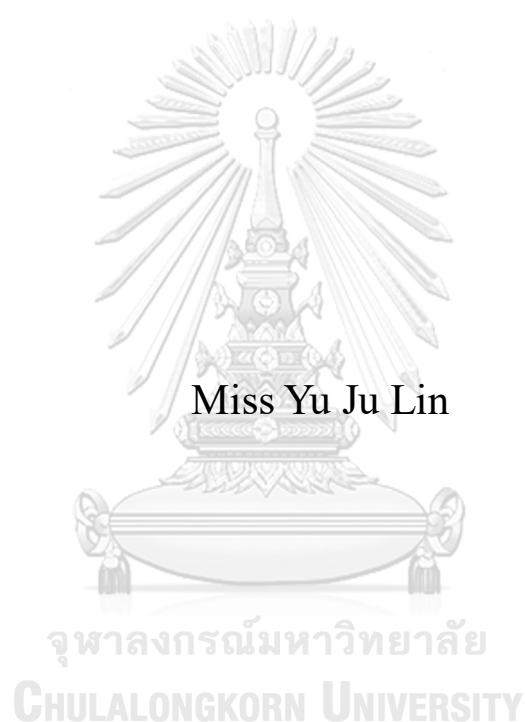


Can Offshore Wind Electricity in Taiwan be Sustainable?: The
case of Taiwan's first offshore wind project, Formosa 1 in Miaoli



A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Arts in International Development Studies
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FACULTY OF POLITICAL SCIENCE
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จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

ความยั่งยืนของโครงการพลังงานลมนอกชายฝั่งในไต้หวัน:กรณีศึกษาโครงการพลังงานลมนอกชายฝั่งแห่งแรกของไต้หวัน Formosa 1
ในเทศมณฑลเหมียวลี่



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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต

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ย จู ลิน :

ความยั่งยืนของโครงการพลังงานลมนอกชายฝั่งในไต้หวัน:กรณีศึกษาโครงการพลังงานลมนอกชายฝั่งแห่งแรกของไต้หวัน Formosa 1 ในเทศมณฑลเหมียวลี่. (Can Offshore Wind Electricity in Taiwan be Sustainable?: The case of Taiwan's first offshore wind project, Formosa 1 in Miaoli) อ.ที่ปรึกษาหลัก : คาร์ล มิดเดิลตัน

ใน ขณะ ที่ แนวนุคิด เรือง ความ ยั่งยืน (Sustainability) ได้ถูกนำไปใช้ทั่วโลกเพื่อรักษาสมดุลระหว่างการพัฒนาและสิ่งแวดล้อมไต้หวันได้ให้คำมั่นที่จะเปลี่ยนแปลงเพื่อมุ่งไปสู่การใช้พลังงานหมุนเวียนและไฟฟ้าพลังงานลมนอกชายฝั่งก็เป็นหนึ่งในอุตสาหกรรมเกิดใหม่ที่มีศักยภาพ ดังนั้นจึงได้นำโครงการที่เพิ่งได้เริ่มมีการดำเนินการมาเป็นกรณีศึกษา วัตถุประสงค์ของงานวิจัยนี้คือเพื่อพิจารณาว่าไฟฟ้าพลังงานลมนอกชายฝั่งเป็นทางออกที่สามารถบรรลุความยั่งยืนแบบมีส่วนร่วม (Inclusive Sustainability) ใน ไต้หวัน ได้ จ ริ ง หรือ ไม่ รวมถึงพิจารณากระบวนการยุติธรรมในการมีส่วนร่วมตรวจสอบขั้นตอนการวางแผนและการก่อสร้างโครงการ พร้อมทั้ง กระบวนการยุติธรรมทางสิ่งแวดล้อม (Environmental Justice) ได้ถูกนำมาประเมินผลลัพธ์โดยรวมจากมุมมองของชุมชนที่ได้รับผลกระทบ วิ ท ย า น ี พ น ธ์ ฐ บ ั บ นี้ เ ป น ง า น วิ จ ัย เ ช ิง ค ุ ณ ภา พ โดยมีการดำเนินการภาคสนามเป็นเวลาสองเดือนในเทศมณฑลเหมียวลี่ ซึ่งเป็นเขตประมงชายฝั่งที่ถูกตั้งเป็นสถานที่สำหรับสร้างกังหันลมที่แรกและที่เดียวของประเทศ นั่นคือโครงการ Formosa 1 โครงการได้เริ่มดำเนินการเชิงพาณิชย์เมื่อเดือนธันวาคม 2562 โดยมีการสัมภาษณ์ชาวประมง สมาชิกสมาคมชาวประมง เจ้าหน้าที่รัฐ และนักวิชาการ

ผลการศึกษาแสดงให้เห็นปฏิกริยาสองแบบจากกลุ่มผู้ได้รับผลกระทบหลัก ซึ่งคือชาวประมง การก่อสร้างโครงการมีระดับผลกระทบที่ไม่เท่ากันต่อวิธีการทำประมงหลักสองวิธีในพื้นที่ นั่นคือประมงแบบใช้“อวนลอย” และประมงแบบใช้“เบ็ด” ชาวประมงส่วนน้อยรู้สึกถึงความไม่ยุติธรรม ขณะที่อีกกลุ่มหนึ่งเห็นถึงคุณค่าของโครงการพลังงานลมนอกชายฝั่ง ในทางกลับกัน แม้จะมีระดับผลกระทบที่แตกต่างกัน เมื่อมีการใช้กระบวนการยุติธรรมในการพยายามลดความสูญเสียในระหว่างขั้นตอนและมีการหารือค้นหา ติ เกีย ว กั บ ผล สั พ ธ์ เ พื่ อ เ พื่ ม ผล ประ โย ช น์ ใน ระยะ ยาว ให้ มาก ที่ สุด ความยุติธรรมด้านสิ่งแวดล้อมก็ได้มีบทบาทในการรักษาดุลอำนาจอย่างมากในโครงการนี้ สาขาวิชา การพัฒนาระหว่างประเทศ ลายมือชื่อนิสิต

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Yu Ju Lin : Can Offshore Wind Electricity in Taiwan be Sustainable?: The case of Taiwan's first offshore wind project, Formosa 1 in Miaoli. Advisor: Carl Middleton

While sustainability is implementing all over the world to strive to balance the development and environment, Taiwan is also committed to the transition towards renewable energy, and offshore wind electricity is one of the emerging industries with potential, therefore taking its newly operated project as a case study. The purpose of the research is to determine whether offshore wind electricity is a viable solution to achieve inclusive sustainability in Taiwan and the concept of procedural justice is involving to examine the planning and construction stages of the development while environmental justice is applied to evaluate the overall outcome from the perspective of the affected community. As a qualitative research, the thesis conducted two-month fieldwork in Miaoli County, where the coastal fishing area is the site of the country's first and only wind farm, Formosa 1 which started commercial operations in December 2019, with interviewees including fishers, members of fishery association, government officials, and scholars. The result shows the polarized reaction of the main affected group, the fisher, to the construction owing to the difference in the degree of influence on the two main fishing methods in the area, "gillnetting" and "pole and line". A small group of the fisher felt unjust while the other recognized the value of the offshore wind project. On the other hand, despite varying degrees, when procedural justice was sought to reduce the losses during the process and the consensus on the outcome was discussed to maximize the long-term gains, environmental justice was actively balanced in the project. Being one of the pioneer academic research to review the case after its completion, this paper concludes that, as Taiwan's first offshore wind project, Formosa 1 did not fully convince everyone with its sustainability, but with the experiences, it did pave a relatively smooth way for the future development towards sustainability.

Field of Study: International Development Studies Student's Signature

Academic Year: 2019 Advisor's Signature

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CHAPTER I. INTRODUCTION

1.1 Statement of Research Problem

Every era has its own challenges, and climate change is definitely one for the 21st century, no matter for Survivalists who worry about the imminent ecological crisis or Prometheanists who believe that technological progress will solve any difficulties that arise (Middleton, 2019). When environmental issues became one of the main topics for international institutions and national government, the concept of sustainability stood out as a “central guiding principle” of the United Nations and was suggested to other authorities at all levels (United Nations, 1987). Although Dryzek (1997) proposed three approaches, administrative rationalism, democratic pragmatism, and economic rationalism, to solve the environmental problem, if the discourse cannot be translated into a language that everyone can understand or be realized in people's daily lives, effective changes will still not be made. On the other hand, sustainable development should not just be an agenda of the summit, but also need to be the catalyst for bottom-up resilience-building because the vulnerable group is often most affected, and environmental protection is an all-humankind-mobilized goal that none can ignore.

The importance of energy for economic growth and quality of life goes without saying, therefore renewable energy that can avoid environmental damage compared to traditional energy seems to be a critical key to balance development and environment since it is difficult to foresee that in recent years we may be able to drastically reduce our dependence on energy. This thesis focuses on offshore wind electricity, on the one hand, due to its growing influence on the international stage as a result of more mature technology, and on the other hand, owing to Taiwan's advantages and the necessity for energy transformation in this regard.

Taiwan is a small island with limited resources, especially raw materials for fuel for electricity generation are highly relying on imports, which is as high as 98% (Bureau of Energy, 2019). The imported energy source is mainly fossil fuels, such as petroleum, natural gas, and coal, which once push Taiwan accounting for about 1 % of global carbon dioxide emissions in 2008 (Wu, 2011). The pollution from coal-fired power plants and the concern of nuclear power plants are like time bombs that from time to time provoke public protest, which then makes the goal of accelerating the energy transition a top priority for the government (MEA, 2018b). As the Taiwanese president set green energy vision for 2025 in 2016, "achieving an electricity generation structure with 20% renewable energy, 50% natural gas, and 30% coal burning by 2025, and stable power supply" (Office of the President, 2016), all actions have actively begun. Of the target of a total 27 gigawatts, which is almost 3.5 times the current renewable electricity production (Table 1), solar electricity accounts for 20 gigawatts; the wind is responsible for 5.5 gigawatts; and the rest is allocated to water, biogas, and other (EPA, 2020). In terms of offshore wind power, Taiwan has advantages. According to "Global Offshore Wind Speeds Rankings" from 4C Offshore (n.d.), a consultancy and market research organization of offshore electricity, thanks to the strong wind generated by the special terrain, fifteen of world's top twenty best offshore wind farms with strong winds (several are sharing the same ranking) are from Taiwan.

Table 1.

Renewable energy generator capacity structure in Taiwan

unit: gigawatts

Renewable Energy Share	Total	Solor	Offshore Wind	Water	Biogas & Other
2019 Actual	7.795	4.15	0.128	2.091	0.708
2025 Goal	27	20	5.5	2.08	/

Note. The actual generator capacity of 2019 was adapted from “Energy Statistics Data Inquiry System”, by Bureau of Energy, 2019, retrieved from: <https://www.moeaboe.gov.tw/wesnq/Views/B01/wFrmB0104.aspx>. Copyright 2019 by Ministry of Economic Affairs; shares of various categories in 2025 were adapted from “The Renewable Energy Development Act” by Environmental Protection Administration, 2020, retrieved from: https://ghgrule.epa.gov.tw/low/low_tw_doc_page/41. Copyright 2020 by Executive Yuan. Table made by the author.

Despite its many attractions, Taiwan did not start operating the country's first offshore wind farm until the end of 2019, and apart from the previous technical threshold of not having the industry knowledge, the biggest obstacle is the opposition of related interest groups. As Usher (2019) described at the very beginning of his books that “renewable energy is a surprisingly polarizing subject” (p. 1) which makes environmentalists, economists, and politicians eager to clarify their respective positions, it shows that energy is a political issue as well. From an international perspective, with a high proportion of imported resources, this affects a country's ability to withstand external shocks, including the financial crisis, regional conflicts, and climate change; domestically, air pollution, electricity prices, and energy security are all issues under the electoral system.

The energy transition is imperative for Taiwan to reduce vulnerability on the global stage, but under democratic mechanisms, sustainability ought to be from the perspective of everyone and fishery should not be marginalized in the developments based on offshore construction. Therefore, this thesis conducts a case study in Miaoli, which is a coastal fishing area and the site of the country's first offshore wind farm, Formosa 1 (Figure 1), to study the role that stakeholders played in the project and their contribution and attitude towards sustainable development; and from the statements provided by local government, association, academia, and local people to review the process and

outcome of Formosa 1 after its commercial operation in December 2019 (FOWI, n.d.). At the same time, the research explores the relationship between the project and affected locals to do a comprehensive analysis of the potential for the offshore wind farm to be sustainable in the nation, mainly from the perspective of the fishing communities to see how their livelihood changes reflect the development. The results of the study aim to understand the responses of local people under a global trend to further assist future sustainable development and assess the possibility of the first case of offshore wind power extending to other constructions as a good model, and in the meanwhile learning from its negative impact and potential harm so that strengthening the country in the face of challenges and mitigating more damage to the planet.

Figure 1.

Formosa 1 Offshore Wind Farm



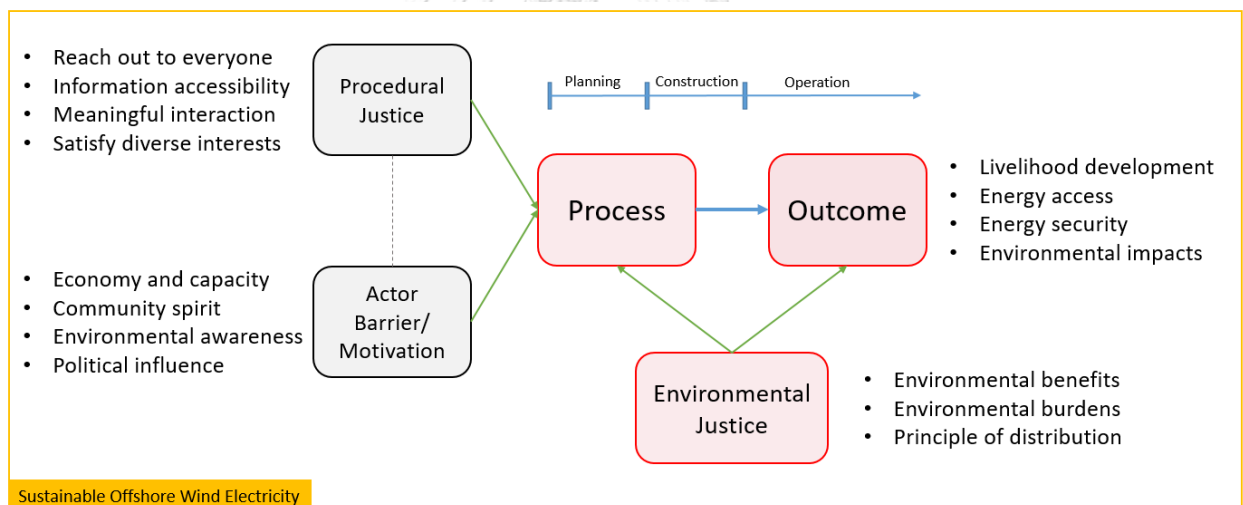
Note. From “News Center”, by FOW I, 2019, retrieved from: <https://formosa1windpower.com/news/>. Copyright 2019 by Formosa I Wind Power Co., Ltd.1.2
Conceptual Framework

1.2 Conceptual Framework

The research was answered from three dimensions focusing on different perspectives to see whether the process and outcome of the offshore wind project in Miaoli can be considered sustainable. First, from the experience of various stakeholders to evaluate the negotiation process of Formosa 1's planning and construction; then used evidence to analyze the sustainability of the outcome during the current operation; last, by collecting the opinion of affected locals to summarize the achievement of the project in terms of environmental justice (Figure 2).

Figure 2.

Conceptual framework



Note. Credit: the author.

To review the public participation, the study adopted the concept of Zuhair & Kurian (2016) to separate the practice of participation into procedural sides and actor barriers and integrated with findings of Webler & Tuler (2006) to respond the question that was the negotiation process in line with procedural justice and were there any

barriers for fishing households to participate. Webler & Tuler classified the statements that constitute good participation into four perspectives, and the present research used the four key statements covered by all perspectives as a measure of procedural justice.

The outcome was discussed in the context of sustainability, using the four opportunities of renewable energy towards sustainable development proposed by Owusu & Asumadu-Sarkodie (2016) to examine what were the anticipated and actual results of fishing livelihood changes in the operation period due to the wind farm. Then the discourse of environmental justice from Walker (2012) was also applied in the chapter to discuss how do fishing households think their new livelihood and if it had become more sustainable.

1.2.1 Process

The negotiation process in planning and construction was measured from two parts, procedural justice and the actor barrier. The procedural justice had involved different views from the local government, developers, scholars, and local communities, and four criteria were explored,

- (1) good processes reach out to all stakeholders;
- (2) share information openly and readily;
- (3) engage people in meaningful interaction;
- (4) attempt to satisfy multiple interest positions (Webler & Tuler, 2006).

Procedural justice is an approach to reach fairness and competence in deliberative participation, yet, other than that, Zuhair & Kurian (2016) pointed out socio-economic obstacles might also affect the consequence of public participation which bringing down the motivation of stakeholder. Therefore, the research selected four factors of social, environmental, political, and social-economic aspects separately to examine

their negative or positive impact on the community willingness to participate, including,

- (1) financial and human capacity (social-economic aspect);
- (2) community spirit (social aspect);
- (3) environmental awareness (environmental aspect);
- (4) political influence (political aspect).

1.2.2 Outcome

The outcome of the offshore wind project evaluated from the perspective of fishing households was focused on its potential to be sustainable during the operating period, in terms of both the livelihood and being a national/global citizen, hence the result was reviewed through four opportunities presented by renewable energy to assess the extent to which it met the conditions proposed by Owusu & Asumadu-Sarkodie (2016).

- (1) Social and economic development: did livelihood change for the better? How about industry transition and the implementation of localization?
- (2) Energy access: did the surrounding locals get any energy benefit or subsidies as compensation for the nearby construction?
- (3) Energy security: does the community feel safer regarding national construction and energy policy?
- (4) Climate change mitigation and reduction of environmental and health impacts: how do residents evaluate this project in response to international trends?

1.2.3 Environmental justice

According to Walker (2012) that “the criterion of just distribution should be expected to reflect the different meanings of goods and bads that emerge in particular

contexts” (p. 44), the definition of the environmental commons being benefit or burden varies from person to person, thus the research focused on how the affected community value the project as a whole before judging whether it was justice enough or not. After measuring their gains and losses during the process, the locals viewed the principle of distribution, and finally, gave their own opinions on environmental justice.

Walker, citing Bell (2004), indicated three principles of distribution, “principle of equality”, “principle of equality plus a guaranteed standard”, and “a guaranteed minimum with variation above that minimum according to personal income and spending choices”, which are applicable to different situation and people's perception of fairness and the adoption of principles in this area affected local residents' satisfaction with the project.

1.3 Research Methodology

The research applied the qualitative method to collect primary data with the focus group discussion and semi-structured key informant interview and used secondary data from academic papers, reports, and newspapers to review previous studies and fill the knowledge gap.

1.3.1 Data collection

Besides the literature review, more supplementary information was added during field investigations from May to July 2020, including related documents of the project process, local data, future plan, and present condition. Bilingual reference sources, English and Mandarin, were collected, so that increased the adequacy. The pre-work of primary data collection began with a leading discussion with representatives of the Nanlong Fishery Association, whose fishing area was partly occupied by the wind farm,

at the end of January to get an empirical review of the project, then the researcher conducted one-on-one interviews in May and June with open-ended surveys carried out face to face and, adapted to the evolving COVID-19 circumstance, via telephone and email as well.

One of the main purposes of the research is to explore the thought of the fisher, who, therefore, being the majority of the key informant interview. The information gathering focused on the two largest fishing harbor under the administration of Nanlong Fishery Association, Longfong and Waipu, and two main fishing methods, “gillnetting” and “pole and line”, among them. Fishers were selected from each of the groups to facilitate the analysis of different perspectives and attitude changes. Other interviews involved local officials from different departments of the Miaoli County Government who work on the related issues of fishery and the project, and the support from the academic group are the researchers with the local community and marine life experience (Table 2). Additionally, a direct observation also assisted in data collection.

Table 2.

Interview matrix

Participant		Tool	Number of Participant	Timeframe
Group	Type			
Fisher of Longfong Fishing Harbor	Gillnetting method	Key informant interviews	5	May 2020
		Group discussion *1	5	May 2020
	Pole and line method	Key informant interviews	4	May 2020
		Group discussion *1	3	May 2020
Fisher of Waipu Fishing Harbor	Gillnetting method	Key informant interviews	3	May & Jun. 2020
	Pole and line method	Key informant interviews	2	May & Jun. 2020

Nanlong Fishery Association	Representative and staff	Group discussion *1	2	Feb. 2020
	Staff	Key informant interviews (Email)	1	May 2020
Local government official	Economic Development Dep., Miaoli County Government	Key informant interviews	1	May 2020
	Environmental Protection Bureau Miaoli County Government	Key informant interviews (Telephone)	1	May 2020
Academics	Community experience	Key informant interviews	1	May 2020
	Marine experience	Key informant interviews	1	May 2020

Note. More details in Appendix chapter. Credit: the author.

1.3.2 Data analysis and coding

The data analysis went with the conceptual framework separating three sections (Table 3) and the questionnaire for semi-structured interviews was designed into three stages that are planning, construction, and operation to clarify the participation and implementation in different periods. The conversation was conducted in Mandarin and Taiwanese and translated into English afterward. Auxiliary tools like Microsoft software and Google translation and records, photos, and notes which took under permission were used. The field notes were coding in view of Bernard (2006) that the response from participants was classified by emphasized frequency and with different perspectives to be analyzed complied with the three core concepts, namely process and procedural justice, outcome and sustainability, and environmental justice to summarize for the research.

Table 3.

Date matrix

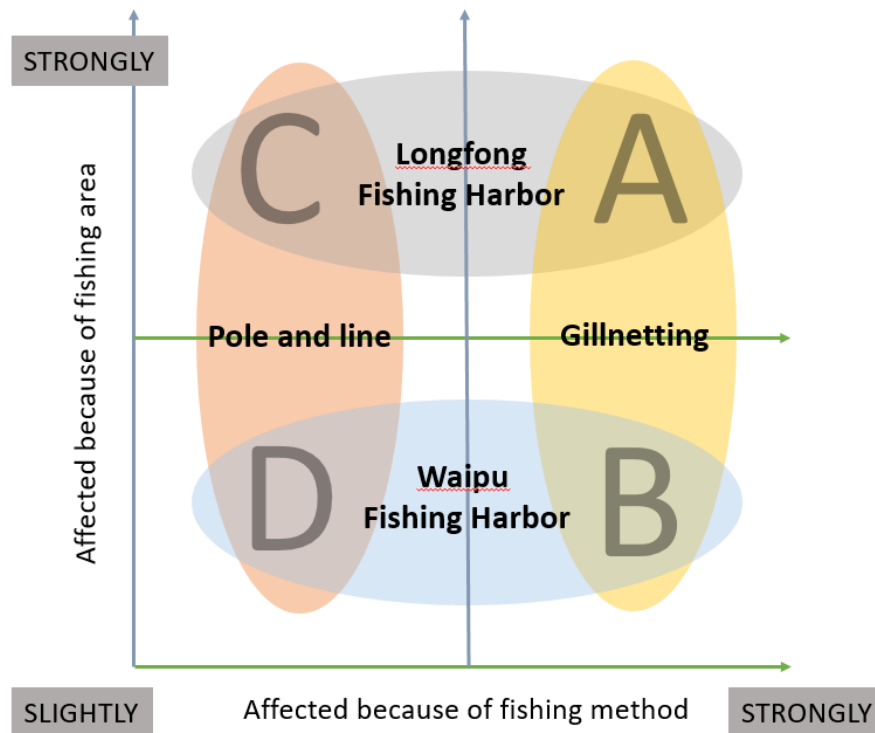
Concept	Data included	Source	Tool	Analysis
Process - Procedural justice -Actor barrier/motivation	<ul style="list-style-type: none"> ▪ Literature review of public participation ▪ Research of local experience ▪ Project process report 	<ul style="list-style-type: none"> ▪ Fisher ▪ Fishery association ▪ Government official ▪ Academics 	<ul style="list-style-type: none"> ▪ Secondary literature review 	<ul style="list-style-type: none"> ▪ Analyze the offshore wind electricity in the context of renewable energy in Taiwan ▪ Group the most common response from each stakeholder and transcript the data into English ▪ Summarize the interviews based on the framework and questions
Outcome	<ul style="list-style-type: none"> ▪ Literature review of sustainability ▪ Local livelihood data ▪ Report of project consensus 	<ul style="list-style-type: none"> ▪ Fisher ▪ Fishery association ▪ Academics 	<ul style="list-style-type: none"> ▪ Key informant interview 	
Environmental Justice	<ul style="list-style-type: none"> ▪ Literature review of environmental justice ▪ Local livelihood data 	<ul style="list-style-type: none"> ▪ Fisher 	<ul style="list-style-type: none"> ▪ Group discussion 	

Note. Credit: the author.

For further coding, fishers were divided into four categories in the light of their fishing area and method that affect them differently (Figure 3). The degree of influence from A to D gradually decreases, and from the previous review of reports to the actual interview, the difference became more obvious. Other samplings data were systematically grouped and represented by interview code recorded in Chapter Appendix.

Figure 3.

Degree of influence of four categories of Fishers



Note. Credit: the author.

1.4 Objectives of Research

The main objective of the study is to determine whether offshore wind electricity is a feasible solution to achieve inclusive sustainability, and in the meanwhile, to scrutinize three stages, planning, construction, and operation of the Formosa 1 project. In the planning and construction stages, the barriers of public participation in the national project and the degree of procedural justice practice were assessed; the outcome of local livelihood changes and the effectiveness of livelihood recovery in response to the global trend were evaluated in the operation period. In the last part, the research analyzed the social perspective on environmental justice and sustainable development because the project was just finished a few months ago from the time of

writing (July 2020) and in spite of some related investigations during the process, there was little academic research that reviewed after the case completion been found so far.

1.5 Research Scope

The research object of the thesis focuses specifically on the country's first offshore wind project, Formosa 1, from its support policy "Offshore Wind Power Demonstration Awards" being issued in 2012 (MEA, 2012) until its current (July 2020) operating period after the official launch in 2019 (FOWI, n.d.). With the span of about eight years, a wide range has been involved, and the research content is under the umbrella of sustainability to include the procedural justice and public participation of Environmental Impact Assessment and the compensation negotiation; the environmental justice and livelihood change of the project result. The stages of planning, construction, and operation are covered by the social perspectives of stakeholders such as fishers and academics.

1.6 Research Limitation

The research was conducted only in Taiwan with the case study of the only currently completed and operating project, which makes the result relatively regional-limited and lack of samples to compare and summarize. The study itself was also affected by the accessibility of information. Because of the confidentiality clause in the negotiation process, some of the official records are not available, and with the company regulation and business consideration, primary data from project developers and investors were comparatively insufficient and need to be complemented by open documents. The project started in 2012 and in some of the interviews, it was difficult

to date back to the early stage of the plan around eight years ago, leaving only one project report and make triangulations hard to reach throughout.

Furthermore, due to the impact of the outbreak of the COVID-19, doubts about in-person interviews had increased that affected the quality and quantity of reachable participants.

1.7 Significance of Research

There are three phases of the national policy of the offshore wind electricity that will mention in Section 2.2.1 and in which Formosa 1 belongs to the first phase, Demonstration Incentive Program (MEA, 2018a). It means more offshore wind projects are planning in Taiwan and shows the high demand for smoother progress in similar issues. With the investigation of the project's process and outcome and the understanding of the social and stakeholder's opinions, the thesis concludes the problems encountered and the directions that can be improved in the future. Thus, the highlight of the research results is from the perspective of the most affected community to examine the practice of sustainability as a global goal is economically viable, socially equitable, and environmentally friendly, and to contribute to a bottom-up mechanism for further implementation of the energy transition.

1.8 Ethical Issue

The study was conducted under ethical considerations. The participants of the fieldwork were ensured to be clearly informed, voluntary, in agreement, and properly confidential, as well as photos and recordings during the process were taken with the consent of them. The research is used for academic purposes.

1.9 Structure of Thesis

As Chapter 1 stated the question, concept, method, objective, scope, limitation, and significance of the research, Chapter 2 will systematically review previous academic papers to identify the existing knowledge and the unknown with fields of the connection between sustainability and offshore wind electricity, offshore wind electricity specifically in the context of Taiwan, and public participation in the energy sector. Chapter 3 is going to provide an overview of the case study, covering the fishery association and fishing harbors that related to the affected community, as well as the disputes around Formosa 1.

Chapter 4 and Chapter 5 will introduce the finds of the fieldwork. The three parts of the planning stage, site selection, Environmental Impact Assessment, and compensation negotiation, and the construction stage is going to be discussed in Chapter 4. Chapter 5 will focus on the outcome in terms of livelihood and environmental justice and the future of the series development of the offshore wind electricity. At last, Chapter 6 will draw conclusions with discussions, recommendations, and suggestions for future research to summarize.

CHAPTER II. LITERATURE REVIEW

The chapter will start from Section 2.1 to review the concept of sustainability in terms of offshore wind electricity to frame the big picture, and in Section 2.2, more background information about local context will be involved, covering environment-related policies, implementation plans, and present conditions in Taiwan. Then in Section 2.3, public participation will be discussed as a means to achieve sustainability, and last, Section 2.4, the knowledge gap will be provided from the finding of the literature review.

2.1 Sustainability in Offshore Wind Electricity

Sustainability is a tradeoff we propose to the world, but who is the subject, “we”, of the proposal? Government, individuals, countries, or human beings?; who’s the object, “world”, to sign on the agreement? biological world, the Earth, other people, or ourselves? Over the years, hundreds of definitions have appeared, some of which have disappeared, some have merged with others, and some have become mainstream. As Leach, Scoones & Stirling (2010) indicated that “sustainability did not always have such significant connotations..., it has a history” (p. 37). In 1987, “Our Common Future” made the vision of sustainability in the context of development, “humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 16), and then in 2015, Sustainable Development Goal was set with 17 directions to guide for more action and attention.

Being a branch of the big trend, renewable energy has its advocate to consider it as one of the “better ways” to balance development and nature. Owusu & Asumadu-

Sarkodie (2016) enumerated the opportunities of renewable energy towards sustainable development.

- (1) Energy security: with the relatively equal distribution around the world, renewable energy reduces the risk of importing and the vulnerability of countries to price fluctuations, thereby consolidating the reliable supply of energy and national security.
- (2) Social and economic development: considering the fact that economic growth is the most important factor in increasing energy use and also the living standard over the past decades, it's not surprising that social development, economic growth, and energy consumption are twined together.
- (3) Energy access: compared to traditional electricity supply which relies on a large-scale infrastructure mainly in the urban area, renewable energy-based mini-grid systems improve the accessibility for rural citizens.
- (4) Climate change mitigation and reduction of environmental and health impacts: being the strongest foothold of renewable energy, this advantage has almost become a slogan vigorously promoted.

Narrow down to offshore wind electricity, Keivanpour, Ramudhin & Kadi (2017) brought to light its sustainability under three pillars separately. On economic, in order to guarantee its long-term profitability and productivity, the evaluation of existing supply and future demand is the first task, followed by a cost-benefit analysis of investment after considering subsidies, local economic potential, and commercial competitiveness. They further emphasized that “the other aspect of economic sustainability is socioeconomic features including improving employment and economic opportunities and effective collaboration among stakeholders to facilitate and

expedite the offshore wind farm development and eliminate the barriers and challenges” (p. 9).

In the social dimension, it includes a wide range of social benefits, such as the citizen welfare, public acceptance of offshore wind power, energy security, and job creation; for the surrounding residents, its impact on the coastal landscape and the possibility of involving ports and fishing rights, or the implementation of community investment and local development are the focus of their attention. The concept of NIMBY which refers to “not in my back yard” had been applied to the offshore wind context as well, Gendell (2019) described the situation that even though people are beginning to realize the benefits of green energy, examples of protest continue everywhere, yet, the movement of PIMBY, “please in my back yard”, shows the trend to follow as well because more and more people have seen or foreseen the benign changes and economic benefits it brings.

In comparison with an onshore wind farm, the offshore base has more environmental uncertainty and challenges to overcome and research, especially in the face of the harsh marine conditions like waves, winds, weather, and water currents, for example, the requirement of special materials that can adapt to the ecology of the sea and feasible installation and maintenance procedures away from the coast (Kaldellis et al., 2015). Although reports of turbines as artificial reefs to gather fish have alleviated some doubts, the location of an offshore wind farm should also avoid affecting bird migration paths and biodiversity, and exclude protected and natural disaster danger areas. Environmental Impact Assessment is needed, and regarding site selection, Chaouachi, Covrig & Ardelean (2017) suggested Geographical Information System as a local data collection tool at the initial stage, then considering the limitation factor

from technical, regulatory, and economical aspects to screen potential sites for final assessment. Related to the issues of environmental sustainability, Huang, Gan & Chiueh (2016) saw the necessity of Life Cycle Assessment for turbines to cut back negative impact from non-renewable resource demands while pursuing clean energy.

2.2 Offshore Wind Electricity in Taiwan

Taiwan's energy development goal is “ensuring the balanced development of energy security, environmental sustainability, green economy, and social equity” (MEA, 2017b, p. 1). After the first National Energy Conference in 1998, the country reached a consensus on developing renewable energy and initiated the establishment of policy guidelines and strategic plans.

2.2.1 Offshore wind electricity policy in Taiwan

Following the discussions at the first meeting and two more national conferences, the “Renewable Energy Development Act” became their output and was published in 2009 to be the law source for further action (MEA, 2019a). With “non-nuclear country” as a national goal in the near future, the government fully promotes the energy transition and guide the development of correlative industries under the premise of stable power supply, and offshore wind electricity is one of the important projects. The energy-related law, “Electricity Act”, was amended in January 2017 to push greater encouragement for green power by giving priority to renewable energy while managing the electric power dispatching and connections (MEA, 2017a). Following the above amendment, the “Renewable Energy Development Act” completed its first major revision in April 2019 after ten years of implementation, and set the total generated amount of renewable energy for 2025 to be more than 27 gigawatts, which allocated

5.5 gigawatts to the offshore wind (MEA, 2019a).

In order to meet the goal within a given time, several actions have been started couple years ago to bring the country closer to its vision, for example, the “Offshore Wind Power Demonstration Awards” began in 2012, the “Points of Siting Application for Offshore Wind Power Project” announced in 2015, and the “Wind Power Four-year Promotion Plan” set in 2017, and among them, two crucial policies were adopted to make it easier for Taiwan to pass through the initial unfamiliar stage. First, based on international experience, used the model of “First Feed-in Tariffs, Then Auctions” to attract quality developers; second, applied three-phase development strategy, which started from Demonstration Incentive Program, then Potential Zones Construction, and in the long-term plan, it is expected to become a large zonal and national cluster (MEA, 2018a).

As a reference for the project candidates, the “Direction for Allocating Installed Capacity of Offshore Wind Potential Zones” (MEA, 2018a) identifies the requirements that should be met during the application stage and from which we can find its responsibility for sustainable development. Besides reporting the environmental impact statement, which is the basic qualification of becoming a Qualified Project, the applicants need to mention their practical approaches to drive the local industry, train local talents, promote social development, facilitate environment integration, and avoid or mitigate the damage of ecosystem in the proposal. Other substantive proof related to wind farm development is also the mandatory supporting information, such as research of underwater cultural heritage, the permission of submarine exploration, opinion report of fisheries, or agreement letter from the local government, and when it comes to the affected community, there are two major laws that protecting their rights. “Benchmark

of Fishery Compensation for Offshore Wind Power Plants” established a compensation mechanism to compensate the fishers for their possible economic losses due to wind farms, and “Measure for the Use and Management of Electricity Development Assistance Fund” was derived from “Electricity Act”, which stipulates the raising of “Electricity Development Assistance Fund” and indicates its purpose to give back to the society and with a certain percentage to allocate to the fishing association and local government for the development of nearby areas and welfare of surrounding residents. The whole selection procedure will be overseen by experts, representatives, and scholars with offshore wind power specialty to ensure that the chosen developers fulfill their responsibilities to the environment and people (MEA, 2018c).

2.2.2 Offshore wind electricity plan in Taiwan

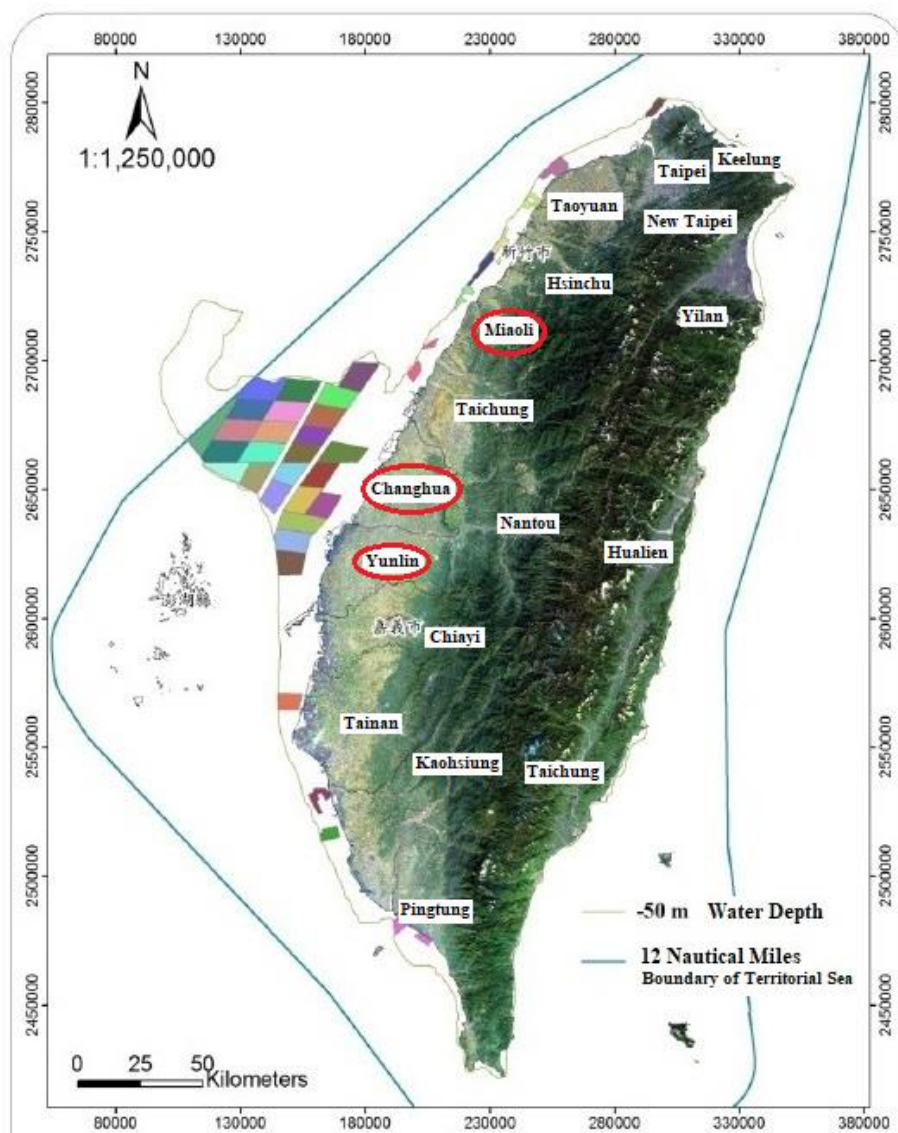
As Bureau of Energy announced thirty-six potential farm sites, mainly located on the Taiwan Strait off the coast of Miaoli, Changhua and Yunlin counties (Figure 4) in 2015, Taiwan's offshore wind development begins to accelerate. The government started from scratch with the three-phase development strategy, in addition to achieving the assigned target in the medium term, also hoping to lay a good foundation for continued and steady growth in the future.

The first phase, Demonstration Incentive Program, was officially launched after the publication of the “Offshore Wind Power Demonstration Awards”, which authorized by the “Renewable Energy Development Act”, in 2012, planning to complete the setting up of three demonstration wind farms by 2020 (MEA, 2019a). At the time of writing (July 2020), one of them, Fuhai Offshore Wind Farm, is stuck in the environment impact assessment dispute, and the second one, Taipower Offshore Wind Farm, is expected to finish by the end of 2020 after multiple invitations and failures of

tender. The only one that was completed, Formosa 1 Offshore Wind Farm, which is also the only one of the country and the case study for this research, was operated at the end of last year, 2019.

Figure 4.

Data of Taiwan's 36 potential offshore wind farm sites



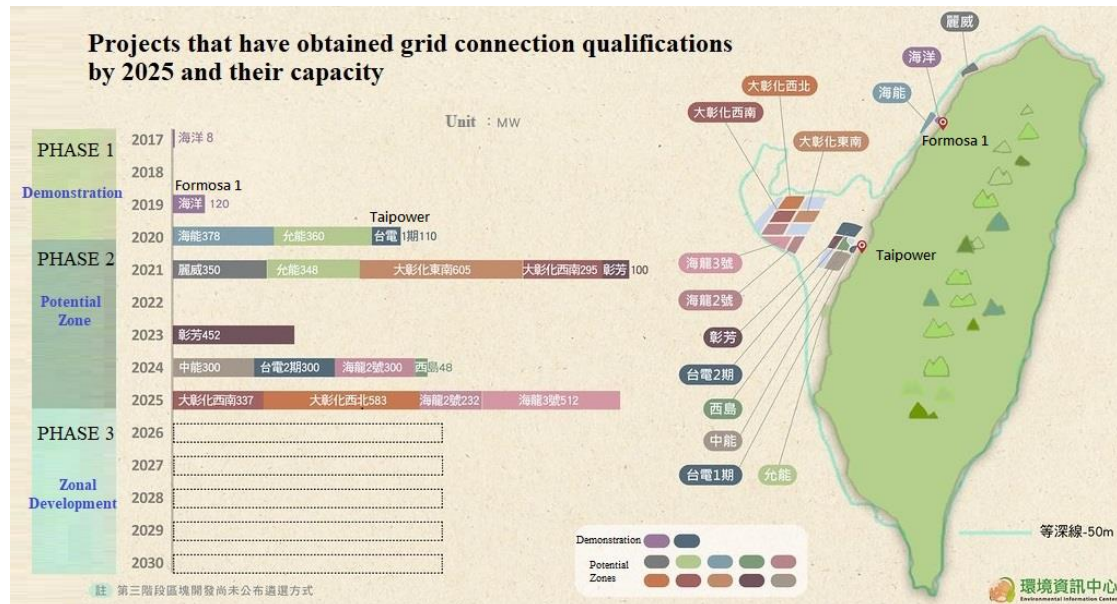
Note. Red circles mark the three main counties, Miaoli, Changhua and Yunlin, where have more potential sites. Adapted from “Potential Site”, by Thousand Wind Turbines Project, n.d., retrieved from: https://www.twtpo.org.tw/offshore_show.aspx?id=963. Copyright by Industrial Technology Research Institute. Originally Mandarin, translated by the author.

In the second phase, Potential Zones Construction began in 2015 with the disclosure of potential sites and the release of "Direction for Allocating Installed Capacity of Offshore Wind Potential Zones", and applications from interested manufacturers were opened. From the strategy, "First Feed-in Tariffs, Then Auctions", there are two batches for the projects with feed-in tariffs, complete in 2020 or complete before 2025, and auctioned projects are required to provide electricity in 2025 (MEA, 2018a).

So far, both phases are actively underway. They are responsible for 5.5 gigawatts of renewable energy distributed to offshore wind electricity in accordance with the national policy and will gradually join the mission of supplying clean power with the first one, Formosa 1 Offshore Wind Farm (Figure 5). The third phase, Zonal Development, is a long-term program that aims to drive the innovation of independent technology and industrial development with economies of scale (TWTPO, n.d.). However, there are still some policy and technological supporting measures need to be improved, for instance, the dedicated dock and industrial zone near the location for assembling and installing, the training of maritime engineering construction fleet, alternatives for promoting more harmonious relations with fisheries, and ecological protection mechanism (Bureau of Energy, 2017). Other additional positive effects should also be included in the plan and implemented effectively, such as deeper ocean research and information gathering, because this is not only helpful for further development plans, more knowledge allows us to have a better grasp of environmental issues in the future.

Figure 5.

Offshore wind power development planned by the Ministry of Economic Affairs by 2025

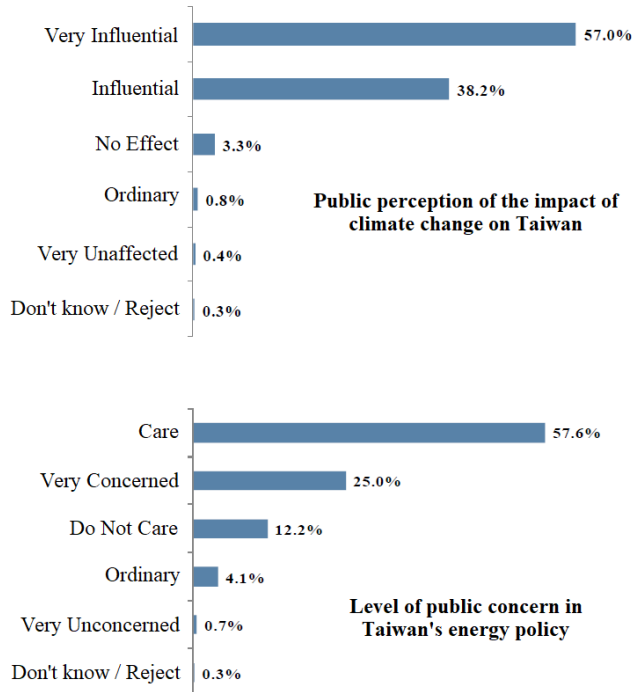


Note. The three gradual green blocks on the left represent the construction years that are expected to be completed in each of the three phases, while the red markers on the map on the right represent demonstration wind farms, which are located in Miaoli and Changhua respectively. Adapted from “Three more offshore wind farms to be launched in 2020”, by Taiwan Environmental Information Center, 2020, February 20, retrieved from: <https://e-info.org.tw/node/223117>. Copyright 2020 by Taiwan Environmental Information Center. Originally Mandarin, translated by the author.

2.2.3 Sustainability and electricity in Taiwan

Risk Society and Policy Research Center (2018) used Stratified Random sampling to conduct a telephone interview, “Survey Report on Public Perception of Taiwan's Energy Transition”, of people over the age of 18 living in Taiwan, the result found out that 95% of the interviewees said climate change has a certain impact on the country and over 80% of the respondents are concerned about Taiwanese energy policy (Figure 6), however, more than half feel they are not clear about national clean energy policies, which in turn has affected the practice of promoting energy transition and more construction.

Figure 6.

Survey Report on Public Perception of Taiwan's Energy Transition

Note. A total of 1,068 participants. Adapted from “Survey Report on Public Perception of Taiwan's Energy Transition”, by Risk Society and Policy Research Center, 2018, *College of Social Science, National Taiwan University*, pp. 2, Figure 1 & pp. 3, Figure 2. Copyright 2018 by College of Social Science, National Taiwan University. Originally Mandarin, translated by the author.

Being one of the newly industrialized countries in 1960, Taiwan's electricity consumption had increased year by year, and as Taiwan Power (2019) stated:

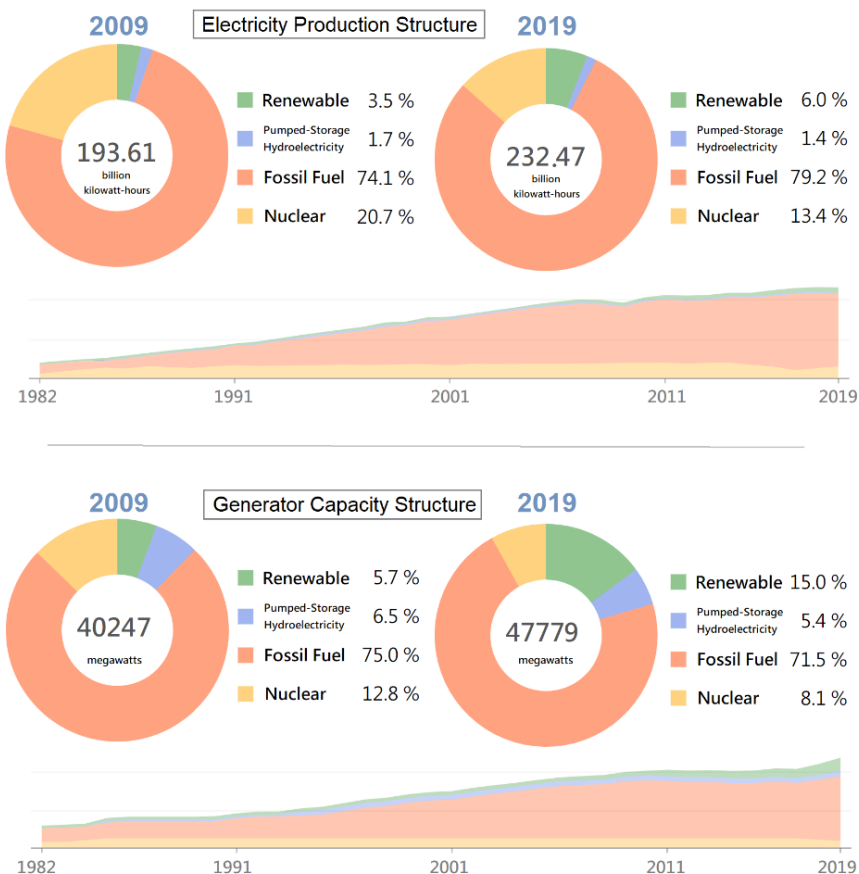
“The original hydropower was in short supply, so that was gradually replaced by fossil fuel power, however, Taiwan itself has almost no raw material for power generation and needs to rely on imports. The situation in the Middle East of the source of imports was long-term unstable during the time, therefore, around 1970, the Minister of Economic Affairs at that time, Mr. Sun, decided to build the nuclear power plant to ensure stable energy supply to support the booming domestic economy.”

And it made the energy matrix of Taiwan now dominate by coal, natural gas, and two nuclear power plants, each accounting for 46%, 33%, and 12% in 2019 (Bureau of Energy, 2019)

Since the “Renewable Energy Development Act” was issued in 2009, even though the amount of power production is still relatively low, the capacity of renewable energy generators has continued to increase every year (Figure 7), but there is still a lot of room for the effort to reach the goal of 2025, which are "achieving an electricity generation structure with 20% renewable energy, 50% natural gas, and 30% coal burning by 2025, and stable power supply" and “becoming non-nuclear country” (Office of the President, 2016).

Figure 7.

Electricity production and generator capacity structure of Taiwan



Note. The data is collected from Taiwan Power, the biggest and state-owned electricity industry which supplied 70% of the country's electricity in 2019, and other national power sources including private power plants and self-use power generation equipment (Bureau of Energy, 2019). Adapted from “Electricity production and generator capacity structure”, by Taiwan Power, 2020, retrieved from: <https://www.taipower.com.tw/tc/page.aspx?mid=204>. Copyright 2020 by Taiwan Power. Originally Mandarin, translated by the author.

In addition to the dispute over the allocation of various types of power generation as a national target, there are many different voices for the development of renewable energy itself. Take offshore wind as an example, the first is concerns about the government-guaranteed feed-in tariffs, on the one hand, a gap of about US\$ 0.1¹ per kilowatt-hour between the price of feed-in tariffs and auctions paid by the government (MEA, 2019b) made some people feel that their tax money is being abused; on the other hand, the worry about the increasing of overall electricity bill after renewable energy integrates into the grid because of its generation costs from immature technology (Liao, 2019). Second, regarding public acceptance and social perception, such as ecological impact, fisheries debate, and procedural justice, is discussed more in the following chapters.

These issues reflect some of the longstanding problems, for instance, the long-term electricity price subsidy policy has made people lose the awareness of actual costs, and the fact that the public did not play an active role in the production of social knowledge became a barrier to communication. Zhao & Fang (2019) was calling holistic policy thinking of energy transition and social transformation together to form social robustness, which from the explanation of Seijger et al. (2016) referred to

¹ Feed-in tariff of offshore wind in Taiwan was US\$ 0.195 (NT\$ 5.8498) in 2018, US\$ 0.184 (NT\$ 5.5160) in 2019, and US\$ 0.170 (NT\$ 5.0946) in 2020 per kilowatt-hour; auction price released in 2019 was US\$ 0.074-0.085 (NT\$ 2.2245-2.5480) per kilowatt-hour (MEA, 2019b).

“knowledge that is relevant and accepted by actors in the context of its application” (p. 393) so that diverse groups can be motivated and involved in the conversation of energy supply.

Ministry of Economic Affairs (2018) had clarified that the price was in line with international standards, and the policy of feed-in tariffs is a necessary way to attract and protect investors at the initial stage to create an economic scale. Besides, the country's electricity price stabilization mechanism will keep households from a sudden surge in costs and the main difference will be in the use of electricity by industry. Nevertheless, there still many challenges waiting to be overcome and many thoughts requiring consensus while walking towards sustainability, not only between the government and the people but also between the political parties.

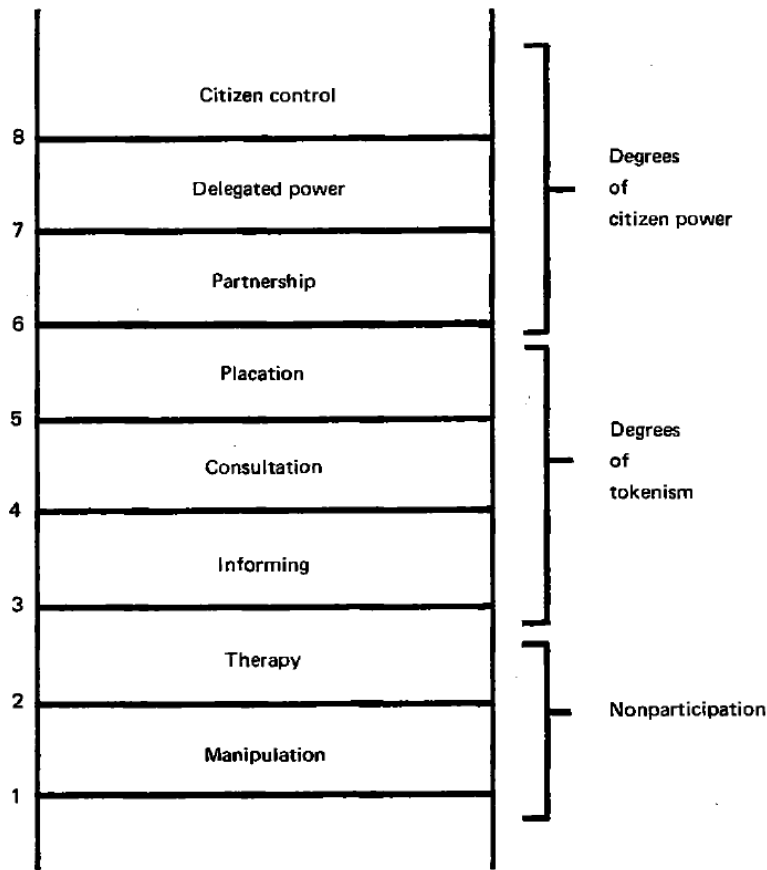
After 2016 the new government coming to power, it pushed the 2017 Electricity Act Amendment which one of the articles is “nuclear power generation equipment should stop operating before 2025” (Office of the President, 2017, Article 95) to be replaced with renewable energy and natural gas. Yet opponents stated that “it is a way to break the current road before finding out a new solution”, “it is not feasible with existing technology”, and “the aggressive development of renewable energy and natural gas generation has destroyed biodiversity”; and with the argument that “using nuclear electricity as a backing of people's livelihood, economy, and national security, so that pragmatically plan the national energy policy” (Huang, 2018) to be one of the cases of 2018 Taiwanese referendum held on November 28. The voting result abolished the article with a 54% agreement of all participants (CEC, 2018) and brought about another amendment to the “Electricity Act” in early December of 2018. Energy transition debates on the use of nuclear electricity and the pace of renewable energy are continuing

even after the "Go Green with Nuclear" (Huang, 2018) argument passed the referendum, apart from that, the foreign-investment-oriented construction of offshore wind farm and its possibility of localization are public concerns as well. Under these circumstances, Chien (2020) suggested to treat the development of offshore wind electricity as a “green societal mission”, so that the government is “able to reunite its developmentalist drive for growth with the rising environmentalist demand for energy transition, sustaining its dominant role in the emerging green economy” (p.805).

2.3 Public Participation

Public participation, a vocabulary that people are getting used to adding to daily conversation, seems to be within reach under the increasingly popular democracy, yet most of the time, it doesn't mean that power has been evenly distributed to citizens. Arnstein (1969), back in half a century ago, gave her answer to this controversial term, “It is the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future” (p. 216). But she went on to point out the difference in degree. Eight layers (Figure 8) of the extent of the publics' power in decision-making were distinguished to expose the true colors of “participation”. From the bottom level of being a “patient” in the empty ritual waiting for educating and curing, to the upper stage of having the opportunity to express opinions that may not be taken into account, and finally, reach the top rung of negotiating and controlling.

Figure 8.

Eight rungs on a ladder of citizen participation

Note. From "A Ladder of Citizen Participation", by Arnstein, 1969, *Journal of the American Planning Association*, pp. 217, Figure 2. Copyright 1969 by Journal of the American Planning Association.

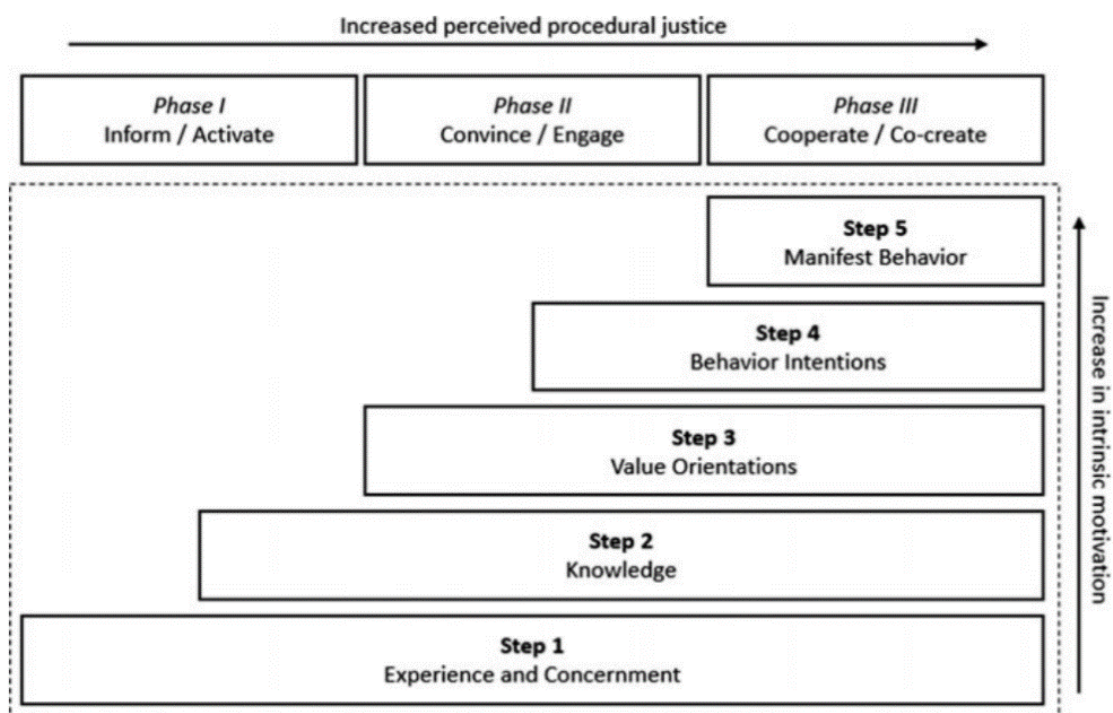
The booming of participation in development with alternative movement to prosper the local can be dated back to the early 1980s as a result of the failure of colonialism's top-down approach and, in the same period, the Participatory Rural Appraisal as a method to involve participation in development was rising rapidly after the advocacy of Robert Chambers, and thus the human-centered concept is progressively entering the international development agenda (Veit, 1998; Mikkelsen, 2005). Oakley (1991), despite also questioning that the participation in reality might even weaker than in rhetoric, especially when it was classified as a means rather than

an end, still proposed the positive arguments to support the importance of participation in the local project, including efficiency, effectiveness, self-reliance, and wider coverage of people who can benefit from development.

In the context of the environment, Zimmermann, Bäumer & Müller (2018) proposed the Stage Model of Participation, trying to explain the situation in which people are willing to involve more. In Figure 9, in addition to the progressive stage of communication on the horizontal axis, four factors of procedural justice, namely the possibility of expression, a respectful approach, confidence in the motives, and neutrality of the decision-maker, also effect on the change of state, and elements at the psychological level are competence, autonomy, and social integration. The five positions of a participant in the model can give authorities a clearer strategic direction to promote participation.

Figure 9.

Stage Model of Participation for the environmental context



Note. From “Achieving a Climate-Neutral Campus: A Psychological Analysis of the Participation Process with the Stage Model of Participation”, by S. Zimmermann, T. Bäumer & P. Müller, 2018, *Handbook of Sustainability and Social Science Research*, pp. 243, Figure 1. Copyright 2018 by Springer.

Typically, energy policy is seen as a technical process or, to some extent, a political means, and now it's also recognized that social values towards electricity plan matter, wherefore the importance of participation is becoming increasingly apparent.

2.3.1 The politics of public participation

Few would deny that participation, like many other mechanisms wrapped in knowledge, cannot break free from the shackle of the power structure, although it was expected and supposed to be written on the prescription to overcome the uneven relationship among stakeholders in development. In most projects in the community, locals are inherently vulnerable because of barriers to knowledge, lack of social status, and related experience that make them passive participants, or social pressure that lets them unaffordable for the accusation of impeding national progress. Hildyard et al. (2001) criticized that “many participatory projects rest on the dubious assumption that simply identifying different ‘stakeholder’ and getting them around the table will result in a consensus being reached that is ‘fair’ to all” (p. 69). The so-called external experts forget that it is not just the "correct" procedure that brings them to the end but also the respect for justice and relations on an equal basis, or, ironically, that's how they achieve their destination.

Social structure is another aspect where power is deeply permeated. When it comes to negotiation with the outsider, locals are often represented by organizations, whether existing or responding, but will it become another issue in the politics of public participation? Because vulnerable communities, poor households, or dissenting

individuals may still be excluded from the formal and highly visible institutions (Cleaver, 2001). On the other hand, the developer might become victims as well since the locals have “precious indigenous knowledge” or their identity sometimes enables them to make unreasonable requests (Mosse, 2011).

In spite of all the challenges, Masaki (2004) was relatively optimistic to see the wrestling of two forces as a daily social dynamic by bringing together Giddens’s structuration theory and Foucault’s conception of disciplinary power. Following the argument of the relationship between structure and actors, Hickey & Mohan (2004) promoted citizenship as a solution to address the social exclusion caused by current developing practice since it “provides a means of linking participation with the emerging ‘right-based’ agenda” (p. 12).

The energy sector has always had some controversy, for example, environmental damage, political bullying, and capitalist oppression. In terms of the politics of public participation in renewable energy, its advantages of energy security and access reviewed in Section 2.1 have been expected to become one of the strengths for more equal access to electricity resources and a more equitable distribution of political power to embrace justice and inclusiveness in decision making.

2.3.2 Public participation in Taiwan

As Freedom House (Repucci, 2020) launched “Freedom in the World 2020” with a negative note, “most established democracies have experienced declines over the past fourteen years”, Taiwan remained its high score in political rights and civil liberties being evaluated as one of five Free Countries in Asia, however, can this directly indicate its achievements in public participation?

“Administrative Procedure Act” was announced in 1999 with the objective to

ensure a fair, open, and democratic process to protect the rights and interests of the people (Ministry of Justice, 1999), and it marked a milestone that governments were beginning to value citizen participation. There are four types of mechanisms that carrying out by the authority under the norm, (1) public viewing, letting the general public has a certain degree of understanding of policy information; (2) seminar, more specifically explaining the policy direction to the public; (3) public hearing, joining by experts and relevant interest groups, and collecting public opinions; (4) hearing, giving stakeholders the opportunity to present and clarify issues (RDEC, 2017). Other forms of participation like referendum mentioned in Section 2.2.3, election, protest demonstration, call in political programs, citizen cafe, internet voting system, social media, are also channels that people can voice out.

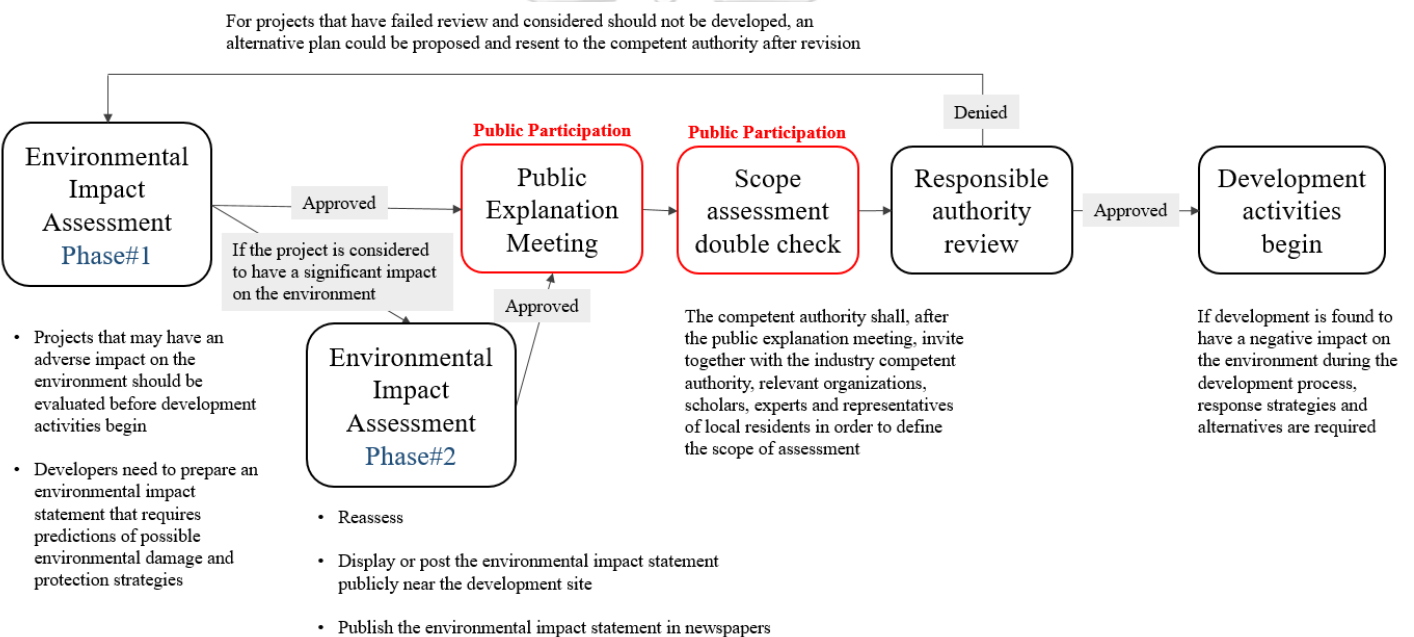
On environmental issues, “Environmental Impact Assessment Act” (EPA, 2003) protected people's right to participate. It can be seen from Figure 10 that during this process, citizens have some opportunities to access the proposal, however, if the assessment does not need to enter the second phase of assessment, there will not be a more rigorous public hearing process to allow affected group to better understand the issue and express their opinions, and this is the case for most offshore projects (Chen & Zhang, n.d.).

Effective public participation depends partly on the willingness and ability of the organizing agency and partly on civil awareness and literacy, however, there are several reasons that let policymakers hesitate to engage further citizen participation, for instance, the government considers that the public is pursuing self-interest rather than the general interest and they doubt about whether participants can represent all the different opinions or not, furthermore, more citizenship in the process means that the

government's role in decision making will be redefined. It points out the dilemma that without restriction or a well-designed mechanism, the actions will instead lead to inefficient administration functions (Chen, 2017). Other problems such as the deliberate exaggeration to create media influence will eliminate the original purpose of expanding participation as well.

Figure 10.

Flow chart of the Environmental Impact Assessment Act



Note. Information form “Environmental Impact Assessment Act”, by Environmental Protection Administration, 2003, Taiwanese Government. Draw by the author.

2.4 Knowledge Gap

As having discussed above, energy transition in Taiwan is one of the urgent priorities, part of which is to build resilience and partly to be responsible for the environment, and offshore wind electricity, which is relatively new but full of potential, is ready for innovation, however, the supporting measures are still incomplete,

perspectives are still inconsistent, and researches are still insufficient. For instance, Changhua County's offshore sea is the area with the most potential wind farm sites in Taiwan, but so far there has no wind turbine, and ongoing projects are not smooth as well. The main reason behind this would be the obstacle to reaching consensus among everyone or the lack and not implemented of public participation, hence the present research will fill gaps of the practical knowledge and the social participation result of offshore wind electricity in Taiwan by analyzing the very first offshore wind project in the country, expecting to provide information from the experience of the people to reduce social costs when developing towards sustainability.



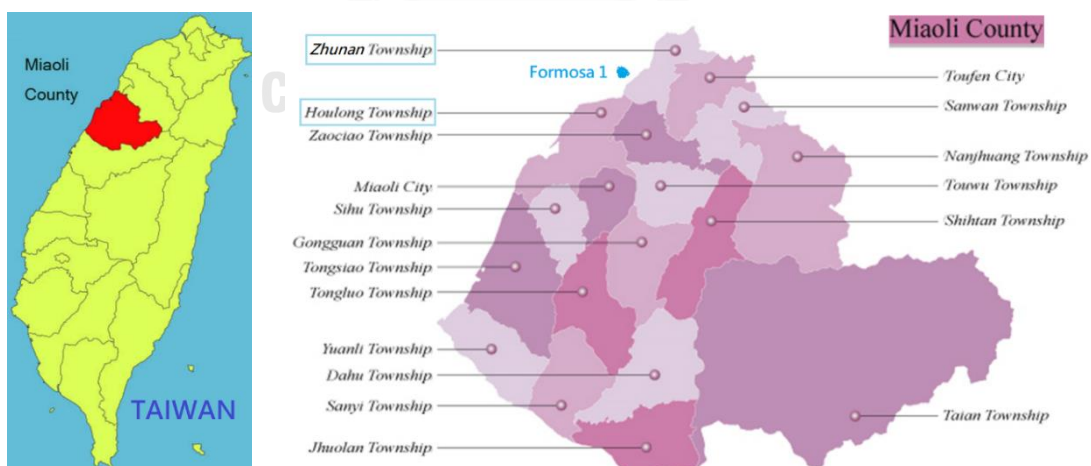
CHAPTER III. BACKGROUND OF CASE STUDY

The chapter details the background of the project policy, investors, disputes, and communities. In Section 3.1, two of the biggest fishing harbors under the Nanlong Fishery Association and the association itself in Miaoli County is narrated; in Section 3.2, the history of Formosa 1 from 2013 is outlining, with findings of a few previous research supporting.

The case study is based on Taiwan's first offshore wind project, Formosa 1, the launch ceremony of which was held on November 12, 2019, with the commercial operation began on December 27, 2019. It is located on the offshore of Zhunan and Houlong Township in Miaoli, a county on the northwestern coastline of Taiwan (Figure 11), having 22 turbines to generate 0.128 gigawatts in total, and with the capacity, it can provide 128,000 households with electricity for one year (FOW I, n.d.).

Figure 11.

Formosa 1 in Miaoli, Taiwan



Note. Left: Miaoli in Taiwan; right: Formosa 1 in Miaoli. Left: adapted from “Popular Tourist Spots in Miaoli, Taiwan”, by Taiwan Tour Guide Website, n.d., retrieved from: <http://mays2.weebly.com/9679-334952664732291-26053369383526420809-2622340670---miaoli-county.html>. Copyright by Taiwan Tour Guide Website; right: adapted from “Geographical environment”, by Miaoli County Gov., n.d., retrieved from: <https://www.miaoli.gov.tw/cp.aspx?n=260>. Copyright by Miaoli County Government.

After the “Offshore Wind Power Demonstration Awards” which has been mentioned in Section 2.2.2 announced in mid-2012, with five categories of scoring criteria (1) executive ability of the work team; (2) plan of demonstration wind farm; (3) plan of demonstration wind units; (4) development plan of wind power industry and its benefits; and (5) promotion plan for offshore wind power applications (MEA, 2012), Formosa 1 was chosen as one of three demonstration projects in January 2013 (TWTPO, n.d.).

The project is run by a joint venture of shareholders from four nations with different expertise. Taiwanese Swancor (7.5%)² was responsible for leading the development and operation management of the project, Danish Ørsted (35%) served as a consultant for offshore wind power construction, and Australian Macquarie’s Green Investment Group (25%) provided financial services and management; a cooperation agreement was signed in 2017 within these three companies, and Japanese JERA (32.5%) joined the investment at the end of 2018 (Swancor, n.d.)

During the construction, there are many foreign participations, for example, turbines from Germany, techniques from Belgium, and vessels from the UK (Hsu, n.d.), which opened up the new market while bringing knowledge and experience to the host country, however, the diversity may also become an obstacle. In addition to language and culture barriers, doubts about local interests and requirements for localization are also challenges, and that’s the sticking point of negotiation among investors, government, and citizens. Gao (2019) criticized the poor implementation of industry localization in the developer selection process was because of the upcoming election that the politicians would like to reach a milestone to persuade the ballot thus lowering

² The shares held by each company

the standard. Chen (2020) observed that even though the Ministry of Economic Affairs had planned the development of local production and supply, the scale is still small and not comprehensive enough to form the local supply “chain”, especially the offshore part of the engineering with the highest technical barrier.

The fishery benefiting from the convenient location near the Taiwan Strait is another industrial issue in the construction of wind farms because Formosa 1 is built on the fishing area of the local fishers of Nanlong Fishery Association (Figure 12).

Figure 12.

Nanlong Fishery Association in Houlong Township



Note. From “Nanlong Fishery Association”, by National Fishers’s Association Taiwan, n.d., retrieved from: <http://www.rocnfa.org.tw/prg30/prg3010.aspx?Tid=LocalM&IId=01#prettyPhoto>. Copyright by National Fishers’ Association Taiwan.

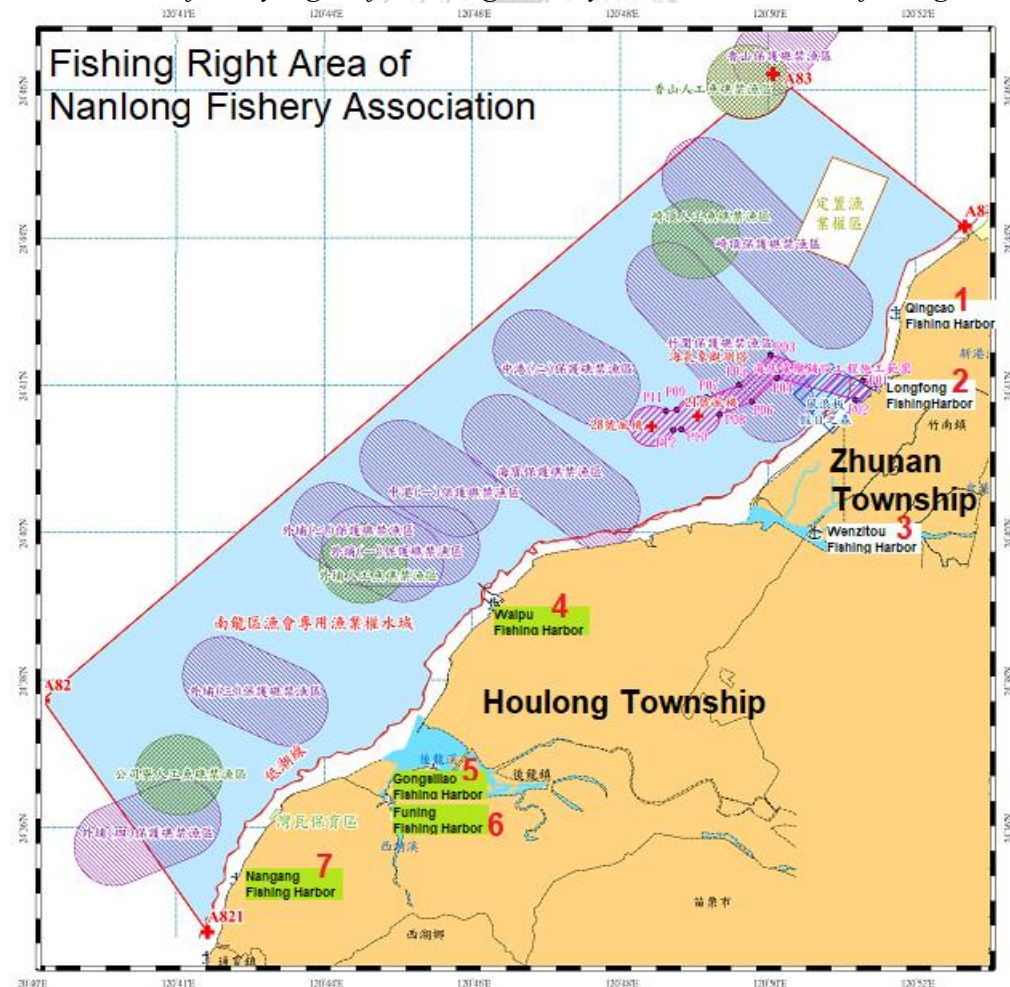
3.1 Nanlong Fishery Association

In 1981, two fishery associations of Zhunan and Houlong Township respectively were merged into Nanlong Fishery Association with the government’s “Taiwan Local Fisheries Association Merger Plan” released in 1976. There are 325 fishing boats registered under the association, which is in charge of operations like fishing rights, fish

market, and fishery facilities for fishers from Zhunan and Houlong Township and it also represented the local voice towards the offshore wind project (NLFA, 2020). The exclusive fishery right of the association is the area extending three nautical miles from the shore, except for protected areas, sailing path, and other fishery rights, and there are seven fishing harbors within the area, from north to south in order are Qingcao, Longfong, Wenzitou, Waipu, Gongsiliao, Funing, and Nangang (Figure 13). Apart from the area, the exclusive right has restrictions on the type of fishery, the type of catch, and related administration as well (Gan & Chiu, 2015).

Figure 13.

The exclusive fishery right of Nanlong Fishery Association and its fishing harbors



Note. Within the red line is the exclusive fishery right of Nanlong Fishery Association and the red numbers represent the seven fishing harbors under the fishery association. Fishing harbors with white backgrounds are in Zhunan Township; fishing harbors with green backgrounds are in Houlong Township. Adapted from “Miaoli County exclusive fishery rights”, by Fisheries Agency, 2016, *Council of Agriculture, Executive Yuan*. Copyright 2016 by Council of Agriculture, Executive Yuan. Originally Mandarin, translated by the author.

Miaoli County has two fishery associations, Tongyuan and Nanlong, and the latter one was the development focus of the local government with the area’s largest fishing harbor, Waipu, within the management. Waipu Fishing Harbor was considered the “Central Fishing Harbor” because of its complete facilities and convenient transportation while Longfong being the second scaled (Lin, 2018b). The fisheries of the region are mostly coastal and a few inshore, and there is no deep-sea fishery. Over the past few decades, the catch and the number of fishing households have fluctuated, but in the later period, they have both dropped (Table 4 & Figure 14). Among the coastal fishery, “gillnetting” and “pole and line” are the two main fishing methods.

Table 4.

Coastal fishery production of Nanlong Fishery Association

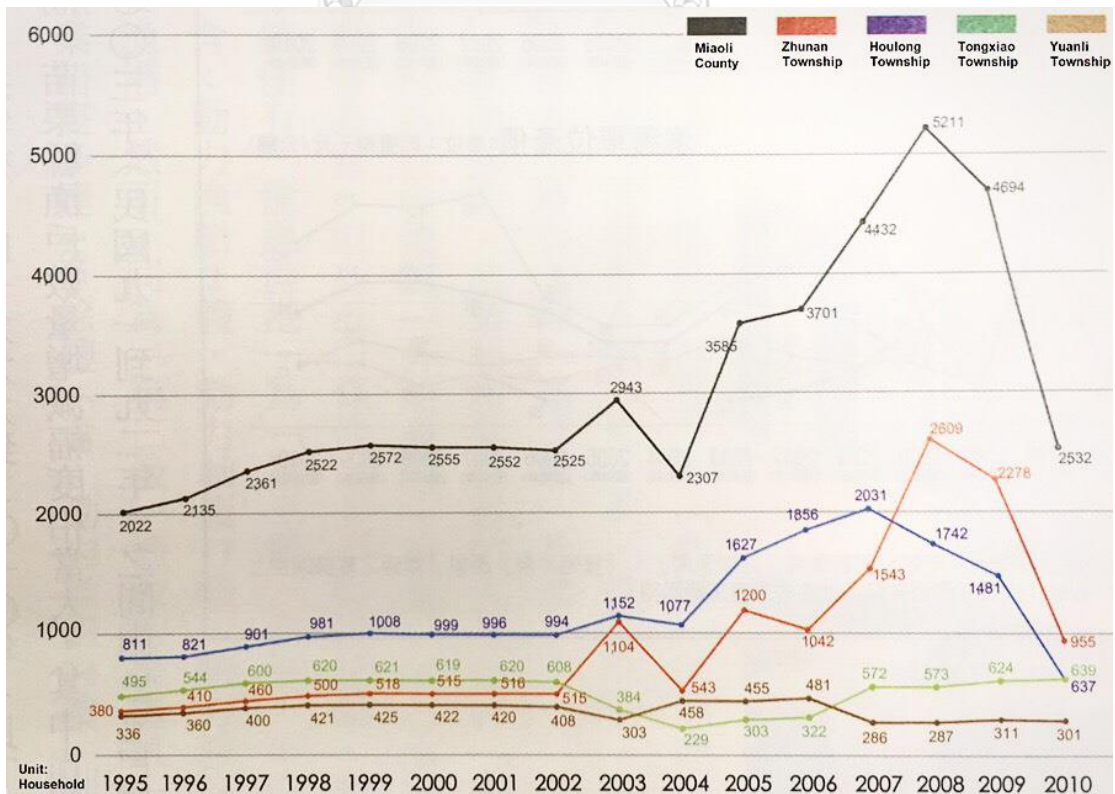
Year	Weight (metric ton)	Value (US\$ 1000)
1994	1,041	2,546
1995	1,554	5,150
1996	1,544	9,500
1997	1,296	4,445
1998	1,118	6,084
1999	1,106	4,589
2000	926	2,711

2001	1,389	3,090
2002	1,311	5,317
2003	964	5,677
2004	628	3,364
2005	660	4,546
2006	552	3,518
2007	629	3,002
2008	627	2,142
2009	744	2,706
2010	460	1,774

Note. Adapted from “Local Chronicles of Zhunan Township - Main Text Volume”, by X.-C. Lin, 2018b, *Zhunan Township Government*, pp. 388, Table 5-2-2-2. Copyright 2018 by Zhunan Township Government. Originally in NT\$, edited by the author.

Figure 14.

Fishing household of Miaoli County's four coastal township



Note. The red line shows the fishing household of Zhunan Township while the purple line is for Houlong Township. Adapted from “Local Chronicles of Zhunan Township - Main Text Volume”, by X.-C. Lin, 2018b, *Zhunan Township Government*, pp. 388, Table 5-2-2-4. Copyright 2018 by Zhunan Township Government. Originally Mandarin, translated by the author.

3.1.1 Longfong Fishing Harbor in Zhunan Township

Zhunan (Figure 15) had about 87 thousand people in 2020 May and was the top three in Miaoli County (MLHR, 2020). The main driving force for population growth in the township was the tech zone and urbanization, pushing it accounted for 68% of Miaoli’s Gross Town Product (GTP) in 2011 (Lin, 2018b). In the labor statistic of the Miaoli government in 2017, 47.96% of the citizens were engaged in manufacturing, 46% worked in the services-based industry, and only 6.04% had jobs in the primary sector, which were mainly agriculture and fishery (ASD, 2018).

Figure 15.

Local market in township center of Zhunan



Note. Zhunan is the third biggest township in Miaoli County. Credit: the author.

Longfong Fishing Harbor is where Formosa 1 locates right outside and is the second-largest harbor of Nanlong Fishery Association, having 99 of the 325 registered boats (NLFA, 2020). It was planned in 1982 thanks to the abundant fishery along the coast of Zhunan (Lon, 2018), and more facilities such as Fishers Activity Center, fish market, and fish auction area were built one after another to add the diversity. The tourist industry was facilitated by attracting people with its location near the West Coast Expressway, the discovery of the conservation dolphin, and the ancient fishing method, Taiwanese Beach Seine, which is about to disappear (Yao, 2002). The once-a-day fish auction (Figure 16) is also well-known, and especially on weekends, it will attract crowds to appreciate this “fresh” and professional event.

Figure 16.

Daily fish auction in Lonfong Fishing Harbor



Note. The fish auction is held daily at 13:30 and at that time only licensed fish vendors are allowing to enter. Credit: the author.

3.1.2 Waipu Fishing Harbor in Houlong Township

The population of Houlong Township has been declining for years, and by May 2020, the number was 6 thousand less than fifteen years ago to become around 35thousand. Without much economic attraction, the outflow of the young generation was serious and made the elderly occupy 18.63% of the total (MLHR, 2020). Even so, Waipu Fishing Harbor (Figure 17) is still an important fishery center of the county, having one-third of the boats that belong to Nanlong Fishery Association (NLFA). The harbor was constructed in 1976 in response to the decline of fisheries caused by the severe siltation of Gongsiliao Fishing Harbor, followed by the recovery of coastal fisheries. Yet it did not last long, the ocean pollution and reduced fisheries led to transformation and made the recreational fishing mainstream (Huang, 2002).

Figure 17.

Waipu Fishing Harbor in Houlong Township



Note. Credit: the author.

3.2 Formosa 1 in Miaoli

The construction of Formosa 1 began in 2015, two years after passing the Environmental Impact Assessment, but the controversy was continuing (Figure 18). In August 2014 Nanlong Fisheries Association invited the owner of 325 boats to vote for the project, with the approved result they further formed a nine people's delegation to negotiate compensation with the developer, however, one of the fishing method group “gillnetting” felt more affected than the other main method of the area, “pole and line”, wherefore organized a self-help group to fight for their right (Peng, 2014).

Figure 18.

Self-help group from gillnetting fishers gathered 30 boats to protest at sea



Note. From “Fishing boats go offshore to protest injustice of offshore wind turbine compensation”, by J.-L. Peng, 2015, May 23, retrieved from: <https://news.ltn.com.tw/news/society/breakingnews/1326791>. Copyright 2015 by Liberty Times Net.

In 2015, there were about 10% of the fishing boat owner who refused to sign an agreement because the scheduled wind farm is in the fishing area to which they belong and they stated that they should be consulted to reach a consensus before development. At that time, the main opponents were fishers of the gillnetting group since the offshore turbine would hinder the flow of fishing nets and even destroy them. The boats with enrollment in Longfong Fishing Harbor were believed to be more influenced than other harbors owing to the site of the project, besides, there were also people who no longer go fishing but still a member of the association and still on the list of compensation. In addition to compensation conflicts aroused by different fishing methods, the impact of the installation process on endangered species, Indo-Pacific Humpback Dolphin (Figure 19), and catches, and the mistrust of decision-making justice all make locals unable to imagine the coexistence of realistic livelihood and ideal sustainability (Lu & Liu, 2017). Such a situation is not the only case, Gray, Haggitt & Bell (2010) found a similar controversy against the backdrop of the UK which are problems related to adequacy of consultation, compensation claims, and data deficiencies. They also claimed that it is a game of power and that the weakest may suffer the most.

Figure 19.

Indo-Pacific Humpback Dolphin

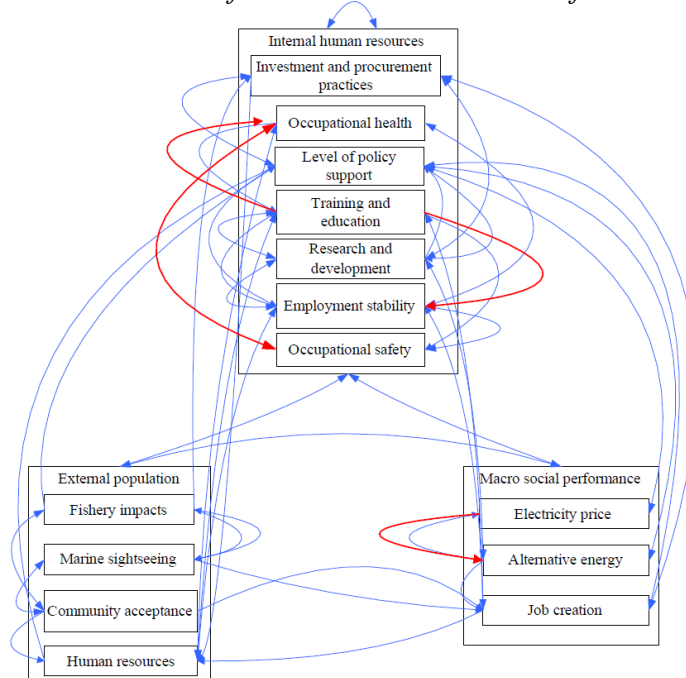


Note. From “Chinese White Dolphins Close to Extinction in Hong Kong WWF urges ‘Dolphin Conservation Management Area’ in West and South Lantau Waters”, by S. Chan, 2019, retrieved from: https://www.wwf.org.hk/news/press_release/?23060/Press-Release--Chinese-White-Dolphins-Close-to-Extinction-in-Hong-Kong-WWF-urges-Dolphin-Conservation-Management-Area--in-West-and-South-Lantau-Waters#. Copyright 2019 by SWIMS Cetacean Ecology Lab, HKU.

Another study on Taiwan’s offshore wind power is from Shiau & Chuen-Yu (2016), in which they underlined the social sustainability on the basis of a social impact index. A system of 14 indicators divided into three categories, internal human resources, external population, and macro-social performance, was developed, and Figure 20 shows their interrelations. In accordance with the result of performance measurements, the top three indicators of social sustainability are (1) job creation; (2) alternative energy effect caused by introducing the offshore wind farm; and (3) community acceptance. Additionally, it is worth mentioning that fisher was not involved at the stage of transforming the narrative performance levels into numerical utility index for further analysis because they were classified as non-professionals.

Figure 20.

The interrelations of the 14 social indicators of sustainability



Note. Red line: Highly interrelated; Blue line: Moderate interrelated. From “Developing an Indicator System for Measuring the Social Sustainability of Offshore Wind Power Farms”, by Shiau & Chuen-Yu, 2016, *Sustainability*, pp. 11, Figure 4. Copyright 2016 by Sustainability.

Although some research has looked at the topic from different angles, the quantity is still comparatively scarce, especially after the project is completed. The chapter goes through the background of the case to gain a general understanding of what had happened on Formosa 1, pointing out its representation to the nation and revealing the worthiness of conducting a review study while more projects are waiting to be done in the near future.



CHAPTER IV. NEGOTIATION PROCESS

In this chapter, the negotiation process of Formosa 1 Offshore Wind Farm will be discussed, including the planning and construction period, to answer “was the process of the project in line with procedural justice from the perspectives of the fisher, the fishing association, the academic, and the local government and were there any barriers for anyone to participate?”. During the planning stage, first, the project developer will decide on a location and, according to the “Environmental Impact Assessment Act” (EPA, 2003) of Taiwan, the development where there is a concern of adverse impact on the environment should be evaluated and an environmental impact statement with predictions of possible environmental damage and protection strategies should be proposed. In the Formosa 1 project, one of the affected group, fishers, in 2012, had only 16% agree on the development, which was far less than 88% of residents and 76% of local representatives at the beginning (FOW I, 2014), therefore, after the passing of Environmental Impact Assessment in late 2013, several coordination meetings were held to meet the consensus of fishing resource compensation and obtain fishers’ consent, and after which the construction can start.

To examine the justice and the opportunity of public participation during the project process, procedural justice and actor barriers will be applied with their four criteria respectively in sections. Procedural justice has elements including, (1) reach out to everyone, (2) information accessibility, (3) meaningful interaction, and (4) satisfy diverse interests; actor barrier and motivation are affected by (1) economy and capacity, (2) community spirit, (3) environmental awareness, and (4) political influence. Section 4.1 will focus on the site choosing process before the project was published in the formal review in October 2012 (EIAIS, 2012), and in Section 4.2, the Environmental

Impact Assessment will be explored until its approval at the end of 2013 (EIAIS, 2013). Section 4.3 will consider the compensation negotiation before construction commenced, and continued by Section 4.4, the construction process will also be understood. Lastly, Section 4.5 will give an overview of the project before its operation.

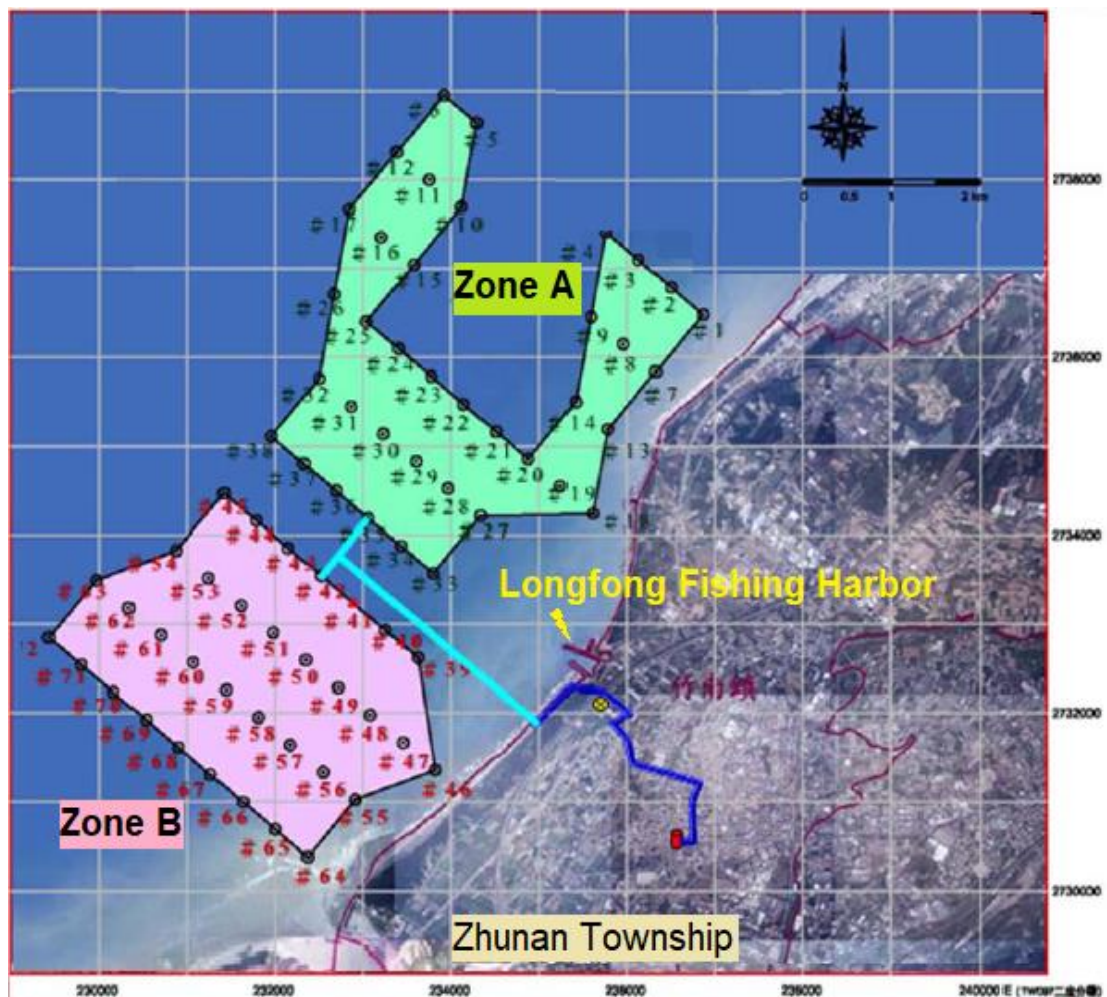
As the argument of this chapter, when the site selection focuses on economic aspects and the environmental impact assessment is mainly aimed at the environment, social issues should not be considered last, which poses problems for the subsequent process. Though there were still injustices of process and actors' identity in project planning and construction period, the improvement of related policies and the actual execution of government might be a feasible way to substantially reduce public anxiety.

4.1 Siting of the Planning Stage

Figure 21 shows the site of the wind farm originally proposed by the developer, Swancor, to the Environmental Impact Assessment Review Committee. Swancor redistributed shares to become Formosa I Wind Power Co., Ltd in 2017 (Swancor, 2017).

Formosa 1 located 1-5 kilometers off the coast of Zhunan Township and scattered in 5-20 meters' water depth, separating to Zone A and Zone B to keep the ship channel of Longfong Fishing Harbor, with 71 turbines and 1 meteorological observation tower covering an area of 18.2 square kilometers (EIAIS, 2012). The selection considerations involving marine resources, land ecology, social-economy, and cultural asset, which will be summarized in the next paragraphs.

Figure 21.

Geographical map of Formosa 1 Offshore Wind Project

Note. Adapted from “Public online information of Environmental Impact Assessment Report of Zhunan Formosa 1 Offshore Wind Electricity”, by Environmental Impact Assessment Inquiry System, 2012, *Environmental Protection Administration*, pp. 2, Figure 1. Copyright 2012 by Environmental Protection Administration. Originally Mandarin, translated by the author.

4.1.1 Economic dimension

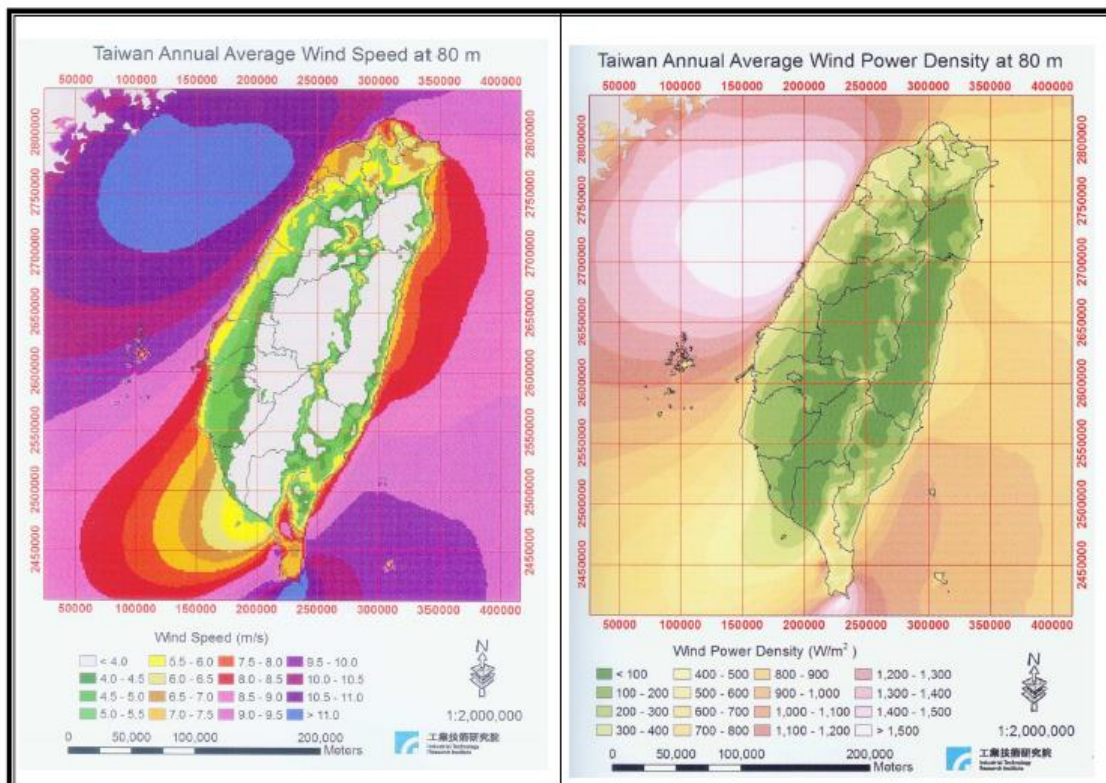
The origin of this project was the national Demonstration Incentive Program organized in 2012 mentioned in Section 2.2.2, and, being one of the three selected plans of “Offshore Wind Power Demonstration Awards”, Formosa 1 needed to meet the siting requirement to receive subsidies from the government to support its economic cost. The

siting requirement of the award was that the wind farm needed to be installed in the water area beyond the depth of 5 meters and avoid the sailing path, military control, and ecological protection so that to sell electricity with the government-guaranteed feed-in tariffs and get the sponsorship of research, construction, administration, and promotion expenses (MEA, 2012).

The economic benefits of the investment are largely determined by wind resources of the site selected, making Taiwan's west coastal area the first choice (Figure 22). The project developer used the research outcome to identify potential regions, and, “by performing wind electricity simulation to estimate power generation” (FOW I, 2014, p. 5-8), the location was initially decided after being measured against development costs.

Figure 22.

Taiwan annual average wind speed and density at 80-meter height



Note. Adapted from “Environmental Impact Assessment Report of Zhunan Formosa 1 Offshore Wind Electricity”, by FOW I, 2014, *Formosa I Wind Power Co., Ltd*, pp. 5-6, Figure 5.2.1-2 & Figure 5.2.1-3. Copyright 2014 by Formosa I Wind Power Co., Ltd.

4.1.2 Environmental dimension

On the basis of “Operational Guidelines for Environmental Impact Assessment of Development Behavior” derived from “Environmental Impact Assessment Act” (EPA, 2003), the investigation of “environmentally sensitive area” is essential in the report, and if the development situates on the sensitive area, the developer has to explain the reason for not changing and measures to avoid or mitigate the adverse environmental impact (EPA, 2017).

As far as this project was concerned, it was located in five of the thirty-four sensitive areas, where were:

- (1) areas recorded to conservation wildlife;
- (2) noise control area;
- (3) water pollution protection area;
- (4) mining area where mining rights were registered;
- (5) fishery rights area exclusively for fishery association.

As solutions proposed by the company, mitigation measures of the ecosystem, noise, and water pollution have been formulated; confirmation of the company to which the mining right belongs has completed; communication with the fishing group was conducting (FOW I, 2014, p. 4-11).

4.1.3 The lack of social dimension

In spite of trying to alleviate the economic and environmental challenges in the site selection stage, the social level lacked further communication. Dr. Kwang-Tsao

Shao, an academic at Biodiversity Research Center of Academia Sinica, pointed out, “some factors are known before the selection and will be taken into account, but a few will be discovered only when you do in-depth investigations while you are going to develop” (Interview ACB1; 14 May 2020).

Dr. Hsin-Yi Lu, an academic at the Department of Anthropology of National Taiwan University, presented her ideas with local experiences,

“public participation and information announcement should begin in the siting stage because the proposal that has reached the EIA process is basically already decided, it will take a lot of time and cost to revise” (Interview ACA1; 13 May 2020).

She explained the case further,

“the fishery survey in Taiwan has always been not very accurate, let alone knowing where the fishers are fishing. So there is no so-called scientific data about where our best fish farm is, this part will only be understood by asking the fishers” (Interview ACA1; 13 May 2020).

Some fishers mentioned the critical role of the wind farm location causing controversy in the project as well. One fisher of gillnetting group expressed, “the construction is too close, which means we have no working space” (Interview FSB1; 28 May 2020), and the other added, “our offshore fishing right is within three nautical miles. If the developer is built in a place beyond that, there will not be so many problems, because it is not within the scope of the application” (Interview FSA3; 25 May 2020). While gillnetting fishers strongly pushed the wind farm farther away from the coast to avoid impacts on the operation, even without much difference, pole and line fishers agreed to this plan too, and one from the method illustrated the benefits, “if the developer builds

them deeper, it's also good for us. It's like throwing a fish reef in a deep place, we can get the fish back soon after we go there” (Interview FSC1; 26 May 2020).

Despite there were voices calling for legislation prohibiting development within three nautical miles and the strategy of “Deep-sea First, Coastal Later” was promoted by environmental organizations, policies were not yet implemented (Chen, 2018). The topic of construction location is originally the internal issue of the developer while procedural justice can be practiced in Environmental Impact Assessment. However, since the site selection stage has an extremely important influence due to various reasons and cost considerations, should public participation be included in the procedure earlier?

4.2 EIA of the Planning Stage

The Environmental Impact Assessment Report was reviewed the first time in June 2013 by the Environmental Impact Assessment Committee after its submission, and three public explanation meetings with locals in the development place were held before and after (Figure 23), which will be discussed in Section 4.2.1. The second review was conducted four more months later in October 2013 accompanied by a decision not to enter the second phase of assessment, then the project was approved on November 27, 2013 (FOW I, 2014). The member of the committee, in accordance with the “Direction for Allocating Installed Capacity of Offshore Wind Potential Zones”, including representatives of related government agencies, financial or engineering experts and scholars of offshore wind, in total 19 to 27 people (MEA, 2018a).

Figure 23.

Timeline of Environmental Impact Assessment

Note. Information from “Environmental Impact Assessment Report of Zhunan Formosa 1 Offshore Wind Electricity”, by FOW I, 2014, *Formosa I Wind Power Co., Ltd.* Draw by the author.

4.2.1 Public explanation meeting

The first public explanation meeting was implemented in the light of “Operational Guidelines for Environmental Impact Assessment of Development Behavior” to collect the opinions of residents and attach them to the report together with solutions (EPA, 2017). On November 27, 2012, villagers in Zhunan Township were invited, with other government agencies and related organizations such as Nanlong Fishery Association and Matsu Fish Conservation Union. The meeting was written that it was free to participate and anyone can raise their hands to speak, and from the records, there were central and local government officials around 10 people, almost 40 residents, three environmental organizations, and more than 70 members from the fishery association signed for participation. The main feedback was focused on fishery concerns and

engineering questions, and in addition to that, the developer was asked to hold extra briefings especially for fishers to understand the impact and have a channel of voicing (FOW I, 2014, appendix 8), which contributed to the other meetings.

The second explanation meeting in June 2013 focused more on the construction of the meteorological observation tower while the third was specifically conducted for the offshore wind farm. The meeting record clearly showed the opposition of fishers who expressed strong disagreement and requested a reasonable compensation plan. The meeting was ended with the promise of the company to propose the estimated compensation plan at the next meeting and only start the project after reaching a consensus with fishers (FOW I, 2014, p. 13.2-10). In the interviews with fishers, the detailed discussion of the Environmental Impact Assessment part was limited since it was almost eight years ago, and fishers were put more effort into the next stage of compensation negotiation so that the report from the developer was the main source to organize these memories.

An opinion poll of the nearby locals was conducted from December 15 to 28, 2012 by a research team commissioned by the developer, giving a more quantitative data of the general idea. The sampling was divided into three categories, including 511 residents, 241 fishers, and 55 representatives like local legislators, councilors, and mayors (FOW I, 2014, p. 7-12). The results showed that there were 66% of residents agree the construction and 22% were conditional agree; 20% of the representatives consented and 56% voted conditionally; the proportion of fishers who disagree was up to 84%. Though some attitudes changed later, the two groups of fishers initially had similar ideas. When asked if the pole and line fishers were in favor of building from the beginning, a fisher who uses the method answered that “there were also people objected

because we didn't understand much about the offshore wind at first" (Interview FSC4; 29 May 2020). The main reason for resident approval was "wind power is a clean resource in line with the world trend", and "can effectively use the wind resource" was why the representatives support offshore wind electricity; "impacting fisheries" has become a major issue that hindered the recognition of fishers. Fishers wanted to know if the fishing resource will be affected, while the residents concerning the destruction of marine ecology, and fishers considered an explanation meeting a better way to communicate yet residents preferred the use of mass media (Table 5).

Table 5.

Opinion poll

Question	Resident		Fisher		Representative	
	Response	Percentage	Response	Percentage	Response	Percentage
Heard of this project	No	85.3%	No	50.2%	Yes	74.5%
Agree or not	Yes	66.1%	No	83.8%	Conditional consent	56.4%
Reason to agree or disagree	Clean, world trend	61.2%	Impact fishery	84.2%	Effective resource	45.5%
Condition of consent	No damage to landscape	44.2%	Not affect fishing area	74.1%	Give back to local society	61.3%
Issue of concern	Marine ecology	57.9%	Fishing resource	86.3%	/	/
Preferred communication method	Mass media	59.3%	Explanation meeting	80.5%	Explanation meeting	70.9%

Note. The highest ranked option and its percentage was selected as the representative answer for each question of the three groups. Information from "Environmental Impact Assessment Report of Zhunan Formosa 1 Offshore Wind Electricity", by FOW I, 2014, *Formosa 1 Wind Power Co., Ltd*, appendix 7. Summarized by the author.

4.2.2 EIA review committee

There were three conclusions after the first review committee on June 3, 2013, which drove the revision of the project.

Evaluation based on the commitment to reduce the scale of development at the meeting is required.

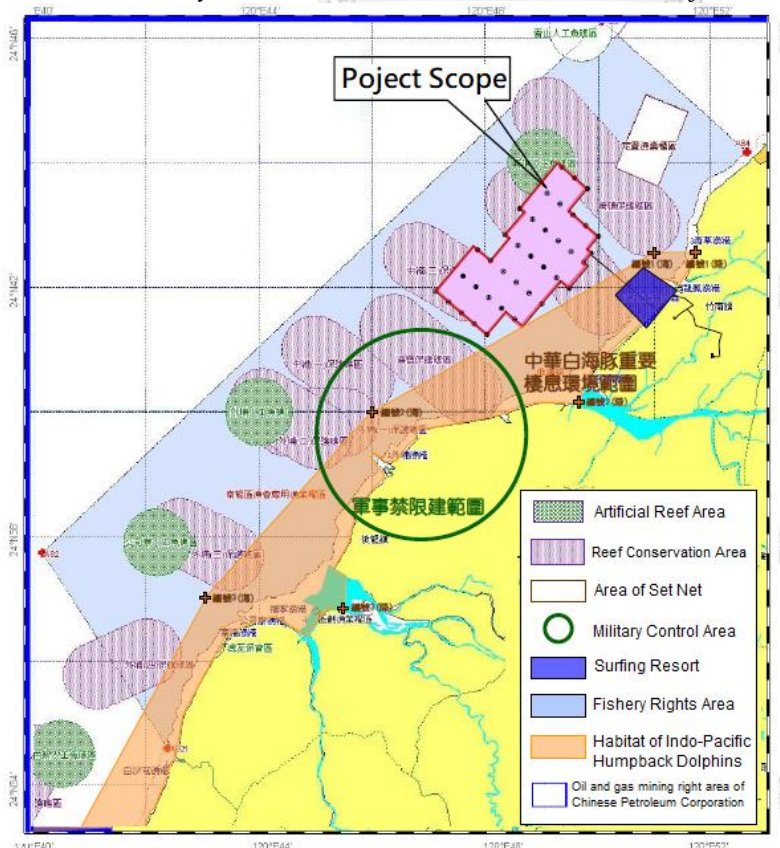
Consider the drafting "Major Wildlife Habitat of Indo-Pacific Humpback Dolphins" for development planning.

Evaluate the revised plan (EPA, 2013a, p. 1).

The construction scope put forward in the second meeting was narrowed to stay away from environmentally sensitive areas and avoid the habitat of Indo-Pacific Humpback Dolphins (Figure 24).

Figure 24.

Environmentally sensitive areas around the location of Formosa 1 Wind Farm



Note. Adapted from “Environmental Impact Assessment Report of Zhunan Formosa 1 Offshore Wind Electricity”, by FOW I, 2014, *Formosa I Wind Power Co., Ltd*, pp. 4-13, Figure 4.3-1. Copyright 2014 by Formosa I Wind Power Co., Ltd. Originally Mandarin, translated by the author.

Even though Hung (2020) mentioned that nonhuman such as dolphins and oysters can also produce convergent power to affect the territorialization, deterritorialization, and reterritorialization of the green energy space, the location is hardly changed after the siting decision. Yet in this case, it did adjust, mainly because of the dolphin's habitat and its NGO campaigns launched by environmental groups during the Environmental Impact Assessment. Dr. Kwang-Tsao Shao, an academic at Biodiversity Research Center of Academia Sinica, indicated,

“Taiwan’s current EIA system is not very good. At the beginning of the meeting, environmental protection groups will be the first to speak, but some of which are too extreme to use various reasons to criticize, so that the committee members dare not speak or can only make negative comments, We cannot say that this method is wrong. Indeed, some parts of the government need opposition voices to let everyone think deeply, and at the same time allow ecological conservation measures to be better, but the problem is not to be too irrational to tell facts that violate science” (Interview ACB1; 14 May 2020).

One of the government officials implied the power of stakeholders was more with others than locals: “there are many ways for people to complain, for example, professional environmental groups will write official documents to the government to bring their opinions into the formal operating procedures”. They shared a story about the political power that, at one meeting, after the affected residents agreed, one councilor was still protesting for some reason, causing confusion to the locals and other

participants (GOA1, 18 May 2020).

After adjusting for several environmental concerns and improving the impact mitigation plan, the case passed the review with "no significant adverse impact on the surrounding environment" and began the next stage to have in-depth negotiations with fishers before its construction (EPA, 2013c).

4.2.3 Procedural justice

In the process of Environmental Impact Assessment, by using the criteria to scrutinize procedural justice would find out that there is a policy-guarantee door open for people to have opportunities to participate but also existing obstacles for citizens to fully express themselves and get heard.

- (1) Reach out to everyone: both the committee and the explanation meeting was open for any joining and had advance notice. In spite of having other concerns about participation, several interviewed fishers mentioned that it was free to take part (Interview FSCG & Interview FSB1).
- (2) Information accessibility: the project information was published before the committee complying with the act and records could be found online. However, lots of public information are things that developers are willing to let people know, plus other political and biased control may cause the message to be incomplete or incorrect. Dr. Kwang-Tsao Shao, an academic at Biodiversity Research Center of Academia Sinica, told, "some people regard protest as a stage for performance and try to convince their own opinions without having a specific basis, but many people don't understand the whole picture, they will feel that make sense" (Interview ACB1; 14 May 2020). The data is theoretically open and accessible, but with the knowledge

gap and hidden information, the media has its important role to shrink the distance between people and the professional field.

- (3) Meaningful interaction: the committee records revealed benign interactions in the words like “the developer has responded appropriately to most of the previous committee’s comments” (EPA, 2013b, p. 3), and better changes have happened, yet fishers had different thoughts too. Some complained, “even if you object, the government will still do it” (Interview FSD1; 25 May 2020) or “the meetings are useless, I don’t want to listen” (Interview FSA1; 28 May 2020), while some praised that “I learned a lot from the explanation and knew more about the offshore wind electricity” (Interview FSC1; 26 May 2020).
- (4) Satisfy diverse interests: Environmental Impact Assessment concentrated more on the environmental section, and in this case, the scope adjustment on the second committee was the result of interest trade-off. But the social issues such as the balance between the development and fishery resource were only warned rather than enforced by the committee during the assessment and were then put aside to wait for other negotiation.

While touched the upon barrier and motivation of the participants, Dr. Hsin-Yi Lu, an academic at the Department of Anthropology of National Taiwan University, narrated that

“fishers seldom go to the Environmental Protection Agency to participate in the review committee meeting, mainly because it is too far”³. Moreover, the imbalance of social status and speaking weight had also become a source of anger. One

³ The Environmental Impact Assessment Review Committees are normally held in the national Environmental Protection Agency in Taipei City, where has around a hundred-kilometer distance from Miaoli County.

middle-aged male fisher stated that “at that time, we asked to retreat the construction to the depth of 30 to 40 meters, but later there was no way, the revised plan only kept the living area of the dolphin within 15 meters” (Interview FSA5; 27 May 2020).

The same adjustment requirements for the field had different consequences, making people question the fairness and the power relationship in between.

4.3 Compensation of the Planning Stage

The negotiation process between the developer and fishers was confidential and can roughly be pieced together from the interview and a few news, and apart from these, the “Local Chronicles of Zhunan Township” (Lin, 2018a) has some key records of the project as well.

4.3.1 Compensation negotiation

The developer began the negotiation with the fishing community who still has concerns about the development after the passing of Environmental Impact Assessment in order to get the consent of them to officially start the construction. The argument of fishers was that the project cannot affect their livelihood or fishery resources, and if unavoidable, which was the case, there should be reasonable compensation. The initial stage of the negotiation revolved around the "reasonable compensation" of both parties, and the local chronicle (Lin, 2018a) recorded the second meeting that “the fishers worried that their livelihoods would be damaged, and think that the compensation was obviously insufficient. The two parties failed to get a consensus at the meeting” (p. 4003), and the fourth on May 2, 2014, was around the same topic of the impaired livelihood and its reparation. It was found during interviews that the amount for fishers’

fishery loss was started from US\$ 1.6 million to US\$ 2 million, US\$ 6 million, US\$ 9.3 million, until the final US\$ 10.2 million⁴, going through five meetings.

After four bargains, Nanlong Fishery Association held a vote among members to gather opinions on August 15, 2014, and, with 225 of the 325 ship owners attended, 213 voted in favor of the construction of the offshore wind farm. The nine-person delegation was formed a month later to continue the communication with the developer, and on April 28, 2015, the development was confirmed with the final amount of compensation consensus reached, and next was how to allocate. Referring to the change in amount, one of the participating fishers explained that “we used the past catch data to fight with them, because the fish auction record is the fairest basis to prove that it is unreasonable” (Interview FSA5; 27 May 2020), and about the distribution, a fisher of the gillnetting group said that “because in the nine-person delegation, there were more fishers from the pole and line method who were less affected, they tend to share equally rather than according to the degree of impact, but it’s not fair” (Interview FSA5; 25 May 2020). The fishery association had their opinion that “the most direct way is the most fair way” (Interview FAA1; 20 May 2020) and fishers of pole and line thought that any compensation was a bonus because it was in cash and could be used everywhere the recipient wants.

4.3.2 Self-help group

Fishers of gillnetting formed a self-help group in mid-2015 to fight for their rights after the amount and distribution way of compensation was finalized. “Increasing compensation, redistribution, and plan canceled were three options that we were

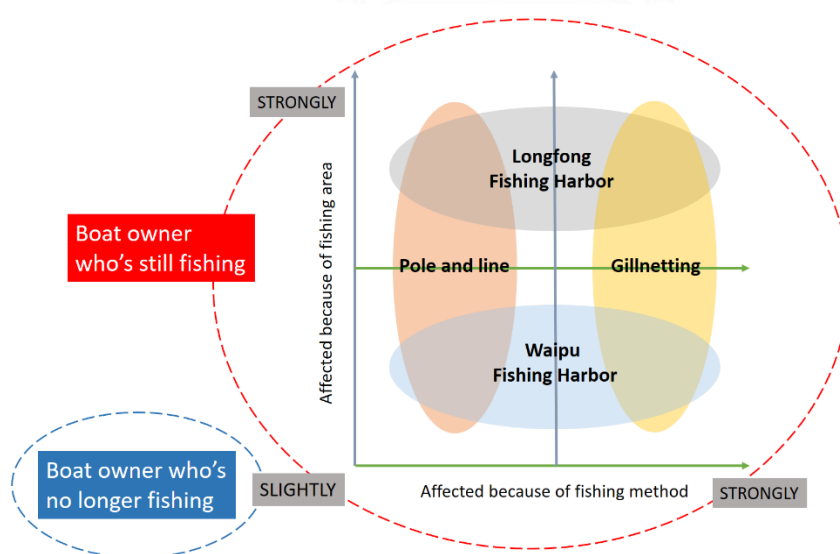
⁴ From NT\$ 47 million to NT\$ 3.05 billion

striving for, depending on which one was accepted by the developer”, told by one of the member fisher (Interview FSB3; 12 June 2020). There were three “unfair points” that the group raised to challenge that the influences were different for fishers based on their fishing frequency, method, and location (Figure 25):

- (1) fishing frequency: among the 325 registered boats, there were less than 250 boats were still fishing, and most of them were sailed occasionally and not using to make a living; only a few boats were owned by full-time fishers who earned the income to raise the family, and they were mostly from the gillnetting group which requires more expertise and were self-help members. They argued that the most vulnerable one was the most affected as well because it was their entire livelihood, but other people had received the same compensation even they were no longer fishing;

Figure 25.

Varying degrees of influence based on different fishing frequency, method, and location



Note. The blue circle represents people with low fishing frequency and less affected; the red circle includes fishers with the different fishing methods (horizontal axis) and location (vertical axis) and their affected degree. Credit: the author.

- (2) fishing method: “gillnetting” is the method that will be seriously affected while “pole and line” benefiting from the reef transformed by the turbines, and in accordance with Nanlong Fishery Association, half of the fishers use each of these two methods;
- (3) fishing location: as mentioned in Section 3.1 Figure 13, there are seven harbors under Nanlong Fishery Association which were all within the scope of claims, and Longfong and Waipu are two of the biggest that have 99 and 120 out of the 325 boats respectively. Formosa 1 is installed on the offshore right outside the Longfong Fishing Harbor, but fishers of the harbor were receiving the same amount as other harbors like Waipu, where is ten kilometers away (Figure 26).

Figure 26.

Location of Formosa 1 and fishing harbors of Longfong and Waipu



Note. Adapted from “Location Details”, by FOW I, 2020, retrieved from: <https://formosa1windpower.com/en/location-c/>. Copyright 2020 by Formosa I Wind Power Co., Ltd; adapted from “Longfong Fishing Harbor”; “Waipu Fishing Harbor”, by Google Map, n.d., retrieved from: <https://www.google.com/maps/>. Copyright by Google Map. Edited by the author.

The self-help group formed with more than thirty people who went fishing frequently and were using gillnets, both from Longfong and Waipu Fishing Harbor, and they wondered why it should be evenly distributed to the 325 member ships of the association and also questioned the bias of the nine-person delegation which consisting of only two gillnetting representatives. The self-help group organized protests on May 23, 2015, and September 8, 2016 (Peng, 2015; Hsu, 2016), and other paper confrontations with the government such as legal attest letter for further litigation. Found out from the interviews that the group lasted around one to two years and disbanded owing to divergence, lack of unity, and the wavering of the leader. On the other hand, the statement of the development company was that the compensation was to repay fishers of the fishing rights for the loss of the future twenty-year wind farm operation and it had nothing to do with the current differences of fishing frequency, method, or location. One fisher recalled that this was only one of the official reasons preventing the self-help group from moving forward, and internal problems were the main obstacle. In the group discussion with the gillnetting fishers of Longfong Fishing Harbor who were the majority of the self-help group, fishers mention that the self-helping group was originally composed of a small number of people and was not sound and strong enough. The process of right-fighting takes time, effort, and money, and after a long time, people would not be so positive if only limited results were seen. Furthermore, everyone had different feelings about the amount of compensation and different ideas about the cost and what they get, which prevented the actions from being sustained (Interview FSAG; 27 May 2020).

4.3.3 Beyond justice

From this process, it could be seen that there was still a certain channel for the

public to participate and express different voices, although the achievements may not necessarily be changed. Nevertheless, the independent journalist, Shu-Juan Zhu (2020), emphasized that “there are still many problems with the current civic participation, including putting which at the end of the policy, making different opinions hardly be accepted, and results in invalid participation and greater distrust of the government”.

During the interview, many people expressed similar views to one of the gillnetting fishers, “everyone can participate in the explanation meeting and they also discussed with us when the process was underway. Everything was told to be perfect, but the government policy and measurement would change after their purpose was achieved” (Interview FSB1; 28 May 2020), and although the comment came from someone who felt injustice, it is a common issue in many situations in Taiwan. Even if the process is carried out according to regulations, the more important is people's trust to the government. A good reputation allows citizens to be convinced and willing to open their hearts to discuss in the process. On the contrary, a disappointing government will only make assessment a document in form and create a vicious circle.

4.4 Construction Stage

A questionnaire (FOW I, 2014) asking locals that what should be noticed most during the construction period, top answers of residents were marine ecology (54.8%) and noise and vibration (43.8%); fishers responded that fishery resources (94.2%) and the effect on operating boats (81.3%) were the priorities.

In July 2019, the project was accused by environmental NGOs of failing to comply with Environmental Impact Assessment commitments to carry out construction without enough observers of Indo-Pacific Humpback Dolphins and was verified and fined by

the government US\$ 50,000 (Sun, 2019). The developer explained that due to the unexpected winds and waves, even though the construction ship could continue the work, some of the smaller observation boats needed to go back, making the requirements unsatisfied (Zou, 2019). The news had affected the social perception of the offshore wind somehow since it was the pioneer and the dolphin habitat had discussed aggressively. In order to achieve more efficient supervision of the subsequent projects, the Environmental Protection Administration planned to organize a cross-departmental team with Coast Guard Administration and Fisheries Agency to improve the current problem of no fleet (Chen, 2019). Other complained issues such as noise also lack restrictions. With the only working season that is limited by the weather, the builder sometimes needed to grasp the time of early morning or evening, when was more sensitive to nearby inhabitants.

As the government officials interpreted, if citizens felt bothered, they can always use the unobstructed channels to voice, for example, the “mayor 's mailbox”, “1999 appeal line”, or searching the head of the village for help. Other than that, finding support from the media or related organizations were effective these days, and despite that the environmental groups argued that the penalty was nothing for the developing company, there will be less illegal actions buried and more justice served.

4.4.1 Localization

Localization was another promise of the developer, both long-term and short-term. During the construction period, there were entertainment boats of pole and line group which carry researchers and engineers to the wind farm for closer works, which, explained by one of the captains that “the entertainment boat (Figure 27) has its own license that can let people aboard just by showing their ID card while the normal pole

and line boats need other application processes, and the fishing rafts are requested for the crew certificate” (Interview FSC2; 26 May 2020).

Figure 27.

Entertainment boat in Longfong Fishing Harbor



Note. Entertainment boat can easily take customers to go fishing or scholars to do research without the lengthy application process. Credit: the author.

Another chance to work for the project told by fishers was the guard boat provided by the gillnetting group to stay around the construction areas preventing ships from accidentally enter. The controversial endangered dolphin gave job opportunities as well, for both the observation boat and the observer hired locally. Dr. Hsin-Yi Lu, an academic at the Department of Anthropology of National Taiwan University, indicated, “in terms of participation, the extent to which the local involvement is influential so that if you ask them, the answers would be diverse. For example, using the local boat for observation was a commitment of the developer in the EIA report, and

while some were joined some were not, the difference of sense of participation is generated from here” (Interview ACA1; 13 May 2020).

But as one of the participating fishers illustrated, “the project and the things we involve have their time limitation. We are not sure how long it will last because they are annually planned” (Interview FSD2; 12 June 2020).

The citizens and government’s expectation of localization, besides the case-by-case job, is the national supply chain and technique of the entire offshore wind industry, containing wind turbine components, underwater infrastructure, and marine engineering ship (IDB, 2018). Office of Energy and Carbon Reduction of Executive Yuan (2019) announced the industrial development schedule of offshore wind power, which was separated to Leading Period (2021-2022), First Stage (2023), and Second Stage (2024-2025) in the light with the 2025 renewable energy vision; and the regional base: underwater component manufacturing plant in the northern and southern part and an industrial zone in central Taiwan. Though the Formosa 1 Project of the Demonstration Incentive Program did not have the hard requirement for localization, “the later the wind farm is integrated into the grid, the more localization it will have to shoulder” (Chuang, 2019).

4.4.2 Foreign investment

Swancor, being one of the pioneer Taiwanese offshore wind companies and the shareholders of Formosa I and Formosa 2 Wind Power Co., Ltd., sold 95% of its share after the completion of the project and refocus on the supply chain of wind power material (Pen, 2019), which might become a catalyst of localization due to its practical experience, yet with the equity transfer, the involvement of foreign companies grew and led to other issues. Nanlong Fishery Association shared the differences between the

undertaking Formosa 2 after Swancor left and the previous Formosa 1 with the Taiwanese company that

“now the developers are mostly foreign investors who don’t know the local culture and were unable to understand the thought of fishers. The communication was time and money consuming. In addition, compared to the cross-national brands who have their own lawyer and consulting team, the resources of the fishery association were relatively scarce that we could only fight by ourselves” (Interview FAA1; 20 May 2020).

Both the foreign investor and the large-capital company had form actor barriers indirectly to other stakeholders. There were barriers of language and culture, as well as the social-economic status and the knowledge gap, increasing more variables to the process.

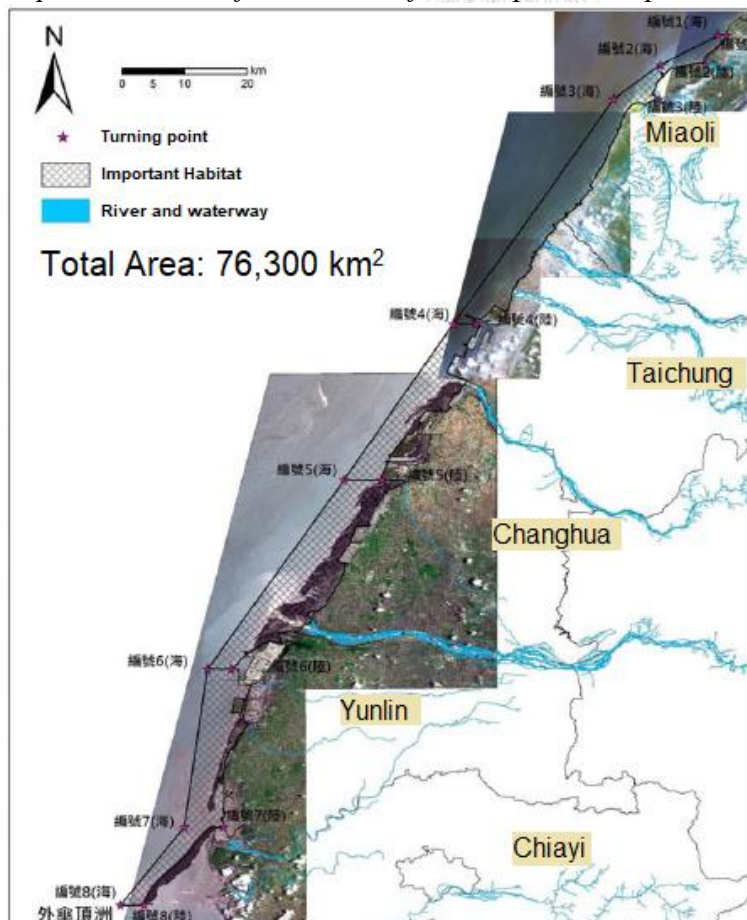
4.5 Summary

There were still injustices during the negotiation process, mainly from the perception of the fishing community, and some were echoed by scholars. However, since it was the first offshore wind project of the country, every participant was learning and revising while doing. In the government part, policies were gradually completed to reduce repeated problems and concerns that provoke severe debates, including the delimiting of “Type and Scope of Wildlife Important Habitat for Indo-Pacific Humpback Dolphin” (Council of Agriculture, 2014) on the west coast of Taiwan in 2014 to protect the environment for conservation animals (Figure 28); a benchmark of compensation specifically for offshore wind in 2016, “Benchmark of Fishery Compensation for Offshore Wind Power Plants” (Council of Agriculture, 2016), rather

than just “Benchmark of Compensation for Fishing Right” (2012) which was applied in Formosa 1; and a tighter site selection regulation is expected to completely avoid fishing areas of three nautical miles. On the other hand, the developer was improving from various responses encountered too, knowing what fishers and residents worried about, what was paid attention by the government, and what should be put more effort to accelerate the following projects. The knowledge has offered a comparatively smooth way for the future development, for instance, an accepted standard establishing by the government could provide guidelines for the distribution of compensation and a customized measure proposing by the developer could ease the conflict among fishing communities.

Figure 28.

Important habitat for Indo-Pacific Humpback Dolphin on the west coast



Note. The preserved area is about 1-3 nautical miles from the coast. Adapted from “Advance notice of ‘Type and Scope of Wildlife Important Habitat for Indo-Pacific Humpback Dolphin’”, by Council of Agriculture, 2014, retrieved from: <https://conservation.forest.gov.tw/latest/0045579>. Copyright 2014 by Executive Yuan, translated by the author.

Procedural justice of (1) reach out to everyone, (2) information accessibility, (3) meaningful interaction, and (4) satisfy diverse interests was basically covered from the overall reply. It can be reflected especially from the attitude change of fishers that 213 of the 325 boat owners (mentioned in Section 4.3.1) showed their positive intention towards the project in 2014 after the poll with less than 20% agreement (mentioned in Section 4.2.1) in 2012. The two years were experiencing three public explanation meetings, three EIA review committees, and several closed-door compensation negotiations to reach the biggest consensus. Yet there still issues and actor barriers that need to be overcome in the planning and construction period. Although the aspects of (1) economy and capacity, (2) community spirit, (3) environmental awareness, and (4) political influence did not significantly hinder public participation in this project, changes such as the advance of public participation, the involvement of social aspect in Environmental Impact Assessment, the trustworthiness of the government, the practice of localization, and the power distribution among actors are still expecting. It relies heavily on the action of the authority and the build of civic literacy.

CHAPTER V. OUTCOME AND FUTURE

After reviewing the process of the offshore wind project, this chapter explores the outcome and future. By the expected benefits of renewable energy, (1) livelihood development, (2) energy access, (3) energy security, and (4) environmental impacts, to ask if there's difference between anticipated and actual outcomes of fishing livelihood changes and from the perspective of fishers, do they think their new livelihood is a realization of environmental justice regarding (1) environmental benefits, (2) environmental burdens, and (3) principle of distribution. Has the overall situation become more sustainable?

In Section 5.1 the current livelihood after the completion of the project will be compared with previous expectations, and in Section 5.2 reviewing the environmental justice by pros and cons oriented from the offshore wind farm. Section 5.3 will give a vision for the future and sustainability, then conclude in Section 5.4. The chapter will investigate the livelihood changes and recovery in response to the global trend of environmental protection and analyze the social perspective on sustainable development, with the talking point focusing on the lessons learned from the experience and its potential for improvement.

5.1 Anticipated and Actual Livelihood Change

In the survey from the Environmental Impact Assessment report, fishers' perspectives towards the current power generation methods in Taiwan were asked (Table 6). Wind power had the highest ranking of both understanding and preference, on the one hand, it showed that the wind turbines have a certain weight in their life because Miaoli has been one of the centers of wind power, on the other hand, it revealed

the majority of fishers' affirmation of the positive impact of wind electricity on energy security and the environment. However, in terms of livelihood, different fishing method groups have distinct views since the planning and construction stages, as well as attitudes towards the outcome. "Gillnetting" was seemed to be the victim while "pole and line" was the beneficiary.

Table 6.

Survey of fishers' perspectives towards the current power generation methods in Taiwan

Taiwan Energy	Coal & Oil	Hydro.	Nuclear	Natural Gas	Wind	Solar	Ocean	No Idea
Know	63.5%	57.7%	68.9%	5.4%	72.6%	27.4%	1.2%	/
Better	29.9%	45.6%	4.6%	4.1%	47.3%	24.9%	1.2%	2.1%

Note. The original question of "Know" was "Do you know which power generation methods currently exist in Taiwan?"; the original question of "Better" was "According to your understanding, which power generation methods are the better way to generate electricity for now in Taiwan?". Information from "Environmental Impact Assessment Report of Zhunan Formosa 1 Offshore Wind Electricity", by FOW I, 2014, *Formosa I Wind Power Co., Ltd*, appendix 7. Summarized by the author.

5.1.1 Gillnetting

The operation of gillnetting is to put the net on the water to make it float with the flow and catch fishes during the moving, fishers explained, and it runs fast and far with the strong ocean current (Figure 29).

Figure 29.

Gillnetting fishing method and its warehouse and nets

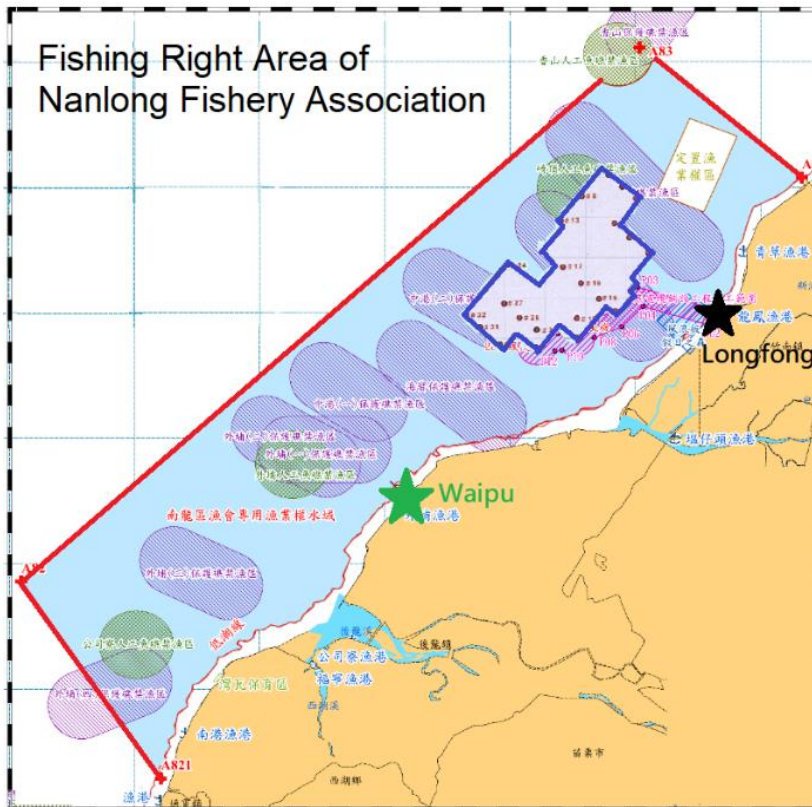


Council of Agriculture, Executive Yuan., pp. 58. Copyright 2012 by Council of Agriculture, Executive Yuan; right: credit: the author.

According to the gillnetting group of Longfong Fishing Harbor, the wind farm was constructed on the best fishing location of the exclusive right area (Figure 30), literally outside Longfong Fishing Harbor with water depth around 15 meters, and the turbines obstructed the path of the net, making the ship have to avoid the area even if more fish gathered under the turbine. Excluding the blocked region, the fishing area near the harbor used to hold more than ten ships now can only accommodate two or three boats operating at the same time, and fishers need to wake up earlier or drive farther to find another place for netting. The cost of time and oil is rising, and it does not guarantee an increase of catch.

Gillnetting group of Waipu Fishing Harbor is comparatively less affected, but since the method relies on the flow of the net to fish, and the fishers of Longfong would come to the area, their operating area is shrinking as well.

Figure 30.

Fishing Right & site

Note. Within the red line is the fishing right area of the fishery association; within the blue line is the location of Formosa 1; the black star is Lonfong Fishing Harbor; the green star is Waipu Fishing Harbor. Adapted from “Miaoli County exclusive fishery rights”, by Fisheries Agency, 2016, *Council of Agriculture, Executive Yuan*. Copyright 2016 by Council of Agriculture, Executive Yuan; adapted from “Attachment for reference letter”, by Environmental Protection Administration, 2018, *Executive Yuan*. Copyright 2018 by Executive Yuan. Edited by the author.

5.1.2 Pole and line

Many fishers with pole and line method (Figure 31) didn't feel much difference, instead, some felt that they had gained things unexpected, because, in addition to compensation, the wind turbine has the potential to become an artificial reef attracting marine life to inhabit. Though the reef is not formed immediately and 50 meters around the turbine is forbidden, a rich ecological food chain with more economic fish is still expected.

Figure 31.

Pole and line boat in Longfong Fishing Harbor

Note. Credit: the author.

Some concerns about the wind farm are inevitable existing regardless of which group, for instance, possible pollution of the building materials to the ocean, uncertain harm of the operation noise and the noticing light to fish, and the security worries about falling fan blade and hitting the machine base in the fog.

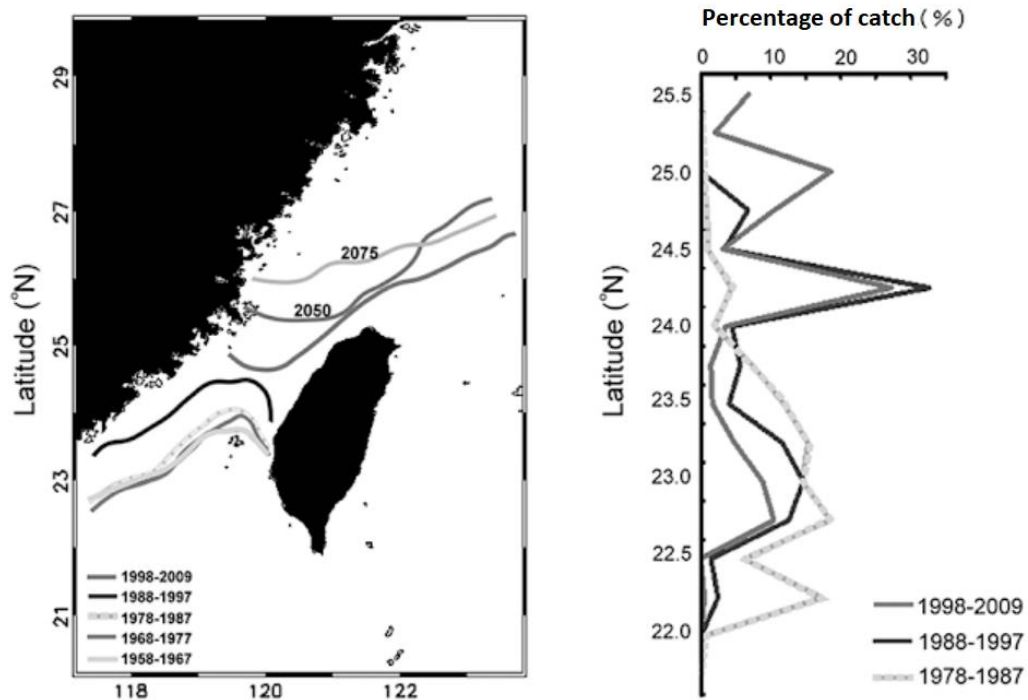
5.1.3 Livelihood transformation

In the research of Lan & Gong (2015), they pointed out that global warming caused by man-made greenhouse gas emissions will change the operation of the atmosphere and ocean systems, leading to water warming and affecting the abundance of fish populations that depend on the speed of reproduction and growth, which affects coastal fisheries. In the case of Taiwan, the rising water temperature in the surrounding seas will cause the fish that spawning in the Taiwan Strait to retreat north. Taking the important economic species in the region, Mullet, as an example, its annual production reached 2.5 million in 1981, but began to decline year by year after 1987, and in 2007 it set a historical record of less than 40,000. To sort out the reasons, overfishing and the

increase in sea water temperature are the main reasons. Fishing behavior and pressure will make marine lives more sensitive to climate change, and the high temperatures caused by global warming will move Taiwan's best fishing grounds (Figure 32) and reduce catches.

Figure 32.

Location distribution map of 20°C isotherm & Percentage distribution map of Mullet catches



Note. Right: the change of 20°C isotherm in the Taiwan Strait in winter every ten years since 1958, and in 1998~2009, it moved northward significantly; left: the location of Mullet catches also found to move northward following the isotherm. Adapted from “The impact of global changes on marine fishery resources”, by G.-W. Lan & G.-Q. Gong 2015, retrieved from: https://scitechreports.blogspot.com/2015/09/blog-post_90.html. Copyright 2015 by Science Monthly.

As a result of the sharp decline in catches under global environmental changes that mentioned above and understaffed with the drop of new generation population to help

for the high-intensity physical work, more elderly fishers needed another job on land to remain the earnings and turn fishing into an extra income or a leisure activity. One of the elder fishers recalled, “I heard from old fishers that they can make a lot of money from fishing decades ago, but now there are a lot less fish” (Interview FSC4; 29 May 2020), and another sighed that “in the past, a large family could fish in farther and deeper waters where has more fish and requires multiple people to work together, but now there are fewer people, and the elders rarely let their children enter this industry, which has limited the effectiveness” (Interview FSA2; 25 May 2020). However, it was not easy for professional skilled workers to change their lifelong careers, whether from the aspect of technique or money, which brought another debate that most gillnetting workers were full-time fishers who need the job to support the family while more pole and line fishers were amateurs.

The commitment of the developer with fishers was fisheries cooperation, including,

- (1) fishery transformation: mainly developing sightseeing fishery to maintain income and reduce ecological consumption;
- (2) Marine Protected Areas: catalyzing the spill-over effect to protect marine resources and increase catches;
- (3) industry cooperation: planning set net fishing and cage culture to share the revenue with fishers and the fishing association (FOW I, 2014).

Fishers of gillnetting indicated the reality that due to the style of the boat itself and the regulations that the fishing raft can only carry people with crew certificate (Figure 33), it's not as feasible for them to transform into a sightseeing boat as many pole and line fishers are doing. Although having some advantages, a fisher of pole and line pointed

out the cost behind that, “the benefit to own a big entertainment boat for sightseeing is that it can carry more people, but it is also really expensive to maintain facilities and keep the license legal” (Interview FSC2; 26 May 2020).

Figure 33.

The fishing raft of gillnetting group



Note. The fishing raft can only carry people with crew certificate. Credit: the author.

Furthermore, the west coast of central Taiwan has a large tidal range that can have a difference of three meters, so the boat needs to wait for the high tide to depart every day according to time (Figure 34), making the offshore sightseeing itinerary limited. As for Marine Protected Areas around the turbines, the gillnetting fishing raft is too big to shuttle freely in the wind farm and the fishing method does not allow them to get the

spill-over fish near the turbine. The industry cooperation was also questioned that set net fishing might be destroyed by the frequent big wave; cage culture might be polluted by coastal industrial emissions, and the mode of operation and the allocation of investments and profits are unclear.

Figure 34.

Ebb of Longfong Fishing Harbor



Note. The boat needs to wait for flood tide to depart. Credit: the author.

Apart from some short-term jobs during the construction period mentioned in Section 4.4.1, other given opportunities like the priority of the child from fishing household to be hired by the developing company haven't seen results yet, expressed by fishers, leading to some disappointment in the new livelihood. Since the negotiation

contract was confidential between the developer and the fisher, there were few places where the government or the public can get involved and scrutinized afterward. The staff of the fishery association said,

“industrial transformation cannot be carried out only by the fishery association or the developer, and we haven't seen the government's determination to localize.... From a practical point of view, if the fishery association did not make a request in the contract and the company did not promise something, it is very difficult to ask the developer during the operation” (Interview FAA1; 20 May 2020).

The columnist, Ju-Yi Liu (2020), analyzed the role that local governments play in the offshore wind industry and its critical position to push the project with developers while ensuring public participation and local rights. Industrial transformation is a long process that needs a series of strategies and the cooperation of the entire supply chain, which requires the government to be a competent and capable middleman.

5.2 Environmental Justice

As people have diverse perspectives towards the project and their own goods and bads, distributive justice from Schlosberg's (2004) idea of “trivalent environmental justice” (p. 521) cited by Walker (2012) will be discussed in detail in this section above the other two concepts, procedural justice and recognition, and covering the questions of “who are the receptors of environmental justice?” (p. 42), “what is to be distributed?” (p.43), and “what is the principle of distribution?” (p. 44) referred to the conceptual framework in Section 1.2.3.

5.2.1 Receptions and environmental features

In this case study, owners of 325 boats registered under the Nanlong Fishing

Association were the main receptions of environmental losses and gains of the offshore wind farm development. They were considered shouldering the burden of fishing resources so that being paid back by the benefit of compensation, however, the “community of justice” (Walker, 2012, p. 42) and the shared “environmental features” (Walker, 2012, p. 43) were controversial themselves.

“Who defined who the affected group is” was questioned in the project while some selected fishers of particular methods or areas were thought unaffected; residents were resentful saying that on land people should be made up somehow as well (Figure 35) (Lin, 2018a, p. 4193).

Figure 35.

Onshore substation of Formosa 1 and Formosa 2 substation under construction



Note. Residents around were asking for compensation as well. Credit: the author.

How to quantify positive and negative effects and make them equivalent by compensation that everyone was satisfied with was experiencing a long debate too. As a fisher who was once using gillnets but now fishing by pole and line indicated, “the impact of the project and turbines is mixed. The disadvantage is that it will be harder to

catch by nets but with the benefit to gather fish” (Interview FSC8; 29 May 2020), and a pole and line fisher who also takes people to sightsee and research said that

“at first, we had negative thoughts towards the construction because it might cause some problems for fishers, but later, with some compensation, it was better.... Now I have also undertaken some related business, which was somehow economically beneficial, for example, we carry scholars to the sea for investigations like water quality, white dolphins, or birds” (Interview FSD2; 12 June 2020),

the result was divided, some people believed it was the gift falling from the sky, others felt it was the end of the world.

Yet, on the other hand, the improvement of the polluted living environment, the strengthening of national energy security, and the restoration of marine ecology were also the benefits that expecting by everyone (Chen, 2019).

5.2.2 The principle of distribution

The final decision of fishers was a two-thirds vote, of which two-thirds agreed to the development and were passed with the highest threshold; the outcome of the project compensation corresponded to the “principle of equality”, which the amount distributed equally to every registered boat without distinguishing their differences of size or operating area and method, but some, mainly people who from the self-help group mention in Section 4.3.2, didn’t consider it a realization of justice. Walker (2012) underlined the importance of dimensions of vulnerability, need, and responsibility interacting with the direct goods and in situations. The current gillnetting group fishers of Longfong Fishing harbor were stated to be more vulnerable than others to react and recover from the influence, and with what Walker illustrated that “claims of justice may

need therefore to be seeking not just simple absolute equality, but one which reflects differentials in need” (p. 46), they might need more helps, both practical and financial, to deal with the changes.

The fishers had tried for convincing the developer to buy out the exclusive fishing right at a high price or had the distributive compensation vary from person to person to achieve the so-called environmental justice. Their appeal was on the basis of seeking a guarantee of a basic standard of livelihood, saying that they were not against the construction of green energy, but the government must protect people from being unable to make a living.

After rational dialogue and emotional request, neither the amount nor the distribution way of Formosa 1’s fishery compensation has changed. Yet, the lesson has been learned in a second-phase national offshore wind project in Yunlin County. In the light of the announcement from the local fishery association published in March 2020, the compensation was divided into three categories by the number of days fishing last year, fishing method, operation area recorded by the nautical recorder, and fish market auction sales with the amount varying from US\$ 10,000 to US\$ 63,700 per registered boat (YLFA, 2020). It is difficult to reach everyone’s satisfaction, but better solutions are constantly being explored.

5.2.3 Tyranny of the majority

As above, there are possible approaches to address the problem: redistribution applying “principle of equality plus a guaranteed standard” or “a guaranteed minimum with variation above that minimum according to personal income and spending choices” (Bell, 2004) may be one; enlarging the environmental goods can be another, for instance, industrial transformation support policies, damage reduction measures, and local

electricity subsidies. More active movements by the government and the companies can ease doubts and let affected people feel more cost-effective and worth for the losses.

The other issue is the mechanism of distribution and decision-making. Under the democratic system, the thought of tyranny of the majority is existing, and it was one of the arguments of interviewed gillnetting fishers, who expressed,

“do you think the compensation was useful? If there were no compensation, the resistance may be greater. The most important thing is why the company was finally allowed to do it because there were more people who have no influence. We raised our hands and lost, and we have always been the minority who were defeated” (Interview FSA4; 27 May 2020).

As Donald (2002) quoted Alexis de Tocqueville’s thought of majority tyranny that “the laws of democracy tend towards the good of the ‘greatest number’ which means only the majority, not the totality, and the good that is pursued is general but not universal” (p. 745), the right of minorities was buried in the trend of pursuing maximum benefit. How to take dimensions of environmental justice into consideration to adjust the practice of fairness is an issue that should be learned and improved from experiences.

5.3 Future and Sustainability

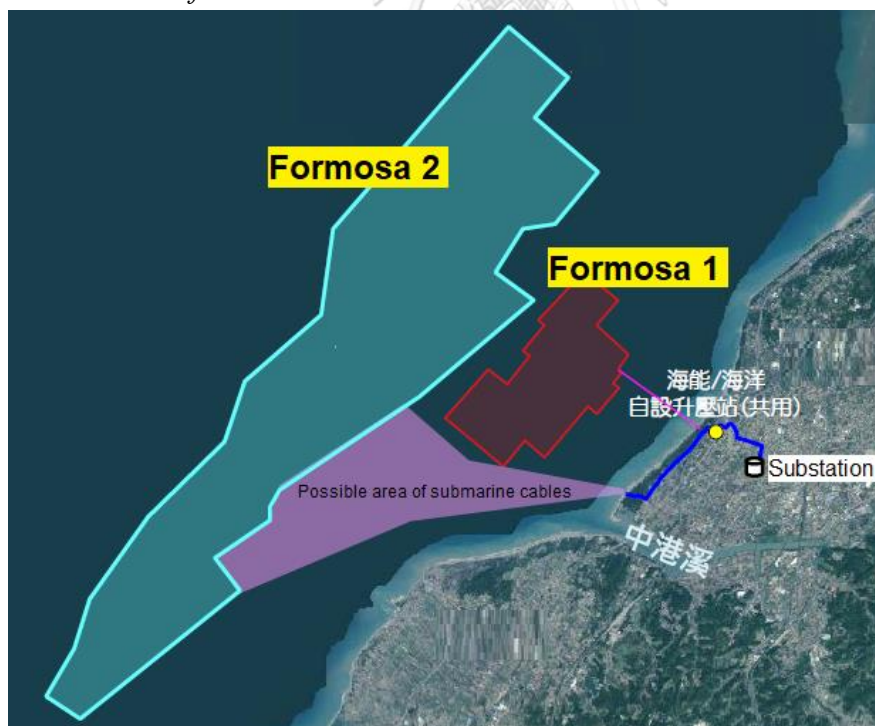
The completion of the wind farm is still less than a year, and many people said that it’s too early to assert its performance and effects, long-term observation and monitor are required. After a lengthy journey, Formosa 1 came to an end, but waiting for the affected people was another construction, Formosa 2, not far from the previous one.

The second time was relatively smoother, passing the Environmental Impact Assessment in early 2018, without much negative news, the developer signed the

contract with Nanlong Fishing Association in January 2020. The process and the result of the compensation negotiation were fully confidential. There was no self-help group this time, and the possible reasons were partly because the site was farther and in the deeper sea (Figure 36), and partly because “there’s already a wind farm blocked there, and adding another will not make much difference”, fishers said calmly (Interview FSA3 & Interview FSAG). For the final outcome, the fishers of gillnetting expressed a little helplessness and acceptance. Very few children are going to inherit the skills of their parents, so many fishers will just keep fishing as long as possible, then end this expertise in their own hands.

Figure 36.

The location of Formosa 2 and Formosa 1



Note. The blue area is the range of Formosa 2; the red area is the range of Formosa 1. Adapted from “Environmental Impact Assessment Report of Zhunan Formosa 2 Offshore Wind Electricity”, by Formosa 2, 2018, *Formosa 2 Wind Power Co., Ltd.*, pp. 6-16, Figure 6.1.2-2. Copyright 2018 by Formosa 2 Wind Power Co., Ltd.

From another perspective, there has been controversy about the gillnetting method, especially under the global pressure of sustainability and ecofriendly. Lin (2016) argued that it's contradictory that Taiwan still compensated for a fishing method that has been prohibited by many countries. "Local Chronicles of Zhunan Township" (Lin, 2018a) recorded some news about related measures, for example, "Mr. Zhang was elected as a model fisher on Fisher's Day because he refused to use the gillnetting method" (p. 3929); "Fisher Chen released the baby fish together with the Fisheries Agency. He said that recently fishers had reduced the use of gillnets, and if they caught small fish they will put them back into the sea, hoping that the future generation can also enjoy fishery resources" (p. 3973).

The government amended "Regulations for the Issuance of Building Permit and Fishing License of Fishing Vessel" in January 2017 to stop the issuance of a newly applied gillnetting license (Council of Agriculture, 2020a) and announced "Gillnetting Fishery Counseling Transformation Measures" for local governments to help the boat with the license of gillnet to transform to pole and line method and improve the impact of the fishing on coastal environment and marine resources. However, under the local autonomy policy, Miaoli County was still not one of the thirteen counties that set their fishery management standards and applied for gillnetting method transformation subsidies, which was about US\$ 6,600 for full-time and US\$ 5,000 for part-time boats (TCGAB, 2018; Council of Agriculture, 2020b).

With the comprehensive coordination between policies in fisheries and projects in development while rethinking of whether fishing itself is sustainable, perhaps, the promotion of the offshore wind farm will push sustainability in the other way.

5.4 Summary

The anticipated and actual outcome and the opinion of environmental justice achievement were distinctive between two groups of main fishing methods in the area. Fishers of gillnet were heavily affected by the wind farm that would block their floating fishing nets while the pole and line group benefited from turbines becoming artificial reefs. Regard to the justice of environmental gains and losses, the compensation for members of the fishing right where was occupied by the development was viewed as the goods to make up burdens derived from the construction, and livelihood transformation was proposed to further balance the negative changes. However, the equal compensation that gave to gillnetting fishers who suffered more from the bads but with fewer benefits and the other group who had almost no losses resulted in the unbalanced feeling, and not to mention the inherent advantage of pole and line boat owners to participate in the tourism industry. From the example of other counties such as the offshore wind project in Yunlin mentioned in Section 5.2.2 which distributed compensation accordingly and the gillnetting transformation mentioned in Section 5.3, the role of local government under decentralization is crucial. How the central government provides the standard to deal with problems at the national level and ensures the performance and equivalence of various agencies; how local governments increase the accountability to people and learn from each other. The delving of these issues could be a catalyst for better social transformation in the energy transition.

In spite of polarized emotions, there were useful experiences could contribute to other projects. First, to reduce protests, the important fishing ground should be reserved from the beginning of the site selection period since fishers of different operation methods were all agreed on the benefits of the farm being moved to deeper waters. Fully

communication was another key element of the benign circle during the negotiation. When the fishery association was asked what value lessons could be brought to the future after the project, they replied concisely, “listening to local needs and providing specific practices” (Interview FAA1; 20 May 2020), which refers to the government and the developer. There are a few good signs that can be seen from the current location of Formosa 2 far away from the coast and smoother negotiation progress.

Second, more benefits provide by the government to give back to people with the NIMBY effect. Though there has already had the “Electricity Development Assistance Fund” mentioned in Section 2.2.1 for the local government and organizations to use on the residents (MEA, 2018c), the “electricity price subsidy” was proposed several times during the interviews with groups of fishers. They pointed out that it is one of the most actual policies that can be felt by people. Moreover, stratified compensation for groups of different levels of impact is also essential to reach fuller equality.

Third, the cooperation of the cross-departmental team to promote regional tourism rather than limiting only in the fishing harbor. The “Local Chronicles of Zhunan Township” (Lin, 2018a) recorded, “‘2012 Miali Ocean Festival’ was held in Lonfong Fishing Harbor with the night concert and the experience activity of the ancient fishing method, Taiwanese Beach Seine. The series taking place also in two other harbors, Waipu and Yuangang, were aiming to push the development of recreational fishing and the transformation to the tourism industry” (p. 3807); and in 2015, “the coastal path with bicycle lanes was rebuilt by the Miaoli Government to connect the harbors and resorts for citizens to hike and relax” (p. 4125). With the start and some finished scale expansion, the continuing livelihood transformation towards sightseeing would be less limited and provide more opportunities for diverse incomes.

As the first national project, despite the outcome did not satisfy everyone, with the accumulation of knowledge, Formosa 1 Offshore Wind Farm can be improved to become a good model of sustainable electricity for Taiwan and replicated to more developments.



CHAPTER VI. CONCLUSION

The research focuses on renewable energy which is considered a possible solution for untying the negatively intertwining environment degradation and soaring energy consumption and took Taiwan's newly developed offshore wind industry as a case to explore its potential for contributing to sustainability. Formosa 1 is the country's first offshore wind project completed at the end of 2019, and its background was mentioned in Chapter 3. Chapter 4 and Chapter 5 narrated procedural and environmental justice, process and outcome, and the perspective of related affected people of the project, trying to answer that "can offshore wind electricity in Taiwan be sustainable". The implication of the research will be found in the 6.1 Discussion section and followed by Section 6.2 for the conclusion and Section 6.3 about the recommendation. Finally, Section 6.4 will provide some potential research for the future.

6.1 Discussion

The result indicates that the perspective of affected communities was polarizing towards the construction. A small group of the fisher in the region felt unjust while the other recognized the value of the offshore wind project. This further confirms the previous argument that the different impact on the two fishing method is the main point of divergence but also downplays the significance of other related issues with the conceptual insight that in a democratic system, procedural justice and the actor barrier should be the basic rights of the public, and what causes the outcome are things above the procedural regulation, for example, people's trust to the government and the solution of the majority tyranny. The balance of environmental justice of the affected group is the main measurement for people to determine their intentions, and once the

environmental benefit outweighs the burden, the opinion tends to be positive. In many cases, economic benefits are most felt, as compensation and healthy livelihoods play a role in this project.

The implications of Formosa 1 for politics in Taiwan is the pushing of its soundness to gradually reduce the social concern and disputes since the importance of a robust policy system was shown to ensure environmental justice in the energy transition. The experience from the first offshore wind farm helps for the establishment of a bottom-up mechanism and enhances the tight relationship between policy and the society, giving a direction for other unsolved social-political problems of other developments. Economically, its successful operation has drawn a clearer future of the new energy industry for everyone, no matter is the expanded regional demand opened up by the government-promised market for investors or a reasonable price of stable green energy supply for users.

The result supports the answer that the offshore wind electricity is generally considered sustainable while the chance for public participation and environmental justice of the majority were mostly achieved. However, the research has limitations like conducting within only a short period which lacks the analysis of long-term attitude changes of the society and focusing mainly on the fishing community which ignores the role that other stakeholders play in the development, for instance, the interrelatedness among project developers, government, and the local, resulting in the lack of triangulation.

6.2 Conclusion

To conclude, in spite of both negative and positive views on the sustainability of

Formosa1 among the affected communities, the offshore wind electricity has its potential to achieve inclusive sustainable development, because, despite varying degrees, environmental justice was actively balanced. The pursuit of procedural justice aims to reduce the bads during the development process and the consensus of the outcome tries to maximize the long-term goods.

In the case of Formosa 1, procedural justice of the Environmental Impact Assessment and follow-up construction issues was met by free participation, information accessibility, and rights to express and protest, for example, the self-help group from gillnetting fishers who thought the result was unfair; the consensus result went through a series of compensation negotiations and livelihood transformation. As Taiwan's first offshore wind project, Formosa 1 did not fully convince everyone with its sustainability, but with the experiences, it did pave a relatively smooth way for the future development towards sustainability.

6.3 Recommendations

Formosa 1 is Taiwan's first offshore wind project and a milestone towards energy transition, and like many other developments, there are dimensions that need to be taken into account and obstacles that require innovative solutions, especially when the development is still facing social and political problems, for example, untrue rumors that affecting social consensus and the failure to complete localization contracts with developers.

After in-depth research, some suggestions would be given. Firstly, towards the private developer:

- (1) involving the social opinion in an early stage and long-term operation of local

communities to fully understand the value that people embrace;

- (2) continuous communicating with sincere adjustments towards the need that was raised;
- (3) remaining flexible and keeping resilience to the demand of different regions.

Then, recommendations that make to the government:

- (1) implementing supervision and completing policies, including response measures to affected livelihoods, standardization of controversial issues such as fishery compensation, and penalties for failure to comply with the contract;
- (2) cultivating deeply at the social level by empowering the society with a solid education system and improving the quality of public participation through the provision of knowledge and opportunities;
- (3) enhancing the depth and breadth of localization to make a win-win situation with foreign investors and to train local talents being able to take on important jobs.

6.4 Future Research

The project is expected to become a model for the expansion of offshore wind electricity, and in addition to the known issues, some knowledge gaps were discovered during the research, both in the small scale derived from the Formosa 1 project and other more general issues of social sustainability. The gaps will be identified with a research question which was proposed as a suggestion of further studies.

6.4.1 Fishing method and social relationship

In the research, the two fishing methods of “gillnetting” and “pole and line” were the most distinct characteristic that differentiated the perspective and position of fishers,

and during the interview, there were both greetings and criticisms between the various groups. Although mentioned in Section 4.5 that the knowledge from Formosa 1 has removed some obstacles that may cause disputes on the road of offshore wind development, since there was not much understanding about history, it was unclear whether their relationship involved results, for example, if they have good relations before the development, will they feel that the allocation is fairer or the principle of distribution might be different?; will the fisher who change their method be considered to be out of the original group?; or will the tight relationship between the methods can encourage the transformation towards sustainability? which raised the question that

“what was the interaction between the result and the relation of the two fishing method groups before and after the project?”

with three sub questions,

- (1) “will the close or unfamiliar relationship between fishers of gillnetting and pole and line affect the outcome?”;
- (2) “has the result made them more opposite to each other?”;
- (3) “will the tight or alienating relationship between fisher groups affect their willingness to carry out fishery transformation?”.

The objective is to clarify the critical power relations and convert the potential negative influences into the motivation for cooperation.

6.4.2 Participation and social identity

The fishers around the harbor that near the offshore wind farm has the opportunity to join the construction and the type of the job depended on the variety of the boat. In Section 4.4., Dr. Hsin-Yi Lu, an academic at the Department of Anthropology of National Taiwan University, pointed out that the sense of participation is highly

interrelated to fishers' works in the project, but the job content did not have the chance to be made a thorough inquiry in this research. So the question

“how would the working experience with the project and to what extent did the fishers participate affect their social acceptance towards the offshore wind electricity?”

is asked, aiming to give a direction for the developer to reduce the protest while inviting the local workforce to become part of the national project and make them feel valued, and sub questions were listed,

- (1) “what kind of job can enhance the fisher's positive connection with the project?”;
- (2) “will the attitude change on account of the working frequency?”;
- (3) “what would be the selection mechanism of the related job, and how to avoid the negative impact on people who have no chance to involve?”.

6.4.3 Local governments and social transformation

As Liu (2020) indicated that “the local government is considered to be the key to the success of the transformation, but in the case of setting up offshore wind electricity, there were many debates it faced and there was no precedent.... The consensus depends on the accumulation of local government experience” and mentioned in Section 5.4 the significance of local authorities for local development, the formula for social transformation is desired.

“What are the characteristics of local governments in social transformation while promoting offshore wind electricity?”

is the question that would like to be answered, and the sub questions would be

- (1) “in what way can the local policy drive social transformation?”;

- (2) “besides the monetary compensation, what can be done more to push the social transformation to keep up with energy transition?”;
- (3) “what are the necessary conditions to promote social transformation?”.

The importance to fill the gap is that it can be used as an example to provide knowledge for further developments.



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APPENDIX

Code	Group & Type	Interview	Tool	Date
FSA	Fisher of Longfong - Gillnetting	FSA1	Key informant	25 May 2020
		FSA2	Key informant	25 May 2020
		FSA3	Key informant	25 May 2020
		FSA4	Key informant	27 May 2020
		FSA5	Key informant	27 May 2020
		FSAG	Group Discussion	27 May 2020
FSB	Fisher of Waipu - Gillnetting	FSB 1	Key informant	28 May 2020
		FSB2	Key informant	28 May 2020
		FSB3	Key informant	12 June 2020
FSC	Fisher of Longfong - Pole and line	FSC1	Key informant	26 May 2020
		FSC2	Key informant	26 May 2020
		FSC3	Key informant	29 May 2020
		FSC4	Key informant	29 May 2020
		FSCG	Group Discussion	26 May 2020
FSD	Fisher of Waipu - Pole and line	FSD1	Key informant	28 May 2020
		FSD2	Key informant	12 June 2020
FAA	Nanlong Fishery Association	FAA1	Email	20 May 2020
		FAAG	Group Discussion	30 Jan. 2020
GOA	Local government official	GOA1	Phone	15 May 2020
		GOA2	Key informant	18 May 2020
ACA	Academics - Community experience	ACA1	Key informant	13 May 2020
ACB	Academics - Marine experience	ACB1	Key informant	14 May 2020

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