe the social aspect of renewable energy. Wüstenhagen et al. [20] explained that social acceptability comprises three dimensions: socio-political, community, and market acceptability. The three dimensions are not clearly separated, as a person can be public or a stakeholder, a member of communities near energy facilities, or a consumer or investor at the same time. Based on a range of studies on local opposition to OWF, the literature has revealed many non-financial reasons for low acceptance such as personal preferences and attitudes, new industries and job opportunities, environmental concerns, impacts on the landscape, inappropriate decision-making processes, and health threats [5,21]. It is beneficial to analyze local opposition in conjunction with other dimensions, including power, justice, and place attachment [20,22,23].

However, since the concept itself limits the conclusion, a series of questions about the acceptability of the concept have been raised. First, do people react to acceptance or rejection? Second, do people have a choice to accept since the project is pre-determined? Third, does some people's acceptance always yield justified results? For the first and second questions, the concept of 'social response' tried to capture various active responses such as support, resistance, and indifference [5,24]. For the second and third questions, the concept of 'societal acceptance' includes interaction between actors and fairness of the promotion process [22,25,26], and "social license to operate' (SLO)' concept tries to imply the need for governance [27-29].

2.2. Collaborative planning for renewable energy

Despite previous theoretical efforts, in many cases, a methodological approach is required to explain why conflict occurs and how to resolve it. This is because renewable energy conflicts do not occur in the facilities themselves and residents' attitudes continue to change [30,31]. Along with the emerging need to consider the social aspect of energy policy, researchers have engaged the public in their research. However, there is no consistent theory explaining the research process and legitimacy of the participatory method [9]. Here, we suggest cooperative planning theory as a strong background to disclose the need for social discussion on location, design, and operation methods in a dynamic process rather than the existing static and location-limited evaluation. Collaborative planning was born under the flow of pluralistic governance as opposed to the rationalist planning method based on effectiveness and scientism. According to the collaborative planning perspective, it is important to consider the interaction between the plan and the social value system, interactions' change and learning, and the linkage with implementation while including the interaction of various stakeholders to make value judgments in the planning process [15]. Collaborative planning can be an alternative to revealing and solving problems due to energy facilities, which were centered on the existing expert and bureaucratic system [32].

Knowledge integration, meaningful involvement, and functioning governance are important factors in achieving cooperation during the planning stage [33]. Planners and stakeholders should share information and values, and the governance system must work collaboratively. During this process, communication has important value in spatial planning and decision-making [15]. A communicative approach pursues the mission of meaningful participation in the energy system planning stage by recognizing local stakeholders and seeking alternative plans for sustainable coexistence with them [9,10] The public participates in the early stage of a project and provides an opportunity to change their opinions to overcome the premise that individual preferences are fixed. By interacting to overcome misunderstandings and exploring solutions, individuals can contribute towards drawing social conditions for approval and designing an acceptable plan. Specific actors involved in this interaction can vary from the national legal process to the local context.

2.3. Participatory research methods in the energy field

Considering the environmental and social impacts of energy projects, it is necessary to thoroughly review a vast number of issues in the agenda-setting stage before being fully located or designed. Researchers can use a calculative approach to analyze representative opinions from the public [34] and ensure that social groups are not socially excluded. The nature of public participation programs for energy transition varies greatly depending on the program design, who has taken the initiative, and whether the action was intended [35]. Combining the deliberative method with the analytical method and using it according to the situation can solve environmental conflict problems [36]. Since the deliberative and public dialogue processes addressed in this study are institutional rather than citizen-led and discursive rather than behavioral, it is easy to conduct research that explores agendas through the analysis of deliberated texts.

Deliberation encourages research participants to speak freely, as well as to form new opinions by discussing with other participants. In some existing studies, participatory dialogues were rigid and standardized in deliberation because of their situational conditions [37]. We should ensure that participants have more authority in the deliberation process, because the more difficult or time-consuming the content is, the more the researcher's intervention tends to limit or induce participants' opinions [9]. A flexible method of modifying or adding new questions

[1] After declaring an energy transition for the first time, the Korean government implemented public participation programs for new nuclear reactors in 2017. Public debate on Shin-Gori Nuclear Reactors 5 and 6 was a variant of Fishkin's deliberative polling.

suggested by researchers through participant discussions can also be adopted [35].

While elicitation follows the traditional in-depth interview method, deliberation tools allow participants to engage in discussions to influence each other actively. Even if the researcher has a priori value-based category or presents it to the participants, various results can be derived depending on the mini-public, and the researcher should closely observe the outcome process and manage the quality of deliberation [35]. Although it is difficult for individual participants to always be representative of sampling, their opinions can represent "public opinion" if they are the result of voluntarily expressing opinions in a public forum on a topic [38].

Research that emphasizes the analysis stage connects the results of citizen participation with current issues, reveals differences and commonalities of opinions between actors, and connects opinions with the sociodemographic data of submitters for a three-dimensional analysis. This deepens the understanding of deliberation results to determine whether sociodemographic variables affect the quality of deliberation [39]. For example, citizens' opinions on energy facilities may vary depending on local proximity [38], and identities such as experts, environmental activists, or consumers [35]. Post-analysis often generates greater implications by interpreting deliberation results in a specific context. Among the analysis methods, text analysis is a representative research method that analyzes opinions directly submitted by stakeholders as much as possible. Strategic future designs such as technology roadmaps [40] or scenario planning [41], including imagining various futures, can produce rich results for foresight through text mining-based techniques.

3. Materials and methods

3.1. Study site

Korea's renewable energy expansion policy is still in its infancy. In 2017, the Moon Jae-in government announced the "Renewable Energy 3020 Implementation Plan" as the first energy transition scheme in Korean history [42]. The plan aims to supply 20% of the total electric power generation through renewable energy until 2030 by generating 12GW of offshore wind power. However, as of June 2021, only 2 out of the 42 OWFs approved for power generation had been completed [43,44]. For example, the Test Phase of OWF on the Southwestern Coast of the Yellow Sea launched in 2011—the first such project in Korea—under the government's leadership was granted a power generation business license in 2013 but could not complete construction until January 2020. As in many other cases, deciding the project site without resident consultation was the first wrong step [1,16]. In July 2020, the government released the Korea Offshore Wind Development Plan, declaring a commitment to the coexistence of and mutual development between OWF and fisheries. However, the *Special Act on the Promotion of the Wind Power Generation Bill*, proposed in May 2021, faced opposition from fishermen across the country.

Korea, surrounded on three sides by water, has been promoting several offshore wind energy projects in the coastal seas. In the absence of a comprehensive law on wind energy, private developers have often led the process from siting to acquiring a business license [17]. During the process, the residents were not adequately consulted, and most fishers became aware of the OWF project after the event [45].

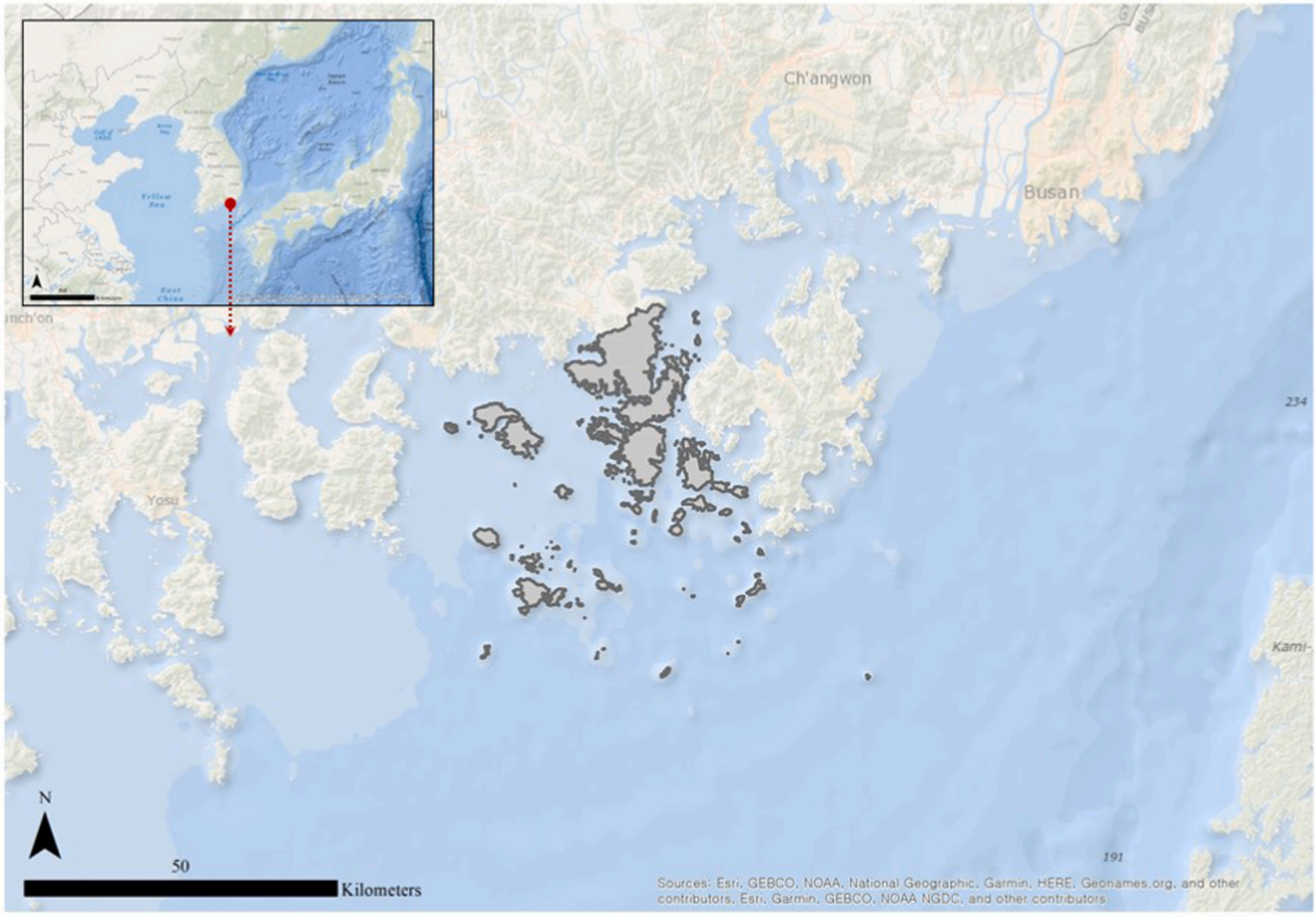

Fig. 1. Location and geographic conditions of Tongyeong-si, the study site.

In this study, Tongyeong-si was selected as the case site, given its strong opposition from the fisheries industry (see Fig. 1). Tongyeong-si is surrounded by the sea on three sides, and approximately 40% of the area is composed of 570 islands. The region has seen development in coastal fishing, aquaculture, and fishery processing. In 2019, official annual seafood sales reached 315 billion won, of which 189 billion won were fish and 102 billion won were shellfish [46]. At the end of 2020, when the conflict was in full swing at the study site, five private developers received power generation licenses or investigated the region's wind characteristics as part of the preliminary phase. Additionally, public companies and private businesses are preparing for wind resource measurements.

In 2013, the Gyeongsangnam-do government conducted an OWF feasibility study and, as a result, the vicinity of *Yokjido* Island off the coast of Tongyeong was identified as having the best siting conditions. Fishers in Tongyeong raised their voices in opposition to the project in 2019 and formed the Offshore Wind Power Response Committee and Damage Countermeasures Committee (DCC). Amid growing conflicts, Tongyeong-si established the Conflict Management Deliberation Committee to mediate conflicts pursuant to the ordinance on conflict management. The committee hosted a citizen discussion in October 2019, but it was cancelled due to protests from hundreds of fishers. In September 2020, Gyeongsangnam-do organized a public–private council; however, the conflict over the number of members and agenda of the council has not been resolved. To make matters worse, since the project was started, the public company installed measuring instruments without consultation with the residents; even with the operation of the public–private council, fishers quickly lost trust in the council (see Table 1 for a summary of the incident).

3.2. Research Method

3.2.1. Preparation step

Tongyeong's public dialogue was led by the government's policy research institution, as a government department's interest in experimental and practical research on social solutions. There was no participation of local governments; it had a specific authority but no binding force for implementation. The program had characteristics of a public dialogue process according to Chilvers et al. [35], since wide participation of non-specified stakeholders was encouraged and the program mainly relied on communicative dialogue and discussion. There is ample evidence that the discussion of the day deserves an analysis. First, it was the first opportunity of its kind in Tongyeong, made possible through the cooperation of many groups and organizations attended by a great number of people. Second, it proceeded smoothly, as even critical participants followed the rules of the discussion until the end. Third, the majority of participants recognized the meaning of the discussion in the final assessment. Admittedly, not all participants had formed an accurate awareness of the intention of this study, and some even criticized the discussion as being intended to promote the OWF project. However, given that public dialogue is not a friendly approach in Korea, unlike the discussions hosted by "local governments" or "the state," it is not surprising that there was some skepticism about it.

Table 1
Milestones of tongyeong Offshore Wind Farm

Time	Actor	Description
2013	Gyeongsangnam-do	OWF feasibility study results show the best wind conditions off the coast of Yokjido
April 2019	Tongyeong-si Council	Yokjido OWF development and design service cost-sharing budget passed
	Fisher groups	Held opposition rally
May 2019	Tongyeong-si	The local government established the Conflict Management Deliberation Committee
September 2019	Fisher groups	Held Gyeongnam Fisher's Right to Survival Resolution Conference
October 2019	Tongyeong-si	The Conflict Management Deliberation Committee hosted Civil Dialogue
	Fisher groups	Protested at and forced cancellation of Civil Dialogue
September 2020	Tongyeong-si, Gyeongsangnam-do	Held a meeting with fishers' representatives to form a public-private council.
October 2020	A public energy company	Proceeded with installing an offshore wind resource measuring instrument, sparking protests from fishers.
	The public-private council	Discussed wind measuring instrument and forced a halt of the construction of the measuring instrument.
November 2020	The public-private council	Scheduled to be held but was canceled due to the difference in opinions between the public and private sectors.

A social impact assessment, conducted prior to this public dialogue program, revealed the perspectives on OWF do not simply consist of pros or cons, but exist at various levels. This interview result was used as primary data in conducting discussions and was compared with the results of public dialogue. The representatives of the groups were interviewed, invited to a public dialogue workshop, and asked to recommend local community activists. Through a snowball sampling process, 27 opinion leaders were recruited, out of which three groups were created. They sat across the tables, for discussion with participants belonging to other organizations. Researchers who attended a preparatory workshop in advance served as table facilitators. Table 2 shows the composition of the participants.

3.2.2. Operational step

The discussion proceeded for an hour and a half (90 minutes) in the following process. In the first step, everyone submitted their opinions in an open-ended manner with no given options. Each participant had two minutes to express their opinions without interruption and post-it notes were used to increase visibility. In the second stage, a discussion was conducted based on the submitted opinions. Participants could ask, supplement, or refute opinions submitted by themselves or by others. In the third stage, after 40 min of discussions around the table, the overall opinions of the three tables were presented. The stenographic records linked to each table were entered into the list of agendas by the researcher in the analysis team. Keywords from the discussion on the day were structured to provide agenda guidance. In the fourth step, additional discussion time was provided, and the participants were asked to select the three most essential agenda items for detailed reasons. In the fifth step, to wrap up the discussion, they were given a chance to share each of the three tables' essential points and evaluate the discussion. The situation of each table, including the post-its, was shared through the screen, and the facilitators summarized each table.

Besides the intervention of facilitators to advance the discussion, there were two interventions. First, the participants watched three 15-minute lectures before the discussion to give them basic information: how OWFs operate, offshore spatial planning, and why renewable energy communication policies are important. This intervention was intended to provide minimal background knowledge. Two experts participated in the experiment online. Second, as mentioned in the process description, an agenda was disclosed to promote mutual discussion after the argument was set up. Participants thereby recognize the existence of opinions beyond their own tables and that everyone's opinions are valuable. This raises the quality of the discussion and provides an opportunity for deliberation.

3.2.3. Post-analysis step

In the text analysis, the issues and consensus on the matters to be considered when introducing wind power were identified through an analysis of the final opinions of the 27 citizens who participated in the public dialogue. The use of text-mining methodologies in a participatory approach that creates a forum for communication helps avoid bias while

Table 2
Composition of the participants

Div.	Affiliation	No. of persons	Div.	Affiliation	No. of persons
Civic Groups (17 People)	Community Support	1	Fishing Group (5 People)	Aquaculture	1
	Labor Welfare	1		Fishing Village	1
	Networking	1		Fisheries Co-Op	1
	Co-Op	3		DCC	2
	Civic Education	1	Marine-Related Institutes (3 People)	Marine Ecosystem	1
	Women	1		Fishery	1
	Resident Autonomy	1		Shipbuilding	1
	Ecology	6	OWF (2 People)	Electric Power Company	1
	Energy Transition	2		Energy Corporation	1

*DCC: Damage Countermeasure Committee

raising new research questions [47]. The text analyzed in this study was created after a discussion by the participants, who explained the most important agenda value for them.

The Q methodology, which analyzes statements as standardized scores, is known to be effective for analyzing the complexity of renewable energy conflicts [31]. It is easy to unravel the views of the public while reducing the involvement of researchers [48]. The process of applying the text-mining method to content analysis is standardized as follows: document preparation and pre-processing, morphological analysis, classification or clustering, topic mapping, and interpretation [41,48-50]. Morphological analysis and unsupervised content analysis are used to identify, structure, and analyze social problems, but they do not fully constitute quantitative modeling [40,50]. As they are entirely dependent on text, it is necessary to know the characteristics of the source and analyze the outcome qualitatively [41,47,50]. Semantic network analysis can identify discourse structures by systematically analyzing the characteristics of connections in communication. Combining text mining and factor analysis reveals important but subtle factors for researchers [51] and helps identify the prominent opinions of different stakeholders [52].

The analysis proceeded as follows: First, final opinions were coded, and morphological analysis was performed on the text content. Second, among the 242 Korean nouns extracted through morpheme analysis, the top 25% (61, with a frequency of 3 or more) based on the frequency were selected as the bag of words. Nouns were excluded that appeared too many times or could not have an independent meaning to select keywords for analysis [52,53]. Accordingly, “need” ($n = 20$), “important” ($n = 11$), “possible” ($n = 10$), “problem” ($n = 8$), “solve” ($n = 6$), “provide” ($n = 5$), “prepare” ($n = 3$), and “way” ($n = 3$) were excluded, and the final 53 keywords were selected. Third, the frequency of keywords for each of the 27 participants was identified to create a matrix. Fourth, a principal component analysis was performed on the important keywords for each participant. Principal component analysis, as a form of factor analysis, has the advantage of being able to obtain low-dimensional data and to preserve the given data as much as possible to better understand them, and has excellent restoration ability to the population even with a few samples [54]. Analysis was performed with SPSS 24.0, and identified several prominent factors as major issues among various opinions.

4. Results

4.1. Opinion clusters

The 53 keywords identified as appropriate for the analysis of final opinions are shown in Table 3. To count the number of times a keyword was mentioned by the participant, a matrix was created between the keywords and participants to be used for principal component analysis [48].

For a clear distinction, it was necessary to select an eigenvalue cut-off at a level higher than the statistical reference value. Therefore, factors with eigenvalues greater than or equal to 2 were selected, and consequently, three representative factors were extracted. With a fine degree of correlation acceptable for factor analysis ($p < .001$), three factors explained 28.41% of the total variance (see Table 4).

Factor 1 is named “resident participation in the siting process.” Participants think it is most important for residents to participate in the siting process as well as to make decisions through consultation. They believe that participation in the process is crucial for the legitimacy of OWF projects and is a prerequisite for resolving conflicts. Factor 2 is the “consideration of damage to fisheries.” To promote OWF, it is necessary to obtain the consent of current users of public waters, minimize fishing damage, protect the interests of fishers, and prepare a fisher participation system. This result reflects the perception that the current Korean

Table 3
Keywords for analysis ($N = 53$)

Rank	Keyword	Fre-quency	Rank	Keyword	Fre-quency	Rank	Keyword	Fre-quency
1	Project	17	17	Profit	7	35	Education	3
2	Damage	13	17	Continue	7	35	Agreement	3
3	Information	12	17	Understand	7	35	Future	3
4	Participation	11	17	Region	7	35	Compensation	3
4	Energy	11	23	Lack	6	35	Guarantee	3
6	Climate	10	23	Resident	6	35	Survival	3
6	Fisher	10	23	Fishing	6	35	Selection	3
6	Sea	10	26	Plan	5	35	Communication	3
9	Science	8	26	Progress	5	35	Role	3
9	Citizen	8	26	Consultation	5	35	Effect	3
9	Location	8	29	Process	4	35	Data	3
9	Tongyeong	8	29	Response	4	35	Long Time	3
9	Wind Power	8	29	Opinion	4	35	Procedure	3
9	Environment	8	29	Transition	4	35	Inspection	3
9	Share	8	29	Debate	4	35	Consensus	3
9	Measures	8	29	Offshore	4	35	Party	3
17	Decision	7	35	Life	3	35	Developer	3
17	Crisis	7	35	Value	3			

Table 4
Factor analysis results

Total variance explained									
Com-ponent	Initial Eigenvalue			Extracted sum of squares loading			Rotation Sum of Squares Loading		
	Total	% Variance	Accum-ulation %	Total	% Variance	Accum-ulation %	Total	% Variance	Accum-ulation %
1	3.02	11.19	11.19	3.02	11.19	11.19	3.01	11.14	11.14
2	2.53	9.39	20.58	2.53	9.39	20.58	2.43	9.02	20.16
3	2.11	7.83	28.41	2.11	7.83	28.41	2.23	8.25	28.41

*Notes: Extraction method: principal component analysis. Rotation method: Varimax with Kaiser normalization. The rotation converged over five iterations. Kaiser-Meyer-Olkin = .276, Bartlett χ^2 = 477.602, $df = 351$, $p < .001$.

business license system fails to give due consideration to the damage to fisheries. Factor 3 is "sufficient information for judgment." Inaccurate information about the necessity of offshore wind power, damage estimation, and profit-sharing measures does not help citizens make the correct decisions. There is also a lack of consensus on the need to respond to climate change as the premise of wind power projects. Many have no choice but to depend on news or speculation, which may raise skepticism among residents. Therefore, accurate information is required.

The speakers vary by each factor. The speakers for Factor 1 (resident participation in the siting process) included participants from all walks of life: civil society community activists, representatives of environmental groups, fishers, shipbuilders, and organizations related to OWFs. It shows the urgency of the agenda item "resident participation in the siting process" for various actors. Factor 2 (consideration of damage to fisheries) mainly applies to fishery stakeholders. Meanwhile, civil society also agreed with the argument of consideration of damage to fisheries, believing it necessary to improve relations with fishers to promote "good" OWFs, and hope that they can work together rather than confront each other. Factor 3 (sufficient information for judgment) mostly corresponded to the environmental groups and those related to energy transition. Since they are well aware of the seriousness of the climate crisis, they want to balance the necessity of renewable energy with the values in other dimensions. It is necessary to share technical, social, and ethical information in order to make rational decisions. Table 5 shows the results, including keywords and the three main theme factors, as well as who belongs to and what they said.

4.2. Common concerns

Lastly, keywords with a small variance (< 0.15) and a positive load average were extracted as common keywords to determine common interests. In other words, they were considered important by the speakers for all factors, with no significant difference in opinion (see Table 6). According to the results, participants were highly interested in but highly dissatisfied with the siting process, especially the process led by private developers. Participants expressed various opinions, including "The public–private consultation and siting should be conducted transparently before deciding on a business operator, and it is necessary to involve residents in the process" (Fisheries co-op), "Mutual persuasion and consultation, based on science and objectivity, is necessary" (Ecology), "Regional conflicts must be resolved. Fisheries and citizens should participate in the decision-making process regarding the shared use of the sea" (Ecology), and "What matters most is for citizens to know and understand" (Women). This result shows that citizens want state and local governments to intervene more actively in the OWF project to secure publicity and fairness. They all pursued reasonable solutions through scientific investigations and information on environmental and social impacts.

5. Discussion

5.1. Implications for siting OWF development

The three factors and common keywords extracted from the text-mining-based semantic network analysis clearly reveal why it is socially challenging to introduce OWF in Korea. Securing transparency in the siting process, as expressed in Factor 1, had the largest explanatory power for gaining the acceptance of OWFs. Even if residents are in favor of renewable energy development, they still need transparent and reasonable grounds for why here ("siting"), why that developer ("public–private consultation"), and whether it is unavoidable to generate power ("power supply plan"). Participants were the opinion leaders of the region but had no knowledge regarding how the project was proceeding or whether they could voice their opinions. There were shared concerns that OWFs could cause damage to both society and marine ecosystems, as with past development projects, like marine sand mining.

As often raised in previous OWF studies [55,56], there was considerable concerns voiced over damage to fisheries (Factor 2) necessitating the mitigation of fears of fishermen who are concerned about their dwindling [11]. There is keen competition among mobile fishing boats in public , but their legal rights to OWF-expected sites are ambiguous. Representatives from the DCC emphasized that the project should proceed in a way that "minimizes the damage to the fisheries due to the reduction of fishing area." Although the government recommends that a public-private council be formed to promote the participation of fishers, specific guidelines were not created until the end of 2021. Regarding damage to fisheries, the government suggests that OWF substructures can be used for fry protection or aquaculture and coexist with the fishery industry, an argument that has not yet been widely accepted by fishers [57]. It is not easy to predict the impact of OWF on fisheries and aquaculture, but it is still vital to take an approach that considers socioeconomic balance [55]. While it is crucial to objectively identify the impact of science on fisheries, it is also important to develop a detailed mechanism to communicate subjective or unpredictable risks [14,56].

Participants considered sufficient information for judgment (Factor 3) as the last crucial factor, which allows them to support or oppose the OWF project and begin to assess it critically. It is insufficient to justify an OWF project solely by satisfying the formal condition of transparency (Factor 1) or succeeding in persuading direct stakeholders (Factor 2). Establishing marine spatial planning in a fully scientific way is challenging, as is persuading the public. Efforts should be made to create, share, and interpret data with stakeholders [11,55,58]. Under the current legal permission process in Korea, scientific investigations are limited to wind resource investigations and environmental impact assessments. Factor 3 implies that a systematic assessment needs to be extended to social impacts. The speakers for Factor 3 provided various ideas for a just energy transition: "quantify the amount of damage," consider "technical countermeasures (options)," raise awareness of the climate crisis through "persuasion about the necessity of setting up OWF in the region," "provide the information needed to prioritize and discuss important challenges," and "consider the ways of mutual coexistence with the residents." These ideas provide signals for how to start local and

Table 5
Results of the factor analysis semantic network and stakeholders for each factor (Main keywords and distribution of the speakers by factor)

Factor			Speaker			Main content
Factor	Keywords**	loading	Div.	affiliation	Factor Score	
Factor 1 (resident participation in the siting process)	**Project**	3.168	**C**	**Community support**	**.573**	• Public–private consultation procedures and siting competitions should be transparently conducted before deciding whom to be the developer, and the project should involve the participation of residents (Fisheries co-op). • Participation in advance and the reflection of resident opinion will increase satisfaction with the process and outcome (Co-op). • Discuss Tongyeong wind power anew. The public–private council should discuss the power plan, location, and necessity from the beginning (Energy Corporation).
	Participation	2.214	**F**	**Fisheries co-op**	**.569**	
	Citizen	1.659	**C**	**Ecology**	**.505**	
	Consultation	1.367	**C**	**Civic Education**	**.496**	
	Location	1.348	**C**	**Co-op**	**.467**	
	Decision	1.229	**O**	**Energy Corporation**	**.466**	
	Information	1.208	**C**	**Co-op**	.353	
	Opinion	1.051	C	Ecology	.173	
	Process	1.034	M	Shipbuilding	.140	
Factor 2 (consider-ation of damage to fisheries)	**Fisheries**	2.902	**F**	**DCC**	**.620**	• The project should be conducted so as to minimize the damage to the fisheries due to the reduction of fishing area (DCC) • A system should be prepared to involve fishers in the process (Fishing village). • Damage to fishers. It is important to gain agreement from the fishers, the direct stakeholders. But the project should not be "pushed around" by them (Networking).
	Fisher	2.850	**F**	**DCC**	**.613**	
	Damage	1.592	**F**	**Fishing village**	**.514**	
	Business	1.404	**C**	**Networking**	**.466**	
	Agreement	1.322	C	Energy transition	.458	
	Wind Power	1.305	C	Ecology	.411	
	Understand	1.202	C	Women	.116	
	Progress	1.173				
Factor 3 (sufficient information for judgment)	**Damage**	3.537	**C**	**Energy transition**	**.720**	• It is necessary to quantify the damage. Technical countermeasures (options), such as floating technology, rather than fixed, are needed (Energy transition) • It is crucial to persuade and share information about the necessity of siting OWF in the region (Community support). • Information is needed to prioritize important challenges, such as climate crisis response and energy (Labor welfare) • Lack of discussion on profit sharing (Aquaculture)
	Profit	1.970	**M**	**Marine Ecosystem**	**.545**	
	Crisis	1.835	C	Ecology	.459	
	Measures	1.743	C	Ecology	.453	
	Climate	1.702	C	Co-op	.354	
	Project	1.603	F	Aquaculture	.302	
	Lack	1.184				

*Note:
- C: Civic groups, F: fishing groups, M: marine-related institutes, O: OWF-related institutes, DCC: Damage Countermeasure Committee
- Each affiliation in parentheses indicates the speaker who said the sentence of content.
- Keywords with a loading of one or higher were selected as the main keywords. The keywords in **bold** represent the highest loadings across the three factors.
- Participants in bold represent statistical significance at the .01 level in the Q factor analysis (Lee et al., 2017). In the dimensionality reduction process, five people showed negative figures for all factors and were excluded.

Table 6
Common keywords' loadings on each factor

Common Keywords	Factor 1	Factor 2	Factor 3	Variance	Mean
Selected	0.306	0.002	0.155	0.023	0.154
Citizens	-0.173	0.079	0.127	0.026	0.011
Developer	0.400	0.025	-0.027	0.056	0.133
Science	0.739	0.361	0.812	0.059	0.637
Location	1.348	0.612	0.820	0.144	0.927

*note: A negative number means that it is not strongly applied to that factor.

collective knowledge co-production in Korean society, where public engagement is lacking [14,59]. When sensitive topics such as profits are not pursued reasonably as a policy, the developers "bribe" the residents causing conflicts, and residents find consultation to be merely "lip service" [11,60].

Three main themes found here are more concrete and urgent in attracting our attention. The focus of existing studies using the stakeholder participatory workshop was what stakeholders were curious about [12,57]. According to a workshop in Germany, there were still many points on the economic and ecological issues that stakeholders concerned considered that experts' studies have not answered [57]. In addition, it was pointed out that existing users of sea areas may feel threatened just by searching for a new way to use marine area. At one multifunctional OWF local workshop held in Italy, participants expected improvement in the marine environment and socioeconomic benefits, while giving negative responses to the lack of social awareness and information about OWF and distrust in the authorities [10]. However, as many college students and no fisheries group participated in the workshop, potential conflicts with fishers remained a major concern that had not been addressed. The three themes identified in this study resemble lay people's opinions on dangerous technologies, such as shale gas and oil extraction [61]. In the deliberative workshops conducted in the UK and the US, the participants expressed skepticism, mistrust, and inequality, and were critical of the feasibility of future benefits. Compared with previous studies, OWF aroused concerns rather than expectations among the participants in this public dialogue. This is also because, unlike the case in Italy, one OWF has already been approved and is in the stage of preparing for installation. In this situation, making groups participated in which "harm" and "inequity" are expected, facilitators can arrive at a much more specific, tunable opinion on their concerns. Although there were very few fishers in the public dialogue, most of the participants supported the importance of fishing after the discussion, reflecting the region's characterization of fishing as a cultural symbol. The importance of information is emphasized here (Factor 3) as in other cases. Also, in the evaluation of the discussion from participants, it was indicated that the information briefing was too short and that there was not much information they wanted.

5.2. Implications for collaborative planning

5.2.1. Understanding stakeholder's diversity

The novelty of public dialogue lies in carefully considering the opinions of each stakeholder. Given an understanding of stakeholders' tendencies and opinions, each organization can participate and establish cooperative governance according to its concerns [5,11,62]. Factor 2 mainly included those opposed to the project and Factor 3 included

those in favor of the OWF project. By contrast, Factor 1, which had the most considerable explanatory power, included both. This indicates a gap between accurately understanding citizens' wants and a "pro-s-and-cons" perspective. To develop cooperative governance in the future, fishers need to participate as key actors, and energy transition groups should work with them to communicate accurate information.

It is worth noting that the positions differed depending on the work characteristics of the fishery industry. Fishers in the DCC use large fishing nets; therefore, there is a high possibility of conflict with OWF. However, the fisheries co-op encompasses a variety of stakeholders, including those in aquaculture and coastal fisheries, who are less concerned about the damage to moving boats. Existing studies on onshore wind power have reported that landscape, noise, and vibration are major factors arousing opposition among residents as the main stakeholders. However, in the case of OWFs, fishers who fish with moving boats and large nets are the main stakeholders. By classifying actors according to such factors, it is possible to distinguish between groups that appear heterogeneous but are identical and those that look alike but are heterogeneous. This reinforces Haggett [5]'s argument that the public should not be viewed as a homogeneous unit, but its diversity should be considered.

5.2.2. *Facilitating Consensus-building*

The methodological strength of public dialogue functions to facilitate consensus-building through learning, deliberating, and changing opinions. According to the social impact assessment conducted in advance, the representatives of the citizen groups and the energy transition group took the position that the sea was not only for fishers, but the representatives of the environmental group also stressed the need to consider the ecological impact, and the fishers opposed the OWF project because it violated their right to fisheries. However, the results of public dialogue indicate the importance of preparing countermeasures against damage to fisheries. Even though citizen's group representatives accounted for a much higher share of the public dialogue participants than those of the fisher group, concerns about fisheries were widely shared. A representative of a citizen group, believing that "the project should not be pushed around by fishers," from the perspective that offshore wind power was needed, also sympathized with the argument of fishers, saying "it is important to gain agreement from the fishers, the direct stakeholders." Furthermore, community opinion leaders conveyed a shared sense of pride and attachment to the sea, an understanding of the region's history of growth, and the cultural heritage of the fishery industry. Since fisheries have cultural and symbolic meaning for the residents and are not just a matter of interest, conflict with fisheries could be placed high on the agenda.

Public dialogue can be a tool for collaborative construction practices that can bring about change while acknowledging the subjectivity around the issue of renewable energy acceptance. Moreover, participants could prioritize the main tasks among too many problems, suggesting "what to do" to the authorities. The results showed that city leaders were fully aware of current problems and deliberated carefully through discussions between different actors. The participants confirmed that each other's arguments were complementary, rather than exclusive, while achieving an agenda face-to-face. This generous momentum allows for opportunities to identify gaps, revise and develop opinions, and build consensus for site planning [63]. This interaction goes beyond asking whether the project is acceptable in this place; it is necessary to collaboratively construct the project plan to make the facilities appealing [64]. In terms of content, Chilvers et al. [28] showed that the results of the unbiased public deliberation workshop were most similar to those of the experts' workshops. It should also be noted that the results of this public dialogue analysis repeated the findings of state-of-the-art research on social acceptance of OWF in Western states [10,11,55]. The case of Korea reaffirms the importance of participatory policy design for new OWFs, along with inclusive governance of various classes, including fishers.

5.2.3. *Social approach to conflict resolution*

The participatory approach has the social motivation to democratize the decision-making process for energy facilities as well as research motivation to deeply understand energy transition [9]. The fact that an individual's value system shared through discussion becomes a shared value system through deliberation has important practical implications. This goes beyond the limits of previous concepts of the renewable energy conflict that reduced the overall opinion of a snapshot, the sum of individual preferences.

This public dialogue initiative started with difficulties amid conflict and a lack of acceptance of renewable energy in South Korea. According to the 2021 Legatum Prosperity Index, which surveyed 167 countries worldwide, Korea ranked 29th in the prosperity average score, but 147th in the social capital category.[2] A low level of social trust can quickly spark conflict. In Korea, no established culture or institution has sufficiently considered social acceptance in development projects. Against this backdrop, social discussion of offshore wind power has been insufficient. Consequently, opinions of the local community tended to be extreme in each area mentioned as a candidate site. Unsurprisingly, there was no place to meet and talk, and thus the conflict intensified. In this context, most participants evaluated this public dialogue trial positively because they could contemplate local issues together and form a consensus in an autonomous atmosphere. At the same time, many were skeptical of whether this conclusion would be reflected in the policy and felt that the given information was insufficient.

6. Conclusion

This study analyzed a public dialogue program organized for OWF agenda-setting through the lens of collaborative planning. When the conflicts regarding renewable energy are approached through the framework of collaborative planning, actors can prevent and reduce conflicts by finding commonalities and respecting their differences. The evolving approach is a crucial method to increase the validity and credibility of the plan as well as the content of the plan. The key local needs uncovered during the study show that a monetary solution is not the only thing residents want to resolve OWF conflicts. Research based on collaborative initiatives provides a platform for the public to change, learn, and interact, leading to the acquisition of social significance for OWFs.

The combination of text analysis and factor analysis used in this study was an effective tool for revealing the values that the specific community considers necessary for OWF projects [31,52]. Text analysis was the result of deconstructing and reconstructing participants' views. The laypeople's keywords were analyzed by allowing them to voice their opinions freely. It enables profound observations when interpreted contextually [47]. Furthermore, factor analysis has implications for collaborative governance, as it can distinguish the characteristic features of each stakeholder's opinions more clearly than a semantic network analysis can [52].

The results of the text analysis, not a complete quantitative method, should be interpreted in this context. In this study, because the researchers directly intervened in the public dialogue process, there is a limitation in that the interpretation of the results is also dependent on the participatory observation method. Although we have partially

[2] The Legatum Prosperity Index™ is an annual ranking developed by the Legatum Institute, an educational charity, since 2007. The 104 variables are grouped into 9 sub-indices: Economic Quality, Business Environment, Governance, Education, Health, Safety & Security, Personal Freedom, Social Capital, and Natural Environment. The social capital sub-index measures personal and family relationships, social networks, interpersonal trust, institutional trust, and civic and social participation. The introduction of the index can be seen at https://li.com/reports/2020-prosperity-index/, and the global survey results are available at https://www.prosperity.com/all-countries.

described this case, it should be analyzed more systematically in future studies. By doing so, we can get closer to the process which is emphasized in this study. In addition, this case remained at the experimental level because local or national governments, which are partners and major actors in collaborative planning, did not participate. Therefore, it is uncertain whether the results in this case are be reflected in the policy. Although this study gathered various local stakeholders as well as fishers, it is necessary to invite relevant government agencies as participants in future research. Allowing responsible actors to participate in an acceptable OWF plan, future research can reveal how collaborative planning can work on OWF issues, as explored in this study.

Credit author statement

Seona Park: Conceptualization, data curation, formal analysis, investigation, methodology, visualization, and writing of the original draft. **Sun-Jin Yun**: Conceptualization, methodology, validation, writing – review, and editing. **Kong-Jang Cho**: data curation, investigation, funding acquisition, methodology, resources, supervision, writing, review, and editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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