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Fishermen's Perceptions and Considerations regarding the Coexistence of Fishing Activities within Offshore Wind Farms

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Abstract : *In this study, a survey on the coexistence of offshore wind farm and fishing activities in Gochang, Gunsan, and Buan's fishermen in the southwest sea offshore wind farm was carried out witn an aim of examining the factors that should be considered when coexisting. A questionnaire was composed after referring to domestic and foreign literature data on examples of coexistence. The questionnaire was issued through direct visits. Frequency analysis and cross-analysis were used for survey response results, and IBM SPSS Statistics ver. 26 was used for statistical processing. As a result of analyzing a total of 84 questionnaires, the perception of the coexistence of offshore wind and fishing activities was the same by 50.0% positive and negative, respectively. As a result of cross-analysis by region, significant differences were found (p <0.039). Gochang fishermen showed a high negative perception of the coexistence of offshore wind and fishing activities at 62.1%, with the main reason being that fishing resources are expected to decrease due to the influence of noise, vibration, and current generated from offshore wind farm facilities. In Gunsan, negative perception of coexistence was high at 57.7%. This was mainly attributed to the impossibility to operate in the offshore wind farm due to the nature of the fishery. On the contrary, in the case of Buan, 69.0% of the positive perception of coexistence was high 'because fishermen were dissatisfied with the current coexistence plan (policy)'. According to previous studies, 91.8% of domestic fishing methods show the possibility of fishing activities in offshore wind under caution, so it is concluded that research should be conducted to coexist with offshore wind and fishing activities as in foreign countries for smooth installation of offshore wind and continuous fishing activities.*

Key Words : *Offshore wind farm, Fishing activities, Fishermen's perception, Possibility of fishery, Coexistence*

1. Introduction

According to the Paris Agreement on climate change response, each country announced its nationally determined contribution rate to set its own climate change response and greenhouse gas reduction goals (UN, 2015). In Korea, the Renewable Energy 3020 Implementation Plan was officiated, and the installation of offshore wind power was targeted at 12 GW (MOTIE, 2017). The potential of Korea's offshore wind power (119 TWh/year) is more than twice that of onshore wind powe r(52 TWh/year), making offshore wind power more suitable for energy availability than land (KEA, 2022). Consequently, the Korean Offshore Wind Power Development Policy has increased the offshore wind power target to 14.3 GW, which is in line with the 10th Electricity Supply and Demand Plan (MOTIE, 2022).

However, the number of offshore wind power plants currently in commercial operation is only 124.5 MW, with three demonstration complexes in Jeju Tamna, Yeonggwang and Southwest Sea (GWEC, 2023). In Korea, there is a focus on offshore wind power as a new renewable energy source, but its spread is generally slow because of residents' acceptance (KPEI, 2018).

According to data provided by the National Federation of Fisheries Cooperatives, 90.0% of offshore wind power permit complexes overlap with fishing activity protection areas, as defined by the Marine Spatial Planning Act. Ways to coexist offshore wind power and fishing activities include the development of profit sharing systems, fish farms, and tourism, which are far from fishing activities (KEPRI, 2020). This coexistence plan can be viewed as a different measure from the one that is most affected by fishing activities using ships.

Europe, where offshore wind power is developed, faces limitations in dividing and managing marine space owing to the rapid increase in offshore energy and limited marine space, and is

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implementing the Multi-Use in European Seas(MUSES) plan as a new policy (MUSES, 2018). However, in Korea, research related to the coexistence of offshore wind power and fishing activities is insufficient. In future, the conflict that fishermen will face before and after the installation of offshore wind power will be the presence or absence of continuous fishing activities, and it is believed that research on the coexistence of the two will be needed both domestically and abroad.

Therefore, this study conducted a survey on the coexistence of offshore wind power and fishing activities based on domestic and international literature, and conducted a survey of fishermen to understand their perception of the coexistence of offshore wind power and fishing activities and what could be considered to ensure coexistence. We derived the elements that needed to be performed.

2. Theoretical background

Before discussing the coexistence of offshore wind power and fishing activities, this study summarizes the definitions of offshore wind power and fishing activities and the current status of conflicts and that could arise when it comes to coexistence.

2.1 Overview of offshore wind power

The definition of 'offshore wind power' according to the Ministry of Trade, Industry and Energy's Act on Management and Reclamation of Public Waters is a case where a wind power generator is installed in an area where water depth exists, either in the 'sea' or 'beach'. Offshore wind energy is divided into fixed offshore wind power and floating offshore wind power depending on the type of facility. Among these, fixed offshore wind power is easier to install than the floating type, has low operating and management costs, and allows for the creation of large complexes. However, conflicts with local residents arise due to issues such as high installation costs, concerns about damage to coastal ecosystems, and fishing rights. Therefore, in this study, offshore wind power was set as fixed offshore wind power, which is expected to overlap with fishing and marine spaces and is expected to cause significant conflict due to issues, such as fishing rights.

2.2 Overview of fishing activities

In domestic offshore wind power conflicts, fishermen are becoming the main actors in collective resistance; hense a need to focus on them (Park et al., 2021). The basic fishing system in Korea is stipulated in the Fisheries Act and is divided into licensed and permitted fishing which is reported fishing according to the nature of the fishing industry. In the case of licensed fishing, the location and area of the fishing ground are specified through the fishing rights register and exclusive rights, such as property rights under civil law are enjoyed. Therefore, it is not difficult to collect the opinions of stakeholders their if fishing rights are affected (Yoo, 2020). Because of the nature of the reported fishing activities, these activities can only be carried out on beaches and shallow water, such as tidal flats, and the radius of fishing activities, such as joint fishing is limited. Therefore, it is expected that it will be easy to identify stakeholders (Yoo, 2020). However, the fishing area for permitted fishing is extensive nationwide or at the city/provincial level, and it is difficult to predict the exact fishing activity area unless through statistical analysis using automatic vessel identification devices. Therefore, it is inevitable that stakeholders will face challenges when specifying the target for study group. Therefore, this study targeted licensed fishing, which is expected to cause the greatest damage and conflict among fishermen due to the installation of offshore wind power in their fishing activities.

2.3 Conflict between offshore wind power and fishing activities

Conflict between offshore wind power and fishing activities could be due to the loss of fishing areas, diversion of fishing grounds, increased fishing efforts, reduced catch, and damage to fishing gear owing to offshore wind power debris and seabed structures.

The result of a survey of stakeholders in Busan, Yeonggwang, Jeju, and Taean on the obstacles to the expansion of domestic offshore wind power showed that the only factor found to be a reduction in fishing rights was the conflict (Lee, 2022), a survey of fishermen in Yeonggwang and Tongyeong showed that offshore wind power, the only factor found to be a reduction in fishing damage without differences between groups (Park et al., 2021). As a result of analyzing the conflicts between offshore wind power plants in Buan, Gochang, Shinan, Tongyeong, Ulsan, Incheon, and Jeju between offshore wind power plants and local fishermen, fishermen in six regions claim a reduction in fishing volume and subsequent damage to their livelihoods due to the construction of offshore wind power plants in local waters. In addition, a decline in fishing production due to marine pollution or infringement of fishing routes due to offshore wind power generation facilities was

reported as the first basis of local fishermen to oppose an offshore wind power project (Kim, 2023).

2.4 Status of coexistence of offshore wind power and fishing activities

The coexistence plan officially announced in the 3020 Renewable Energy Plan includes a development profit sharing system. However, in the long term, it may act as an obstacle to sharing the value of offshore wind power and resident participation (Lee, 2022). In addition, in Korea, coexistence plans for offshore wind power and fisheries have been proposed, such as the construction of complex aquaculture of seaweeds, including oysters, shellfish, seaweed, and kelp, and the indirect creation of fishery resources through artificial reefs. This coexistence plan, which changes the form of fishing activities in the region from catch fishing using boats to fishing using fish farms, has not been embraced by fishermen (Yoo, 2020).

3. Materials and methods

Based on Jung et al.(2019), who studied the possibility of fishing activities within offshore wind power complexes, we classified fishing risks by fishing methods and examined the possibility of the coexistence of domestic offshore wind power and fishing activities. According to information provided by the National Statistical Office, as of August 2023, the total number of fishing boats in Korea was 64,385, of which 39,066 fishing boats(approximately 60.7% of the total) were licensed. As a result of examining the status of fishing boats according to fishing risk among the permitted fisheries, single-line fishing, long line fishing, and anchovy chat boat are categorized as 'low', and bottom longline, floating longline, drag fishing, squid fishing, octopus pot, octopus fish, and coastal trap are categorized as 'normal', a total of 35,844 vessels(91.8%) used the drift net, long net, fixed gill net, and drift net fishing methods, and it was found that there is a possibility of fishing within the offshore wind power complex under caution. In addition, 3,222 vessels(8.2%) of shape nets, beam trawls, purse seines, angular nets, double dragline trawls, steamer coil nets, otter trawls, and single dragline trawls classified as ‘hazardous’ and ‘very dangerous’ are involved in the fishing industry within offshore wind farms. This activity was difficult.

The survey areas were Gochang, Gunsan, and Buan, which correspond to the southwest sea offshore wind power complex, as shown in Fig. 1. Table 1 shows the results of examining the permitted fishing status in the survey area and classifying it according to the fishing risk. There were no fishing methods corresponding to 'low' fishing risk, and 'moderate', showing that the possibility of fishing activities within the offshore wind farm with caution was found to be 82.1%, 'risk' was 11.5%, and 'very risky' was 6.4%.

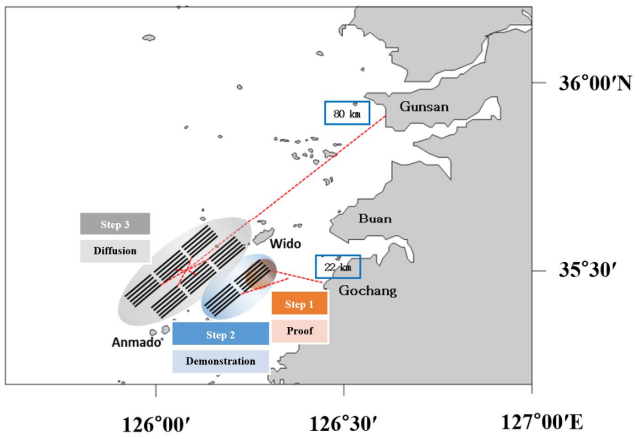

Fig. 1. Southwest offshore wind farms.

To investigate fishermen's awareness of the coexistence of offshore wind power and fishing activities and the factors to consider when coexisting, a survey was conducted by directly visiting ports and attending fishing community meetings in the survey area in July 2023. A total of 133 questionnaires were collected during the research period, and the response from 84 questionnaires were analyzed, excluding questionnaires not related to this study.

The survey on the coexistence of offshore wind power and fishing activities consisted of 21 questions, including general status (9 questions), awareness of the coexistence of offshore wind power and fishing activities (1 question), and factors to consider when offshore wind power and fishing activities coexist (11 questions).

The survey results were analyzed by dividing them into: 1) general status, 2) perception of the coexistence of offshore wind power and fishing activities, 3) differences in the perception of the coexistence of offshore wind power and fishing activities by region, and 4) factors to be considered when offshore wind power and fishing activities coexist. Statistical processing of the survey response results was performed using IBM SPSS Statistics ver. 26 and frequency analysis and cross-tabulation were carried out.

Table 1. The number of permitted fishery level of risk by survey region

Level of risk	Gochang	Gunsan	Buan	Total
Low	-	-	-	-
Normal	185	742	521	1,448(82.1%)
High	4	128	70	202(11.5%)
Unacceptable	4	59	50	113(6.4%)
Total	193	929	641	1,763

4. Results and discussion

4.1 General status

The results of the frequency analysis for the general status are shown in Table 2. There were high missing values in the questions, except for region and language. Those over 60 years old were the highest at 68.3%, those with over 30 years of experience were the highest at 54.2%, and the percentages by region were 34.5% in Gochang, 31.0% in Gunsan, and 34.5% in Buan. The fishing risk according to fishing method was low(3.6%), moderate(84.5%), risky(1.2%), and very risky(10.7%). Fishing vessel tonnage was less than 5 tons in 73.2%, fishing vessel length less than 5~10 m in 50.0%, and vessel age over 20 years in 40.9%. The engine horsepower was 38.0% over 300 hp, and the line quality was FRP 95.8%.

Among the permitted fishing operations in the survey area, the proportions of fishing methods with ‘moderate’ fishing risk and those with ‘moderate’ fishing risk were similar. However, because 'low' fishing methods that did not appear in the survey target area and the survey period overlapped with the fishing season of coastal fishing, there was a lack of reflection of fishermen's perception of the fishing risk as 'dangerous' and 'very dangerous'. It was determined that this consideration was necessary.

Table 2. Analysis of the basic items in the questionnaire survey

Item	Content	Frequency	Percentage (%)
Age	Under 40	5	6.1
	Under the age of 40~50	4	4.9
	Under the age of 50~60	17	20.7
	Older than 60	56	68.3
	Total	82	100.0
Career	Less than 10 years	10	13.9
	Less than 10~20 years	7	9.7
	Less than 20~30 years	16	22.2
	More than 30 years	39	54.2
	Total	72	100.0
Region	Gochang	29	34.5
	Gunsan	26	31.0
	Buan	29	34.5
	Total	84	100.0
Fishing gear	Low	3	3.6
	Normal	71	84.5
	High	1	1.2
	Unacceptable	9	10.7
	Total	84	100.0
Tonnage	Less than 5 tons	41	73.2
	Less than 5~10 tons	13	23.2
	Less than 10~15 tons	-	-
	More than 15 tons	2	3.6
	Total	56	100.0
Length	Less than 5 m	1	4.5
	Less than 5~10 m	11	50.0
	Less than 10~15 m	6	27.3
	More than 15 m	4	18.2
	Total	22	100.0
Age of ship	Less than 5 years	7	15.9
	Less than 10~15 years	11	25.0
	Less than 15~20 years	8	18.2
	More than 20 years	18	40.9
	Total	44	100.0
Engine horse power	Less than 100 horse power	9	18.0
	Less than 100~200 horse power	9	18.0
	Less than 200~300 horse power	13	26.0
	More than 300 horse power	19	38.0
	Total	50	100.0
Ships material	Steel vessel	2	4.2
	Wooden vessel	-	-
	FRP	46	95.8
	Total	48	100.0

4.2 Perception of the coexistence of offshore wind power and fishing activities

As a result of the frequency analysis of the perception of the coexistence of offshore wind power and fishing activities, as shown in Table 3, 42 people (50.0%) had a positive perception and 42 people (50.0%) had a negative perception.

Table 3. Analysis of the coexistence perception of offshore wind and fishing activities

Item	Frequency	Percentage(%)
Positive	42	50.0
Negative	42	50.0
Total	84	100.0

4.3 Perception of the coexistence of offshore wind power and fishing activities by region

As a result of cross-analyzing the perception of the coexistence of offshore wind power and fishing activities by region, significant differences were observed ($p<0.05$), as shown in Table 4. In Gochang and Gunsan, negative perceptions of the coexistence of offshore wind power and fishing activities were higher at 62.1% and 57.7%, respectively, whereas in Buan, positive perceptions were higher at 69.0%.

Table 4. Analysis of the coexistence perception of offshore wind and fishing activities by region

Region	Frequency		Total	X^2(p)
	Positive	Negative		
Gochang	11(37.9%)	18(62.1%)	29	6.477 (0.039)
Gunsan	11(42.3%)	15(57.7%)	26	
Buan	20(69.0%)	9(31.0%)	29	
Total	42	42	84	

Table 5 shows the results of the cross-analysis of the reasons for positive perceptions of the coexistence of offshore wind power and fishing activities by region. In the case of Gochang, the reason for the positive perception of the coexistence of offshore wind power and fishing activities was 'because I am dissatisfied with the current coexistence plan (policy)' at 27.8%, and 'because the fishing grounds are shrinking due to wind power complex facilities' at 22.2%. In Gunsan, 'because an increase in fisheries resources is expected due to artificial reefs and seed release projects within the offshore wind power complex' was the highest at 27.3%, followed by 'because fishing is possible within the offshore wind power complex due to the nature of the fishing industry' and 'offshore wind power.' 'Just because the regulated sea area overlaps with the fishing grounds' was high at 22.7%. In Buan, 'because we are dissatisfied with the current coexistence plan (policy)' was the highest at 24.4%, followed by 'because fishing is possible within the offshore wind farm due to the nature of the fishing industry' and 'because the fishing grounds are shrinking due to the wind farm facilities.' 'Because it works' was high at 17.1%. Other reasons include the need for continuous fishing activities and coexistence measures.

Table 5. Number of reasons for positive perception the coexistence of offshore wind and fishing activities by region

Content	Gochang	Gunsan	Buan
Current policy of co-existence is dissatisfied	5(27.8%)	3(13.6%)	10(24.4%)
Nature of the fishing industry, it is possible to operate in the offshore wind farm	2(11.1%)	5(22.7%)	7(17.1%)
Sea area of the offshore wind farm overlaps with the fishing activity protection zone	1(5.6%)	5(22.7%)	4(9.8%)
Fisheries resources will increase due to artificial reefs and seed discharge projects in the offshore wind farm	3(16.7%)	6(27.3%)	5(12.2%)
Need to cooperate with the national power projects	3(16.7%)	2(9.1%)	5(12.2%)
Offshore wind farm facilities reduce fishing activity protection zone	4(22.2%)	1(4.5%)	7(17.1%)
Etc.	-	-	3(7.3%)
Total	18	22	41

In all regions, the reason for having a positive perception of the coexistence of offshore wind power and fishing activities was ‘because they are dissatisfied with the current coexistence plan (policy).’ In other words, because fishing activities were excluded from the coexistence plan between offshore wind power and the fishing industry, it is believed that there was a highly positive perception of fishing activities and coexistence presented in this study. Offshore wind power is an important task for

decarbonization, but social conflict cannot be avoided because of its the large overlap with fishermen's fishing grounds (SFOC, 2023). In marine space planning, coexistence is recognized as the best alternative for resolving conflict between users. The discovery of economic value and success stories from various coexistence attempts is expected to increase the social acceptability of offshore wind farms and simultaneously attract large capital investments, leading to a more active use of commercial coexistence (Kang et al., 2016).

Table 6 shows the results of a cross-analysis of the reasons for the negative perceptions of the coexistence of offshore wind power and fishing activities by region. In the case of Gochang, the biggest reason for the negative perception of the coexistence of offshore wind power and fishing activities was 'because a decrease in fishery resources is expected due to the effects of noise, vibration, and current generated from offshore wind power complex facilities', which was as high as 34.5%, followed by ‘because fishing is impossible within the offshore wind farm due to the nature of the fishing industry’ at 24.1%. In Gunsan, 'because fishing is impossible within the offshore wind power complex due to the nature of the fishing industry' was the highest at 43.3%, followed by 'a decline in fishery resources is expected due to the effects of noise, vibration, and current generated from the offshore wind power complex facilities.' 'Because it works' was high at 30.0%. In Buan, 50.0% said 'because a decrease in fishery resources is expected due to the effects of noise, vibration, and current generated from offshore wind farm facilities', and 28.6% said 'due to risk factors such as offshore wind power structures and underwater obstacles due to the nature of fishing.' In all three regions, the reason for the negative perception of the coexistence of offshore wind power and fishing activities was ‘the decrease in fishery resources owing to the effects of noise, vibration, and currents generated from offshore wind power complex facilities’. Because the results of studies on whether fishery resources are reduced due to offshore wind power are somewhat different, it is necessary to investigate in more detail the environmental hazards requested by local residents to resolve these conflicts (Lee, 2022). In addition, because it is impossible to predict environmental changes by 100%, it is believed that the reliability of environmental predictions will improve to some extent if a post-evaluation design is established to reduce errors that may occur during the calculation process and verify the results (Lee et al., 2015).

Table 6. Number of reasons for negative perception the coexistence of offshore wind and fishing activities by region

Content	Gochang	Gunsan	Buan
Current policy of coexistence is satisfactory	-	-	-
Nature of the fishing industry, it is impossible to operate in the offshore wind farm	7(24.1%)	13(43.3%)	3(21.4%)
Sea area of the offshore wind farm and fishing activity protection zone are irrelevant	1(3.4%)	1(3.3%)	-
Fisheries resources will decrease due to effects of noise, vibration, and electric current from the offshore wind farm facilities	10(34.5%)	9(30.0%)	7(50.0%)
Nature of the fishery, risk factors such as offshore wind structures and undersea obstacles	5(17.2%)	7(23.3%)	4(28.6%)
Difficult to respond and rescue in case of an accident	1(3.4%)	-	-
Etc.	5(17.2%)	-	-
Total	29	30	14

4.4 Factors to consider when offshore wind power and fishing activities coexist

Table 7 presents the results of the frequency analysis of the factors considered when offshore wind power and fishing activities coexist. Regarding the consideration factors, ‘necessary’ and ‘very necessary’ accounted for 82.4% of the total. The factors considered in this survey were constructed with reference to previous domestic research and the MUSES. As a result of the responses, all questions mainly included ‘necessary’ and ‘very necessary’, so it is judged that it is necessary to reflect the consideration factors presented in this survey question when implementing policies related to the coexistence of offshore wind power and fishing activities. However, the consideration factors presented in this survey question are not specific and do not include all elements necessary for coexistence; therefore, so it is concluded that more detailed investigation and analysis based on domestic and foreign literature and cases is needed.

In addition, unlike abroad, there are diverse fishing methods and a large number of fishing boats, most of which are operated by individuals. Therefore, there are limitations in comparing domestic

Table 7. Analysis of the considerations for the co-existence of offshore wind and fishing activities

Content	Very not necessary	Not necessary	General	Necessary	Very necessary
Update and notify real-time information on offshore wind power through homepages, applications, etc	2(2.4%)	4(4.8%)	17(20.2%)	34(40.5%)	27(32.1%)
Posting safety statements related to offshore wind power at ports, etc	-	-	15(17.9%)	41(48.8%)	28(33.3%)
Provide safety guidelines for offshore wind power operations	2(2.4%)	1(1.2%)	14(16.7%)	34(40.5%)	33(39.3%)
Establishing navigation rules in the offshore wind farm	1(1.2%)	2(2.4%)	15(17.9%)	33(39.3%)	33(39.3%)
Insurance issues in the event of an accident in offshore wind power	-	-	13(15.5%)	27(32.1%)	44(52.4%)
Education on accident prevention and response in offshore wind farms	2(2.4%)	4(4.8%)	14(16.7%)	36(42.9%)	28(33.3%)
Securing sufficient fishing space according to the size and fishing type of fishing boats	-	1(1.2%)	10(11.9%)	34(40.5%)	39(46.4%)
Appropriate day and night markings on offshore wind structures	-	-	10(11.9%)	32(38.1%)	42(50.0%)
Prevent accidents by installing shock mitigation devices, submarine cable protection devices, etc. on offshore wind structures	1(1.2%)	-	11(13.1%)	35(41.7%)	37(44.0%)
Complementing the reduction in catch, such as artificial reefs and artificial seedlings	1(1.2%)	1(1.2%)	9(10.7%)	30(35.7%)	43(51.2%)
Support the purchase of fishing equipment for continuous operation	-	-	10(11.9%)	35(41.7%)	39(46.4%)
Total	1.0%	1.4%	15.1%	39.4%	43.0%

fishing activity conditions with foreign coexistence cases, so it is necessary to take into account domestic fishing types, fishing environments, and so on.

5. Conclusion

This study conducted a survey of licensed fishermen in Gochang, Gunsan, and Buan, areas of offshore wind power complexes in the Southwest Sea, to examine fishermen's perceptions of the coexistence of offshore wind power and fishing activities, and the factors to consider when coexisting. The response rate of fishermen by region was similar and the fishing risk level of the fishing methods of those surveyed was mainly average.

For the 84 survey papers, frequency analysis and cross-tabulation were performed using the IBM SPSS Statistics ver. 26. The analysis revealed that the positive and negative perceptions of the coexistence of offshore wind power and fishing activities were 50% each, and that there was a significant difference in the perception of the coexistence of offshore wind power and fishing activities by region ($p=0.039$, $p<0.05$). In Gochang and Gunsan, negative perceptions were higher regarding the coexistence of offshore wind power and fishing activities, whereas positive perceptions were higher in Buan. The reason for the negative perception of the coexistence of offshore wind power and fishing activities was highly cited in Gochang as 'because a decrease in fishery resources is expected due to the effects of noise, vibration, and current generated from offshore wind farm facilities', and in Gunsan as 'fishery resources'. 'Because it is impossible to operate within an offshore wind farm due to its characteristics' was highly expressed. In contrast, in the case of Buan, the reason for positive perception of coexistence was ‘because they are dissatisfied with the current coexistence plan (policy)’. It was found that all questions regarding factors to be considered when offshore wind power and fishing activities coexist mainly consisted of ‘necessary’ and ‘very necessary.’

The above results are limited in that they only surveyed licensed fisheries in the area corresponding to offshore wind power complexes in the Southwest Sea, and did not include the perceptions of licensed and reported fishermen. In addition, because the majority of fishing methods were classified as having ‘moderate’ fishing risk, there were limitations in investigating the perception of the coexistence of offshore wind power and fishing activities by fishing risk level. Therefore, to coexist with offshore

wind power and fishing activities the future, it is necessary to closely understand the perception of fishing activities within offshore wind power complexes by fishing methods, based on which a more sophisticated evaluation of factors to be considered when offshore wind power and fishing activities coexist.

References

[1] GWEC(2023), Global Wind Energy Council, Global offshore wind report 2023, p. 118.

[2] Jung, C. Y., B. K. Hwang and S. C. Kim(2019), Possibility of Fishery in Offshore Wind Farms, Journal of the Korean Society of Marine Environment & Safety, Vol. 25, No. 5, pp. 535-541.

[3] Kang, K. S., I. S. Jeon and J. Y. Kwak(2016), Possibilities and Orientation toward Co-existence of Offshore Wind Farms, Journal of Wind Energy, Vol. 7, No. 2, pp. 5-13.

[4] KEA(2022), Korea Energy Agency, New & Renewable power statistics 2021, pp. 1-311.

[5] KEPCO KEPRI(2020), Korea Electric Power Corporation Korea Electric Power Research Institute, A Study on the Development of Offshore Wind Power, Fisheries, and Environmental Coexistence Technology, p. 116.

[6] Kim, H. J.(2023), Analysis of the Offshore Wind Power Conflict - Based on 6 Case Analysis -, Graduate School of Kyung Hee University, Master's Thesis, pp. 1-105.

[7] KPEI(2018), Korea Power Economics Institute, A Study on the Establishment of Profit Sharing System to Improve the Acceptance of Renewable Power, pp. 1-168.

[8] Lee, D. I., G. Y. Kim, D. H. Tac, Y. M. Yi, J. H. Choi, H. J. Kim, J. H. Lee and S. S. Yoon(2015), Diagnosis of Scoping and Type of Review on the Marine Environmental Impact Assessment for Ocean Energy Development Project, Journal of the Korean Society for Marine Environment and Energy, Vol. 18, No. 3, pp. 179-188.

[9] Lee, H. Y.(2022), A Study on Barriers and Local Acceptance of Offshore Wind Power in Korea - Focusing on the Four Major Regions: Gyeongsang, Jeolla, Jeju, Chungcheong -, Graduate School of Seoul National University, Master's Thesis, 1-192.

[10] MOTIE(2017), Ministry of Trade, Industry and Energy, Renewable Power Implementation Plan 3020, pp. 1-7.

[11] MOTIE(2022), Ministry of trade, industry and energy, The 10th Basic Plan for Electricity Supply and Demand, p. 113.

[12] MUSES(2018), Multi-Use in European Seas, Ocean Multi-use Action Plan, pp. 1-132.

[13] Park, J. M., H. S. Yim, S. N. Park and K. J. Cho(2021), A Study on the Fishermen Acceptability of Offshore Wind Farms, Korea Environmental Policy and Administration Society, Vol. 29, No. 4, pp. 83-109.

[14] SFOC(2023), Solutions For Our Climate, 2023 Urgent Seminar to Prepare Offshore Wind Power System, pp. 1-46.

[15] UN(2015), United Nations, Paris agreement, pp. 1-174.

[16] Yoo, C. Y.(2020), A Study on the Improvement of the System for Improving the Acceptability of Fishermen in the Offshore-Wind Farm, Graduate School of Konkuk University, Master's Thesis, pp. 1-117.

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