



Knowledge Integration in Taiwanese Environmental Impact Assessment

Student: Shao-Lin Peng

Student No.:3557758

Institution: Utrecht University/Tilburg University/Erasmus University Rotterdam

Programme: Research master in Public Administration & Organizational Science

Supervisor: Prof. Arwin van Buuren

Second reader: Prof. Dr. Arjen Boin

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Abstract

This thesis intends to understand problems regarding to knowledge integration in the Taiwanese environmental impact assessment (EIA) by conducting a single case study on the EIA of the fourth expansion of the Central Taiwan Science Park. The analysis of knowledge integration addresses on actor domains, actors' frames, actors' knowledge strategies, and institutional arrangements. This research reveals the dynamical aspect of knowledge integration which is different from theory. The research indicates the importance of actors' frames on other actors, and institutional effects on actors' frames. In terms of empirical perspective, this research suggests that in order to improve knowledge integration in the Taiwanese EIA, institutional arrangements should be reconsidered, especially on the selection method of the EIA Committee members, the information delivery channels, and the enforcements of the rules in the EIA process.

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List of Abbreviations

CEPU	Changhua Environmental Protection Union
CTSPA	Central Taiwan Science Park Administration
CTSP-IV	Fourth Expansion of the Central Taiwan Science Park
EIA	Environmental Impact Assessment
EIA Act	Environmental Impact Assessment Act
EIAC	Environmental Impact Assessment Review Committee
ENGOS	Environmental Non-governmental Organisations
EPA	Environmental Protection Agency
EPB	Environmental Protection Bureau
NEPA	National Environmental Policy Act
TEAN	Taiwan Environmental Action Network
TTO	Total Toxic Organics
WHLDA	Wild at Heart Legal Defence Association

CHAPTER 1

In Search of Knowledge Integration in Taiwanese Environmental Impact Assessment

We did not go to school! I don't understand what you said at all!

Our home will be knocked down! Our oyster farms will be destroyed! Is it fair and just?

- Complaint of local fishermen from Changhua County

In 2009, when I finished my studied in Australia and went back to Taiwan, I felt that there were more and more protests and demonstrations against governments on environmental issues. Conflicts between governments, local people, ENGOs and developers occur again and again recently in Taiwan. Series lawsuits were filed against the Environmental Protection Agency (EPA). People, especially local people who do not have much education, always argued that their voices had never been heard. Many development projects deeply affected their lives, but they could do little when the project went through the environmental impact assessment (EIA). What is wrong with our EIA system? Why people need to go into streets and protest? Why different voices cannot be heard in the EIA process?

In Taiwan, people used to believe in experts, especially in solving environmental problems (Tang and Chiu 2010; Tu 2012). "Leave it to the experts" is the way how environmental problems have been solved in Taiwan. Experts comprise an EIA committee (EIAC) and review on development projects which may have significant potential impact on environment. In the Taiwanese EIA, experts are at the central of power and knowledge hierarchy. This has been criticised in recent years. People argue that experts have too much power and other voices and knowledge are often excluded in decision making processes (Tu 2009). Some scholars also suggest that "the privilege of scientific knowledge (S.-J. Hsu and Hsu 2001: 116)" is the major reason of uneven knowledge inputs in the EIA. They point out that experts and government agencies usually believe in scientific knowledge and seldom consider the value of local knowledge. Whenever there are disputes in the EIA cases, local people's opinions are often regarded as personal experiences by experts. Experts rarely take their opinions into account in decision making and consider their opinions are not reliable.

Exclusion local knowledge accumulates local people's dissatisfaction on the EIA process and results (H.-H. Chen 2011a; Fan 2008; Tu 2009, 2011, 2012). More and more lawsuits are filed by local people against the EIA results because their voices had not been heard properly (Huang 2011). Those lawsuits increase administrative cost and decrease administrative efficiency, and become headaches for government agencies. Problems of exclusion of local knowledge in the EIA are not only on increasing further administrative burden for government agencies. The most severe impact is that people's suffering from environmental problems would not be recognised and dealt with properly. With concerns on inferiority of local knowledge in the Taiwanese EIA, it raises my curiosity to know why local knowledge is difficult to be integrated in the Taiwanese EIA.

Hence, my research question in this thesis is "what are causes of the problems in integrating different types of knowledge in the Taiwanese EIA?" The sub-questions regarding to this research question are 1) how can different types of knowledge actually integrated in the Taiwanese EIA, and 2) how to enhance integrating different types of knowledge in the Taiwanese EIA. Although the problem of excluding local knowledge in the Taiwanese EIA has been recognised by many researchers, their studies often focus on the role of experts and scientific knowledge in Taiwanese EIA (Y.-j. Chen 2011b; Ciou 2007; Fan 2008; J.-J. Hsu 2009; Liou 2008; Tang and Chiu 2010; Zhang 2012). They rarely discuss the causes of the problems and how to deal with the problems on knowledge integration. I expect the result of this thesis can provide insights for knowledge integration in the Taiwanese EIA for governments to recognise the deficiencies in the EIA systems, for ENGOs to find a better way to communicate with experts and governments, and for local people to have more voices in decision making process.

In this thesis, I start from the literatures reviews in Chapter 2 to find out factors that have impact on knowledge integration from theoretical perspectives, and develop my conceptual framework for the research. In Chapter 3, I introduce research methodologies I apply for the research, and demonstrate how I collect and use data. In addition I present the research structure to show how I analyse data and approach my research questions. In Chapter 4, I provide background information on the Taiwanese EIA and the case I focus for my analysis. Chapter 5, 6, and 7 are the main chapters for empirical data analysis to examine factors which influence knowledge integration. Chapter 8 is the conclusions of the empirical analysis to demonstrate what I have found regarding to knowledge integration in the Taiwanese EIA. Last but not least, I answer my research questions and provide suggestions for future studies.

CHAPTER 2

Frameworks of Knowledge Integration

In order to analyse knowledge integration, first we need to know what it is. Knowledge integration is defined differently in different literatures. I adopt the definition from Edelenbos et al. (2011: 677), and defined knowledge integration as

an ongoing process in which actors collectively produce relevant and useful knowledge which crosses different actor domains.

Knowledge integration contains two elements, the process of knowledge integration and produced knowledge crossing different actor domains. By this definition, it raises two questions: 1) what are different actor domains and 2) what consist in knowledge integration process. In this chapter, first I answer those two questions by reviewing different literatures. In the second part, I present a conceptual framework of this thesis.

2.1 What are different actor domains?

In decision making, different actors may hold different types of knowledge. Actor domains refer to which types of actors have which types of knowledge. There exists a large variety of literature on knowledge typologies, in which knowledge is often categorised in scientific, bureaucratic, and stakeholder knowledge (Bäckstrand 2003; Bruijn and Heuvelhof 1999; Edelenbos et al. 2011; Hunt and Shackley 1999; Nowotny 2003; van Buuren and Edelenbos 2004; van Buuren et al. 2004; van Eeten 1999). Scientific (expert) knowledge is mainly produced by experts and academics. The validity of scientific knowledge is based on scientific models and on peer review. Bureaucratic (administrative) knowledge stems from policy processes and contexts. Most of the bureaucratic knowledge is generated by civil servants or bureaucrats within the bureaucracy or administration. Local (stakeholder, lay, or situated) knowledge is derived from the experience of stakeholders and addresses local experiences and insights.

2.2 What consist in knowledge integration process?

Raymond et al.'s (2010: 1771) framework of knowledge integration (Figure 1)

describes the process in which different types of knowledge are integrated. In their framework, a sequence of actions and issues are suggested to address six different stages of the decision-making processes. This framework (Raymond et al. 2010: 1771) starts with *problem identification* and *identifying existing knowledge*. Hereafter, it continues with *engaging different knowledge*, *evaluating different knowledge* and *applying integrated knowledge during and after decision making*. Three elements which consist in the knowledge integration process can be extracted from the framework. The three elements are: 1) frames, 2) knowledge strategies, and 3) institutional arrangements.

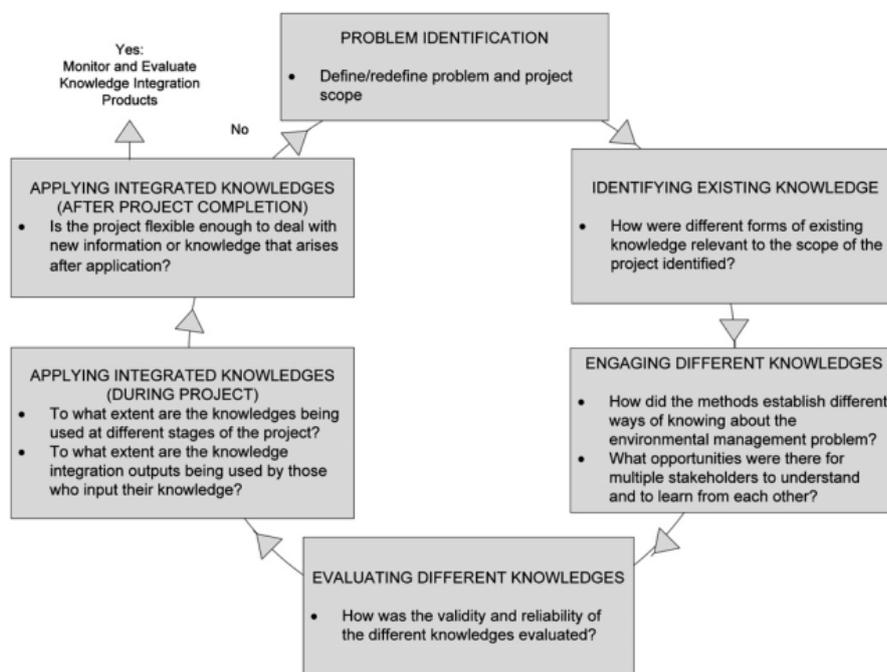


Figure 1 Raymond et al.'s (2010:1771) Framework of Knowledge Integration

2.2.1 Frames

The first stage, *problem identification*, addresses actors' worldviews and frames. Worldviews, frames, or beliefs, different authors may use different terms to describe what forms our perceptions towards others, from physical worlds to abstract knowledge. "Frame" is often used in the field of policy making. Schön and Rein (1994) define frames as a set of relatively stable perceptions of actors toward the world. Frames are beliefs, norms and values that actors have. Frames of actors construct different world views, problem definitions, and interpretation of knowledge (Koppenjan and Klijn 2004: 33; Schön and Rein 1994: 23; van Buuren et al. 2004: 7-8). In knowledge integration, frames of actors determine their perception of problems, the way in which

problems should be dealt with, and desired results. If actors continuously have opposite or conflicting definitions of a problem and are not willing to reflect upon other actors' frame (Deelstra et al. 2003: 526), it is very likely to end up with report wars or knowledge fights (Bueren et al. 2003; Edelenbos et al. 2011; Veld and Verhey 2009) which actors attack others' positions with scientific reports that contain contradictory findings. In this situation, actors are hostile towards each other and unwilling to accept others' insights. Hence, it is difficult to develop a common knowledge ground and it leads to a lower level of knowledge integration. Conflicting frames on problem can lead to knowledge fights, hostile frame of other actors (Koppenjan and Klijn 2004: 71-72) can also result in knowledge fights due to hostility and lack of trust on other actors.

Sabatier's (1988) theory on belief systems is similar to what Schön and Rein refer to as frames. However, Sabatier (1988: 144-45) further distinguishes belief systems in three levels: deep core beliefs, policy core beliefs, and secondary aspects. Deep core beliefs are the basic personal philosophy and normative assumptions. Policy core beliefs are assumptions about actors' interests related to policies. Secondary aspects deal with decision-making processes relating to the actor's interest. Although frames are stable, certain parts of frames are more likely to change. Sabatier (1988) argues that secondary aspects of actors' perception change quite often in decision-making processes. In addition, changes and reframing perceptions are also likely to be achieved through learning in the processes (Hommes et al. 2009: 7; van Buuren 2009: 215). In this regard, different frames do not necessarily lead to controversies and conflicts as perceptions may shift in the processes.

2.2.2 Knowledge Strategies

From the second to the fourth stage of Raymond et al.'s framework (*identifying existing knowledge, engaging different knowledge, evaluating different knowledge*), they suggest to focus on knowledge strategies. Knowledge strategies refer to the ways in which knowledge is present, shared, exchanged, or negotiated between actors for particular purposes in decision making processes. Knowledge strategies vary from actor to actor. Pielke (2007) distinguishes four types of scientists and their knowledge strategies in policy making. Those four roles are *Pure Scientist*, *Issue Advocate*, *Science Arbiter*, and *Honest Broker of Policy Alternatives*. Based on the role they play, they have distinct ways of interaction and strategies in providing their knowledge to decision-makers. The Pure Scientist only provides fundamental information, and does not care about how decision makers will use the knowledge they provide. The Science Arbiter answers all factual questions from decision makers, but there is no personal

preference or value judgement in their answers. The Issue Advocate offers specific information to decision makers and tries to promote or lead decision makers to particular issues which an Issue Advocate is interested in or may have stakes in. The Honest Broker of Policy Alternatives provides all the alternatives to decision makers, but, unlike the Pure Scientist, the Honest Broker does take decision makers' concerns into account.

Pielke's typology on knowledge strategies may not be appropriate to apply on other actors, because of the special role of scientists and experts in the EIA. Scientists and experts must contribute their knowledge regardless of their attitude and willingness. On the other hand, for other actors, it is unnecessary to provide or share their knowledge. Their knowledge strategies can be more flexible and diverse. There are two types of knowledge strategies (Koppenjan and Klijn 2004: 24-28) which may be adopted by non-expert actors in the decision making: 1) information gathering, use of expert knowledge and scientific research, and 2) counter-expertise. The first strategy aims at truth finding. Actors adopt this strategy believe that collecting more information and use scientific research can lead to neutral findings and solve the problems rationally (Koppenjan and Klijn 2004: 25). The second type of strategies aim at supporting actors' own arguments and claims. Actors who adopt this strategy also collect information, but information is for advocating their own claims and convincing others that their claims are more legitimate. If actors keep presenting conflicting information, there is no knowledge accumulation or mutual knowledge exchange (Koppenjan and Klijn 2004: 27).

2.2.3 Institutional Arrangements

Raymond et al. (2010: 1770) consider institutional factors in the last two stages (*applying integrated knowledge during and after decision making*) in their framework. Factors on which they focus are institutional power and control resources. However, institutional factors may have an impact from the start of the processes and may have different dimensions besides institutional power. Institutions are often defined as as commonly shared and used set of rules. What kinds of actions are required, prohibited, and permitted are regulated by institutions (Hodgson 2006; Ostrom 2005). Ostrom (2005: 190) speaks of seven types of institutions: position rules, boundary rules, choice rules, aggregation rules, information rules, payoff rules, and scope rules. Position rules regulate positions or roles of participants. Boundary rules specify conditions under which actors can be assigned to or leave positions. Choice rules define what actors must or must not do in their roles. Aggregation rules determine joint effects in decision

making. Information rules affect knowledge and information communication of actors. Payoff rules prescribe costs and benefits related to certain actions and outcomes. Scope rules determine the effect from the actions on the outcomes. In Ostrom's categories, rules which have major impact on knowledge integration are position rules, boundary rules, choice rules and information rules. Position and boundary rules influence knowledge integration in a way that those two types of rules prescribe actor domains. Choice rules affect knowledge integration by regulating actors' action in choosing knowledge strategies. Information rules directly constrain knowledge and information actor can receive in decision making process. Although rules regulate actors, yet actors may not be aware of rules. Those rules which do not have effect on actions are considered as rule-in-form (Osrom 2005: 138). Rules which have effect are considered as rule-in use (Osrom 2005: 138). Rules may also be broke or created in the process.

2.3 Conceptual framework of Knowledge Integration

By definition, knowledge integration can be influence by the changes in process and in actor domains. From literature reviews, there are three elements which affect knowledge integration process. The three elements are frames, knowledge strategies, and institutional arraigments. The process is influenced by the actors' choice on knowledge strategies and the purpose of knowledge strategies. Actors' intention and methods in bridging knowledge from different domains determines the level of knowledge integration (Edelenbos et al. 2011). Actors' choice on knowledge strategies are further affected by frames and institutional arrangements. Frame on problems (Deelstra et al. 2003: 526) and on other actors (Koppenjan and Klijn 2004: 71-72) influence actors' choice on knowledge strategies to whom and for what purposes. Institutional arrangements influence knowledge strategies by choice rules and information rules. Choice rules regulate what actors must and must not do. In this regards, it limits the scope of choices on knowledge strategies. Information rules affect actors' strategies by regulate source of knowledge and the amount of information actors are able to receive in decision making process. Institutional arrangements not only have impact on knowledge strategies, but also on actor domains. Position and boundary rules define the types of actors and determine whether they are allowed to participate in decision making. Those four factors are interrelated. As they could be changed and altered by actors, the four factors are also dynamic.

The conceptual framework of this thesis is presented in Figure 2. Knowledge integration is influence by four factors: actor domains, frames of actors, actors' knowledge strategies, and institutional arrangements. Knowledge strategies are

affected by frames and institutional arrangements. Actor domains are influenced by institutional arrangements.

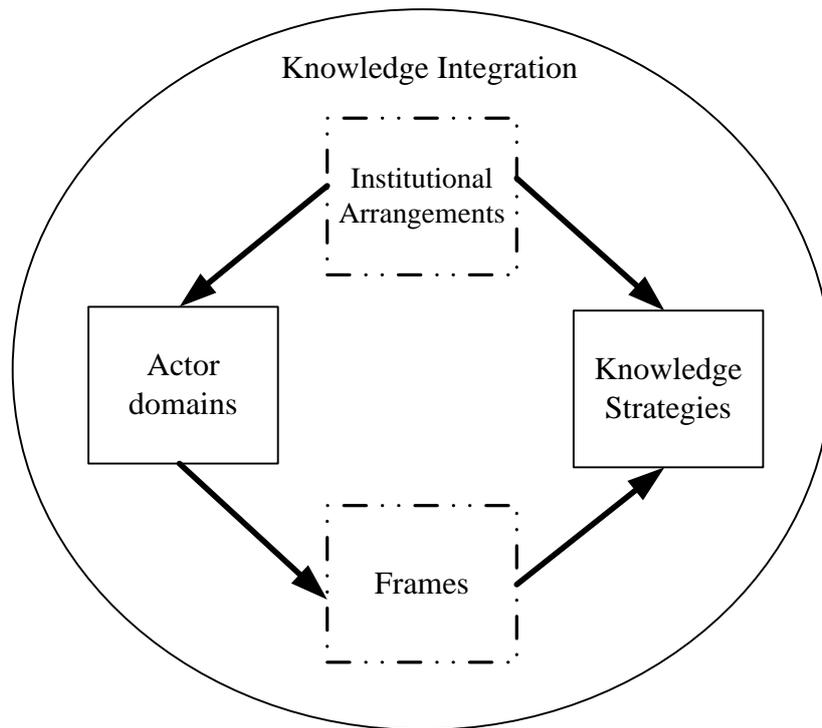


Figure 2 Conceptual Framework of Knowledge Integration

CHAPTER 3

Methodology

3.1 Method: A Case Study on the EIA of the CTSP-IV Project

This thesis will be based on a single case study. Yin (2002: 13) defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. In addition, Yin (2002: 5-10) suggests that a case study method has advantages in answering “how” and “why” questions, and allows researchers to acquire in-depth insights on social phenomena. The aim of this thesis is to find out how knowledge integration in Taiwanese EIA can be improved. A case study method is suitable for this research question, since it is a “how” question. Knowledge integration in Taiwanese EIA may not be referred to as a phenomenon, but it is a contemporary and contextual issue. Furthermore, the research question is not intended to seek a generalised answer which is suitable for all; on the contrary, it focuses on a Taiwanese context. By analysing a selected case, a case study method is able to provide a better way to in-depth discover knowledge integration in a Taiwanese context.

The unit of the case study in this thesis is an EIA of one development project. Based on the research question, essential criteria for case selection are: 1) a Taiwanese EIA case, and 2) it should involve different types of knowledge. The investigated case is the EIA of the fourth expansion of the Central Taiwan Science Park (referred as the CTSP-IV) (See Box 1)¹. Although there are many issues in the case of the CTSP-IV, effluent issues are the only focus in the analysis. Other issues such as air pollutions or land acquisition are not in the scope of this case study. The reason to focus on effluent issues is they are one of the most controversial issues in this case comparing to other issues. Effluent issues were so disputed that additional reviewing meetings were hold specifically for discussing effluent issues. This also means the amount of data on effluent issues is largest. In this regard, it is suitable for analysis how actors use different knowledge strategies and interact with each other.

¹ More background information on the CTSP-IV project will be presented in the next chapter.

Next to the aforementioned criteria, this case was selected due to its complexity and its controversial nature. The EIA of the CTSP-IV project is complex in a way that 12 review meetings were held for this single project. Various groups participated in the EIA processes and, hence, increased its complexity. Controversies that surrounded this case mainly resulted from different environmental problems. Another reason why this case is extremely important is its status as a landmark case. Namely, it examined the Environmental Protection Agency's (EPA) attitude after they lost the first administrative lawsuits, which were filed by local people. The EPA lost their first administrative lawsuits on the EIA of the CTSP-III project (Zhan 2010) and were then forced to go to court as a result of the CTSP-IV project. The CTSP-III project and the CTSP-IV project are quite similar and are, hence, suitable for a comparative case study to evaluate whether a change in knowledge integration has taken place. Even though this thesis only deals with one case study on the CTSP-IV, the research results can be used by other researchers to conduct comparative case studies on relevant topics.

Box. 1 Background Information on the CTSP-IV

The CTSP-IV is located in Erlin Town, Changhua County. It encompasses 631 hectares of land which was formerly part of the Taiwan Sugar Corporation's Wanxing and Dapaisha farms. Before the CTSP-IV, there were already three other science parks in the centre of Taiwan, including Taichung Park (CTSP-I, 413 ha), Huwei Park (CTSP-II, 97 ha), and Houli Park (CTSP-III, 255 ha). The CTSP- I, II, III and IV focuses on semiconductor and optoelectronics industries. The CTSP-IV also aims at optoelectronics industries. The CTSP-IV was created after some enterprises, especially AU Optronics, claimed that the current CTSP- I, II, and III almost reached their capacity. These enterprises also requested more land to increase the number of factories. In this regard, the CTSP-IV project was proposed by the Central Taiwan Science Park Administration (CTSPA) in February 2008. The EIA of the CTSP-IV project started from April 2009 and was conditionally approved in October 2009. The approval of the CTSP-IV project led to the emerge of many debates in society.

3.2 Sources of Data

Multiple sources of data are used in this case study, of which the majority are documents and interviews. To reconstruct the processes of the EIA of the CTSP-IV project, two types of data are needed. These are factual data and personal opinions. Factual data will create an understanding of the facts of the case, of who were the participants and of what the conclusions of the EIA were. Sources of factual data include the environmental impact statement and EIA meeting records². Personal and

² EIA meeting records include records of project team meetings and expert meetings. All the participants' speeches, including the EIA Committee, were written in those meeting records. Besides, supplement documents submitted in paper by participants were also included in the records, such as powerpoint

organisational opinions are used to understand how and why certain people say and do the things they do and how they form their knowledge strategies. Personal and organisational opinions are taken from sources such as the newspapers from the EPA³, mass media, blogs from participants⁴, and interviews. Although when compared to opinions, factual data is relatively less subjective, EIA meeting records might still be biased. Some groups argue that speeches were selectively included in meeting records (Cai 2009). It may influence the case study, yet its impact can be minimised through cross-validation with other sources of data. Another limitation of meeting record is the lack of direct record on the CTSPA. In the meeting records, most of speeches from participants were recorded. However, the CTSPA is the only actor which is not mentioned in the meeting records. Besides, I was not able to interview any employees from the CTSPA. There is no sufficient data to reconstruct the CTSPA's perceptions and actions. With limited data, I do not deal with the CTSPA in this thesis. I only look at how the CTSPA reacted to others from other actors' point of views.

Respondents of interviews are selected from three major groups of actors (that are mentioned below): central government agencies, experts, and civic bodies. Due to time restrictions and practical issues⁵, no respondents from groups of developers and local government agencies were included. Central government agencies included the EPA and the Water Resources Agency. Respondents of experts are taken from members of the 7th EIAC⁶. Respondents of civic bodies are from ENGOs and residents of Changhua County. These numbers are presented in Table 1. In order to protect respondents, interviews are used in an anonymous way, because this case is still a sensitive topic in Taiwan. Oral interviews are transcribed into text in Mandarin, and segments which are used in the analysis are translated into English. It is the same with the meeting records which contain individuals' speeches. I translated their speeches into English. For the convenience of referencing, I give each individual actor a code. In the analysis, I refer to those individual actors with codes. The list of actors' names and their codes are in Appendix 1.

presentation slides. Those records were written by the EPA and published on the EPA's website. (<http://eia-report.epa.gov.tw/EIAWEB/Main.aspx?func=00>)

³ The EPA news is official news published by the EPA on their website.

(http://ivy5.epa.gov.tw/enews/fact_index.asp)

⁴ Some actors from ENGOs have their own blogs. They often post commentaries on their blogs.

⁵ Because the CTSP-IV project is still a very sensitive issue in Taiwan, some actors refused to be interviewed.

⁶ The 7th EIA Committee is the one which reviewed the CTSP-IV project

Role of Actors	Respondent	Code
Bureaucrats	The Minister of the EPA	1
	An official of the EPA	2
	An official of the Water Resources Agency	3
The EIAC members	A member of the 7th EIA Committee	4
	A member of the 7th EIA Committee	5
ENGOS	A member of Changhua Environmental Protection Union	6
	A member of Taiwan Environmental Action Network	7
	A member of Taiwan Environmental Action Network	8
	A member of Taiwan Academy of Ecology	9
	A member of Wild at Heart Legal Defence Association	10
	A member of Xiang Si Liao Village Association	11
	An environmental Lawyer	12
Mass Media	A journalist of Taiwan Public Television	13
Local Stakeholder	A resident in Fangyuan town, Changhua County	14

Table 1 The List of Respondents

3.3 Research Structure

The research structure of the case study is presented in Figure 3. The case is divided into three rounds. The first round is from the first project team meeting to the four project team meeting. The second round is from the first expert meeting to the third expert meeting. The third round is from the fifth project team meeting to the eighth (the last) project team meeting. The reason to have such division is due to there are two transitional points in the EIA process. The first one is the decision to hold expert meetings, and the second one is the decision to end expert meetings. At each transitional point, certain decisions had been made. In this regard, I divide the whole EIA process into three rounds, and see whether there is chronologically change. In each round, actor domains, frames, institutional arrangements, and knowledge strategies is analysed in order to understand how those four factors influence knowledge integration. The level of knowledge integration is also examined in each round.

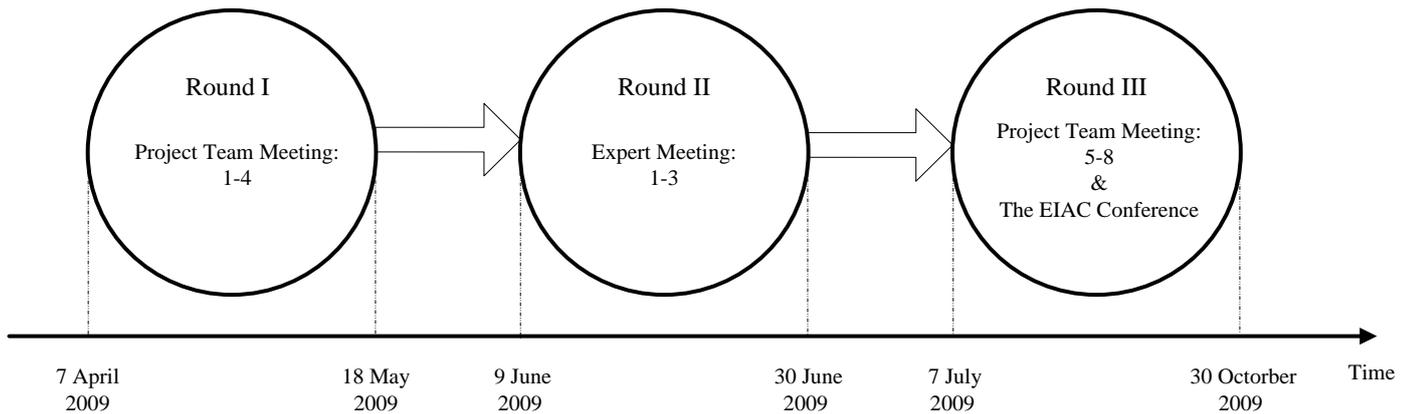


Figure 3 Research Structure: Round I, II, and III

Based on the conceptual framework (Figure 2) presented in the chapter 2, the operationalization on the level of knowledge integration focuses on ‘actor domains’ and ‘knowledge strategies’ because those two factors have direct impact on knowledge integration. Knowledge integration is operationalized into three levels: high, medium, and low level. Criteria of ‘actor domains’ is whether there are three types of actors (experts, bureaucrats, and local stakeholders) in the decision making process. I operationalize knowledge strategies by observing whether actors’ strategies enhance bridging knowledge from different actor domains. Criteria are 1) types of knowledge used in strategies, 2) the purpose of strategies, and 3) other actors’ reaction on strategies.

High level (+):

Three types of actors (experts, bureaucrats, and local stakeholders) participate in decision making process. Actors intentionally use different types of knowledge and actively try to bridge gaps between different types of knowledge. Other actors react to strategies positively.

Medium level (-+):

Two types of actors participate in decision making process. Actors do not pay attention to use different type of knowledge, and have little intention to bridge gaps between different types of knowledge. Other actors’ reaction is passive or no reaction.

Low level (-):

Only one type of actors participates in decision making process. Actors do not use other type of knowledge and have no intention in knowledge integration. Other actors have counter reaction, such as use strategies to fight back.

CHAPTER 4

Background Information - the EIA of the CTSP-IV project

4.1 The EIA in Taiwan

The Environmental Impact Assessment Act⁷ (referred to as the EIA Act) was enacted in 1994 in Taiwan for the sake of environmental protection. This Act was mainly adopted from National Environmental Policy Act (NEPA) of USA (Huang 2011: 326). The distinction between the EIA Act and NEPA is that the EPA is assigned as the only competent agency at the central governmental level in Taiwan⁸⁹. Instead of each administrative sector carrying the EIA by its own, the EPA is the only legitimised sector which is in charge of the EIA. The EPA has the right of veto¹⁰, which is unique in the major EIA system (Huang 2011: 326-27).

The purpose of the EIA Act is to prevent and also mitigate any negative impact from development activities which are mainly referred to as large-scale construction projects¹¹, such as the development of an industrial park. In order to apply for construction permission, the developer should submit their projects to the competent authority for conducting the EIA. Projects that need the EIA are reviewed by the Environmental Impact Assessment Review Committee¹² (referred as the EIAC). At the central governmental level, the EIAC is established by the EPA. The EIAC consists of 21 members, including the Minister and the Deputy Minister of the EPA, 5 delegates from relevant government agencies, 14 experienced academics or practitioners with expertise in their relevant fields¹³. The EIAC members are required to assess 1) the

⁷ Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

⁸ Article 2, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

⁹ I only mention the central governmental level is because the CTSP-IV project is at the central level.

¹⁰ Article 14, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

¹¹ Article 5, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>
Standards for Determining Specific Items and Scope of Environmental Impact Assessments for Development Activities, see <http://law.epa.gov.tw/en/laws/571925793.html#art01>

¹² Article 3, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

¹³ Regulation on the Environmental Impact Assessment Committee, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=0030>

environmental impact statements and reports or other relevant reports; 2) the reports on the difference of the current environment, response strategies, and the environmental impact survey; 3) the EIA process for government policy for which there is concern of an environmental impact; and 4) the revised environmental impact statements and reports¹⁴. Decisions in the EIAC conferences are made by majority vote. If there is no majority vote, the chairman has the right to make decisions¹⁵. In other words, the EIAC has a veto power over submitted projects and, thus, plays the most important role in decision making.

According to the definition of the EIA in the EIA Act¹⁶, the EIA comprises of three essential components: 1) an environmental management plan submitted by the developer, 2) transparency of the plans to the general public, and 3) reviews of the plan. In terms of the reviews, the procedures of the EIA in Taiwan are divided into two phases (see figure 4). The division between phase I and phase II is based on the degree of public participation. There are fewer channels for public participation in the first phase (Huang 2011: 326; Yu 2010: 52-53) and, moreover, the developer should prepare an environmental impact statement¹⁷. This statement includes¹⁸ various surveys on the current environmental conditions, a forecast of the environmental impacts of the development project, and protection strategies. If the review on the environmental impact statement of the development project is considered to have significant negative environmental impacts¹⁹, it is required to conduct the second phase II. In this phase, the developer should prepare an environmental impact assessment report²⁰. The content of these reports is similar to that of the environmental impact statements, but differs in the inclusion of public opinion in the environmental impact assessment reports.

There are three forms of meetings in relation to the reviews on environmental impact statements and environmental impact assessment reports. They are project team meetings (專案小組初審會議), expert meetings (專家會議), and the EIAC conference (環境影響評估審查委員會議). As mentioned above, decisions on development projects are made in the EIAC conferences through a vote by the EIAC members. Project team meetings are held before the EIAC conferences so that specific projects

¹⁴ Article 2, Regulation on the Environmental Impact Assessment Committee, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=0030>

¹⁵ Article 9, Regulation on the Environmental Impact Assessment Committee, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=0030>

¹⁶ Article 4, Paragraph 2, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

¹⁷ Article 6, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

¹⁸ Article 6, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

¹⁹ Article 8, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

²⁰ Article 11, Environmental Impact Assessment Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

may be assessed²¹. A project team consists of 8 to 14 EIAC members, experts and scholars²² and their conclusions are reviewed in EIAC conferences²³. If a controversial topic is discussed during a project team meeting, the chairman can request an expert meeting²⁴. Expert meetings were established in 2008 by the current Minister of the EPA. Experts participating in such meetings are recommended by stakeholders, developers, and central and local governments. The purpose of expert meetings is to seek neutral and in-depth discussion on the disputed issues so that these can be clarified. The experts are in no way enforced to reach a consensus. Their conclusions are only used as reference for the project meetings. In sum, project team meetings and expert meetings are for the purpose of in-depth discussion on a particular project or issue. Conclusions should be reached in project team meetings. Based on these conclusions, the EIAC conferences vote and decide on the approval of the development project.

4.2 The EIA of the CTSP-IV project

The CTSP-IV project was proposed by the National Science Council in February 2008. National Science Council was the industry competent authority of this project of which the developer was the Central Taiwan Science Park Administration (referred as CTSPA). The CTSP-IV project was proposed due to the need for more land from AU Optronics, one of the largest TFT-LCD manufacturing enterprises. The CTSP-IV project targets the industries of optoelectronic industries, but also has semiconductors, biotechnology and green energy industries. The CTSPA's goal is to make the CTSP-IV the world's most competitive science park. After the location selection process, the CTSP-IV was planned to be located in Erlin Town, Changhua County (Figure 4). Due to its status as a national development project, the CTSP-IV project first required the assessment from the Executive Yuan²⁵. After the approval, according to the EIA Act, the CTSPA submitted the CTSP-IV project to the EPA to conduct the EIA. The first project team meeting was held on 7 April 2009. The conclusion was made in the EIAC conference on 30 October 2009. During the EIA process, the CTSP-IV project underwent eight project team meetings, three expert meetings, and one EIAC conference. In sum, 12 meetings were held for this project within a timeframe of six months (Figure 5). The CTSP-IV project only went through phase I of the EIA and,

²¹ Article 2, Regulations on the Project Team Meetings, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=1330>

²² Article 3, Regulations on the Project Team Meetings, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=1330>

²³ Article 12 and 13, Regulations on the Project Team Meetings, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=1330>

²⁴ Article 3, Regulations on the Project Team Meetings, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=1330>

²⁵ The Executive Yuan is the highest administrative organisation of Taiwan.

hence, phase II was not required. The EIAC approved the CTSP-IV project conditionally. The 19 conditions for approval (Environmental Protection Administration 2009c), included effluent standards of different items, limitations on the usage of water, procedures and standards of environmental investigation, health risk assessment, regulations on air pollutants, carbon reduction strategies, resource recycling, green budget and establishment of foundations. In terms of the location of effluent, both of the two proposals were conditionally approved. Based on the conclusion, the CTSP-IV project was permitted and soon its construction commenced. Only if the CTSPA failed to implement the conditions or the proposed plans, the CTSPA would be fined and the construction would be ordered to halt.

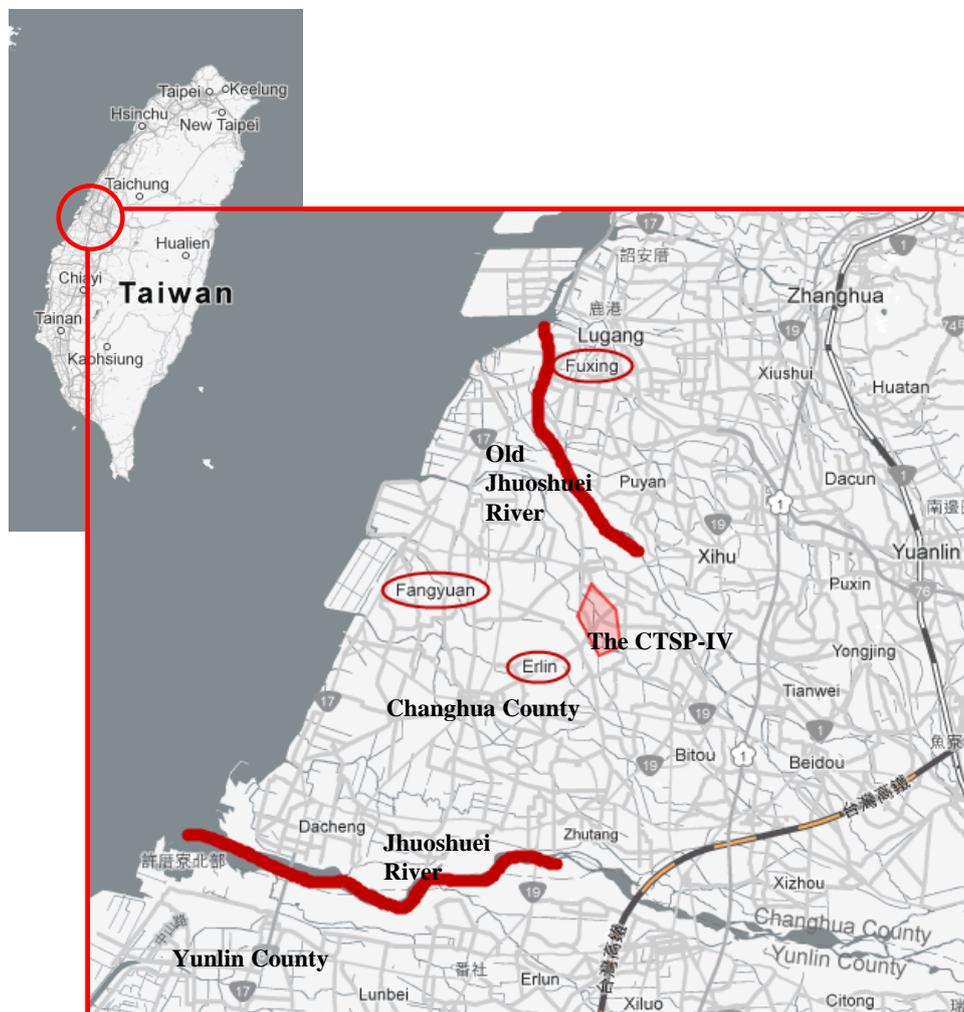


Figure 4 Geographical Information of the CTSP-IV

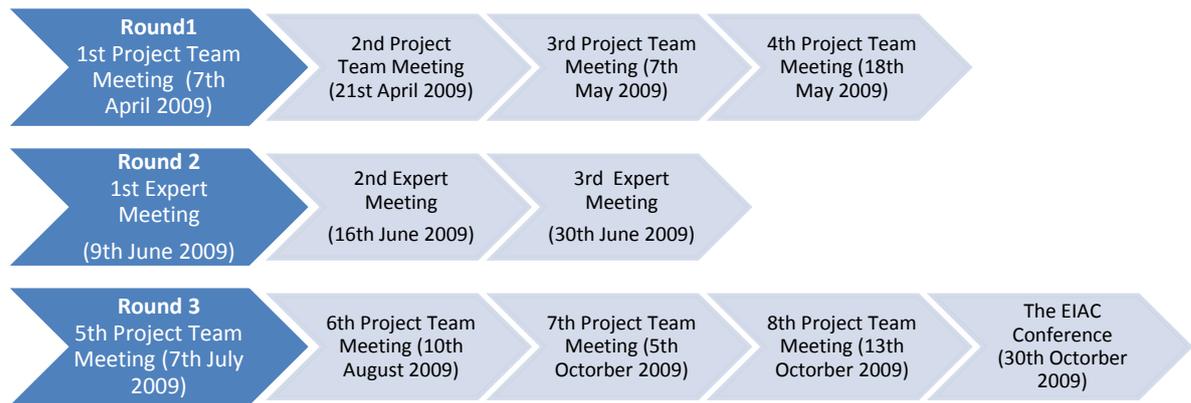


Figure 5 The Timetable for the EIA of the CTSP-IV

There are many controversies in the EIA of the CTSP-IV project. These include air pollution, water allocation, effluent, land acquisition, economic performance, and the EIA procedures themselves. One of the most disputed issues is effluent which is also the main focus in this thesis. Disputes about effluent are mainly on the standards for it, and the locations for discharging it. The standards for effluent proposed by the CTSPA were questioned and considered by various actors as not strict enough to minimise environmental impacts. Different actors suggested different standards in the meetings and argued for their own interests. It was so disputed that the chairman of the project team decided to hold expert meetings just for discussing the impacts of effluent. In terms of locations for discharge, originally the CTSPA only proposed one plan, which located discharge to Old Jhuoshuei River in Changhua County (Figure 4). However, Residents of the Changhua County protested. As a result, at an expert meeting, the CTSPA proposed an alternative to discharge into the Jhuoshuei River in Yulin County (Figure 4). In addition to those two plans proposed by the CTSPA, one of the experts in the meetings suggested another alternative to discharge into the sea. In the last project team meeting, no consensus was reached on the location of discharging effluent. According to the conclusions from the EIAC, the CTSPA was allowed to choose either Old Jhuoshuei River or Jhuoshuei River under the other conditions listed in the conclusions. If the CTSPA would follow an alternative, such as discharging into the sea, they would be required to submit a new proposal for conducting a new EIA. In the end, in accordance with the order from Executive Yuan, the CTSPA chose the alternative for discharge into the sea and submitted the new proposal.

The main groups that participated in the EIA of the CTSP-IV project can be divided into five groups: developers, experts, central government agencies, local government agencies, and civic bodies. Developers in this case are the CTSPA and the National

Science Council, which is the industry competent authority of the CTSPA. However, the CTSPA was the one who supposed to prepare and submit the environmental impact statement. Experts in the EIA refer to the members of the EIAC, project teams, and expert meetings. These experts played the most important role in the EIA; this was especially the case for the EIAC, which had the duty and rights to make decision on the CTSP-IV project. The EPA as the competent authority of the EIA is the largest of the central government agencies. The EPA is responsible for the processes and results of the EIA. Other relevant central government agencies, such as Water Resource Agency, are not as important as the EPA, because those agencies only give advice and are, as a result, not responsible for the EIA results. The major local government agencies include the Changhua County government, the Changhua County Environmental Protection Bureau, the Yunlin County government, and the Yunlin County Environmental Protection Bureau. Changhua County has the most stakes in the CTSP-IV project as the CTSP-IV will be located here. In addition, one of the plans means to discharge effluent in Changhua County. Yunlin County also has some stakes in the project due to effluent discharge plans. Hence, the Yunlin County government and the relevant agencies actively attended all the meetings in the middle of the EIA processes. In terms of civic bodies, Changhua County residents and environmental non-governmental organisations (referred as ENGOs) were the most active actors. Changhua County residents consisted of both residents who would be affected by effluent of the CTSP-IV and those who were not. Positions towards this project were different between those two groups. There were many NGOs participating in the EIA processes. The most actively participating NGOs were the Changhua Environmental Protection Union (referred as the CEPU), the Jingjhu Foundation, the Taiwan Environmental Action Network (referred as the TEAN), the Taiwan Watch Institute, and the Wild at Heart Legal Defence Association (referred as the WHLDA).

CHAPTER 5

Round I: 1st to 4th Project Team Meeting

5.1 Description of Round I

In the first round, four project team meetings were held in April and May 2009. The first project team meeting of the CTSP-IV project was initiated by the 7th EIAC on 7 April 2009. Active organisations in the first round are the CTSPA, the EPA, members of the EIAC, the Changhua County government agencies, the people of Erlin Town, and ENGOs. Local people from Fuxing and Fangyuan Town began to participate from the fourth project team meeting onwards. The project team meetings started with the CTSPA's presentation of the environmental impact statement. With regards to effluent issues, the CTSPA proposed their plans on the location for effluent discharge and the water quality standards that they would comply with. The location which the CTSPA chose to discharge effluent was at the lower reaches of the Old Jhuoshuei River in Changhua County (The Central Taiwan Science Park Administration 2010: 5-31) and its location was at the boundary of Fuxing, Fangyuan, and Erlin Town in Changhua County (Figure 6). People and the environment in those three towns would be directly affected by the effluent. The adopted standard of the CTSPA was the Category C of terrestrial surface water bodies in Surface Water Classification and Water Quality Standards²⁶ (Environmental Protection Administration 2009d: 4).

After the presentation, others, such as EIAC members commented and asked questions about the proposed plans. Many EIAC members considered that there were deficiencies in the water quality standards and suggested and required the CTSPA to increase the standards. Opinions were also given on the CTSPA's plans and claims on the CTSP-IV project were, furthermore, articulated. ENGOs and local people from Fuxing and Fangyuan Town strongly challenged the water quality standards. They argued that the effluent would heavily pollute the water and damage the coastal environment, of which they had their biggest concerns. This was due to the fact that these two towns connected directly to the ocean and, as a result, the majority of Fuxing and Fangyuan Town people

²⁶ Article 4, Paragraph 3, Surface Water Classification and Water Quality Standards, see <http://law.epa.gov.tw/en/laws/309417667.html>

earned their living on aquaculture. They were afraid that the expected pollution would damage their oyster farms. This discussion grew more intense as the project team meetings continued.

In the fourth project team meeting, the EIAC made some decisions. The CTSPA was required by the EIAC members to modify and to improve the water quality standards and, furthermore, stated that the CTSPA should include standards for environmental hormones, heavy metals, and total toxic organics (referred as TTO) (Environmental Protection Administration 2009e: 1). The modified environmental impact statement was expected by the EIAC before the next meeting. In addition, the chairman of the EIAC declared to hold an expert meeting to clarify in particular the polluting effects of effluent (Environmental Protection Administration 2009e: 1). The chairman invited the Changhua County government, the Fishermen's Association, ENGOs, and the CTSPA to nominate experts for these expert meetings. Each group was allowed to recommend three experts.

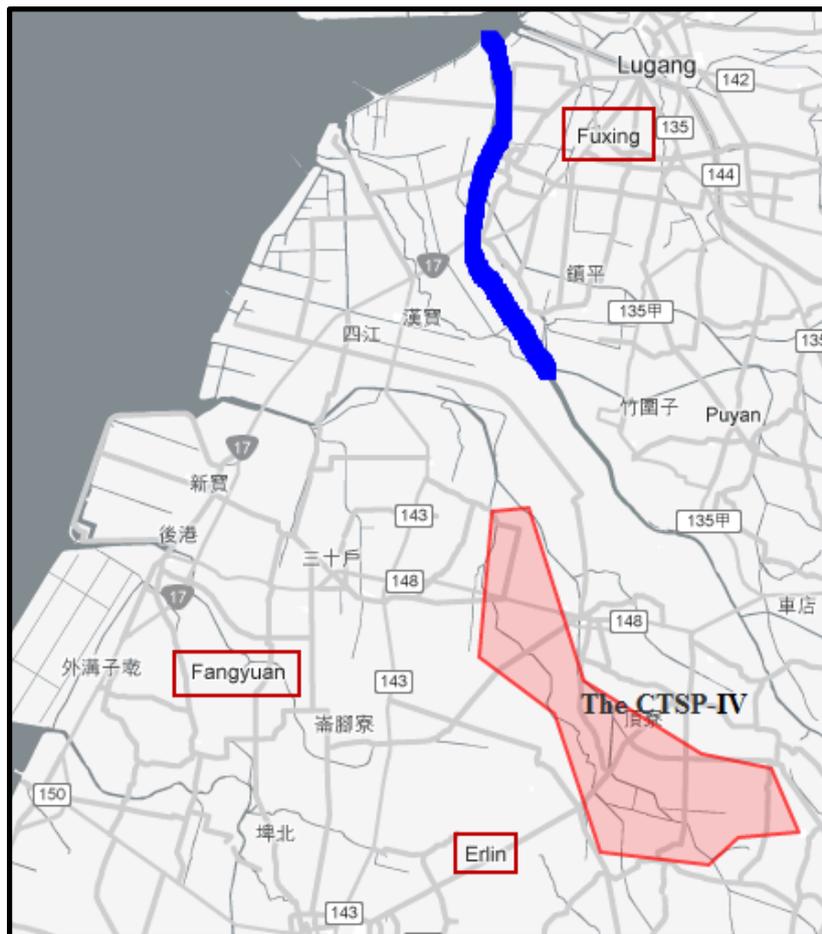


Figure 6 Geographical Information of Fuxing, Fangyuan and Erlin Town

5.2 Frames of Actors – perceptions on the CTSP-IV project and other actors

In the first round, some explicitly stated their perception and positions towards the CTSP-IV project. Some advocated for the CTSP-IV project while others were against it. Moreover, some tried to remain neutral and avoided showing any subjective preference for the CTSP-IV project. Although a part of the people did not openly show their preferences towards the project, they did give their perceptions on the CTSP-IV project privately in interviews.

Most experts in the EIAC rarely expressed their perception on the CTSP-IV project; neither did they show whether they supported or opposed the project in the project meetings. A respondent of the EIAC (Respondent #4) told that he believed that the society could benefit from the CTSP-IV project. Another EIAC member (Respondent #5) showed opposite attitude. This respondent had relatively negative attitude towards the project as he was against the location of the CTSP-IV in Erlin Town. Just like the EIAC, the EPA did not explicitly show their thoughts on the CTSP-IV project and, accordingly, tried to remain neutral in the EIA process. An official of the EPA (Respondent #2) expressed the neutral position of the EPA. This respondent stated that the EPA was the competent authority in charge of the EIA. The EPA did not have any bias in the EIA process and did not have any preference on the CTSP-IV project. At the local level, the Changhua County government (Environmental Protection Administration 2009d: 11) actively stated their support for the CTSP-IV project. The Changhua County government indicated thus supported the project due to its inclusion in the national development plans. In addition, the Changhua County government believed that the CTSP-IV project could bring prosperity and economic development to Changhua County.

In terms of local stakeholders, most of Erlin Town people supported the CTSP-IV project and trusted in the CTSPA. Erlin Town stakeholder ES1 supported the project because he believed that the CTSP-IV project could improve the local economy and increase job opportunities so that young people would become able to come back to work in their hometown²⁷ (Environmental Protection Administration 2009f: 30). Some Erlin Town stakeholders held negative frames on ENGOS. Stakeholder ES2 regarded that ENGOS were against the project without any proper reason, and argued that ENGOS as outsiders did not know local environmental (Environmental Protection Administration 2009f: 30). Unlike Erlin Town, people from Fuxing and Fangyuan town

²⁷ Changhua County is heavily agriculture-oriented. There are fewer jobs for people who do not want to be farmers. Most of young people will go to the major cities, such as Taipei, and find jobs there. Currently the majority populations in Erlin town and other town along the seaside are elders and children.

perceived the CTSP-IV project differently. Although Fuxing and Fangyuan town residents did believe that the CTSP-IV project could create job opportunities for the youths, they worried about pollutions from effluent on the shores, which would destroy their oyster farms (Environmental Protection Administration 2009e: 14-16). In this regards, Fuxing and Fangyuan town people were more suspicious of the CTSP-IV project, and held relatively conservative attitudes compared to the people of Erlin town. They did not believe the CTSPA's promise that there would be no pollution from effluent on the coastal area (Environmental Protection Administration 2009e: 14-16).

Most ENGOs believed that the CTSP-IV project would be harmful to the environment. In the first project team meeting, ENGOs already questioned the project vehemently. ENGO member EN1 even directly declared his opposition to the project (Environmental Protection Administration 2009g: 22). Although different ENGOs focused on different issues, they shared one common perception. Namely, they believed that the negative environmental impacts of the CTSP-IV project should be minimalised (Environmental Protection Administration 2009d: 22-26). ENGOs did not trust the CTSPA and regarded they were irresponsible of not replying questions proposed by ENGOs and the EIAC in the project team meetings (Environmental Protection Administration 2009f: 25).

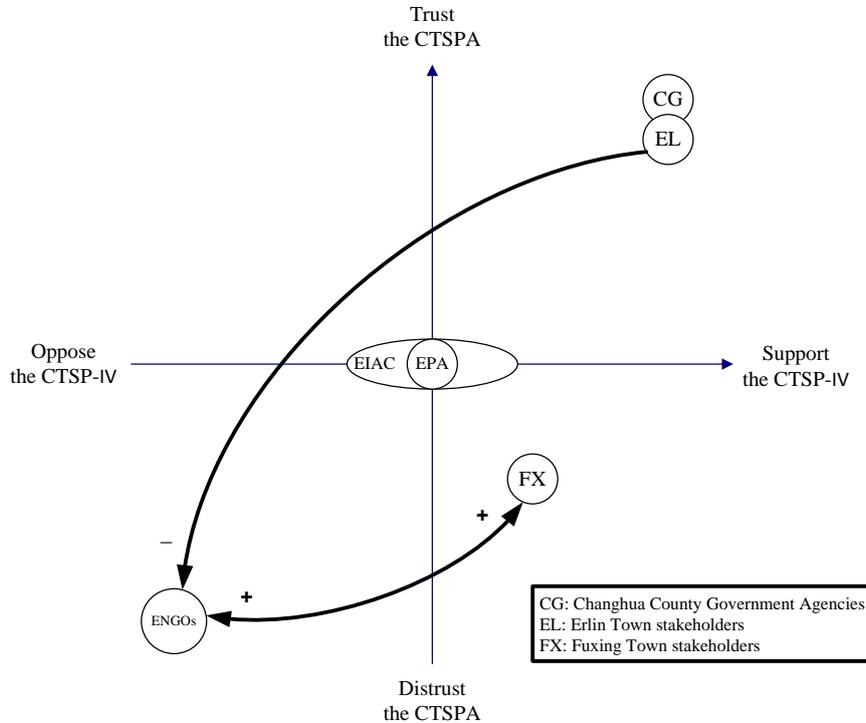


Figure 7 Actors' frames on the CTSP- IV and on other actors in the first round

5.3 Institutional Arrangements – the rules of the game

- Selection of the EIAC Members

In terms of land acquisition, it would first cause impacts and needed to be clarified in the EIA. I was trying to raise this issue, but none of the EIAC members responded, because no one was in this field. (Respondent #9)

A respondent from an ENGO (Respondent #9) indicated that the selection of the EIAC members influenced the subjects in the discussion. According to the Guidelines on Selection Experts of the EIAC²⁸, the experts were supposed to be evenly selected from 14 different disciplines. However, no experts in the field of urban design and land use were selected in the EIA of the CTSP-IV project while most experts were in the field of engineering (Environmental Protection Administration 2007: 4-5). He found it was difficult to put issues, which he was concerned with, on the agenda. He felt that the EIAC members intentionally ignored the issues he raised in the discussion and reckoned that the EIAC members ignored land acquisition issues because none of the EIAC members were skilled in this discipline. Without experts in the relevant disciplines, this respondent found that his topics of interest were not included in the agenda.

- Information Channels

We received most of information from the CEPU. We attended the project meetings. In the meetings, we received more information and started to understand more about the issues. (Respondent # 14)

Many locals from Fuxing and Fangyuan town claimed that they did not receive enough information on the CTSP-IV project when they first attended the meetings. These locals did not know that their area could be polluted by effluent from the CTSP-IV project. In the fourth project tea meeting, many of them required the CTSPA to hold a public explanation meetings on effluent pollution issues (Environmental Protection Administration 2009e: 14-16). In response to information delivery, an EPA official clarified suspicions from local stakeholders,

We put everything on the website. People can search information on the website, to know when the meetings will be held. And also they can express their opinions

²⁸ Article 4, Regulations on the Selection of Experts in the EIA Committee, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=3170>

through our website (Respondent #2)

She stated that the EPA had their own website²⁹ for releasing information and expected that the public would have used their website. However, the respondent from Fangyuan town (Respondent #14) indicated that he did not receive any information from the CTSPA or the EPA before the EIA process. He obtained most information on the CTSP-IV project from ENGOs and in the meetings during the EIA process.

- Time Restriction on Communication

Why there are only three minutes for our ENGOs and those inferior local stakeholders to express our problems and questions? (ENGO member EN1)(Environmental Protection Administration 2009e: 23)

In the fourth project team meeting, ENGO member EN1 argued that there were not enough communication channels for ENGOs and local stakeholders (Environmental Protection Administration 2009e: 23). According to article 4 and 6 in the Guidelines for Attending the EIA Meetings³⁰, in total 20 people are allowed to attend the meetings, and two people per organisation. The EPA has authority to select persons who apply for attending the meetings. An EPA official (Respondent #2) explained the three-minute restriction for ENGOs and local stakeholders. She stated that the EPA expects a meeting to last for three hours, of which one hour is spared for civic bodies to express their opinions. Based on the size of the conference room in the EPA building, the EPA estimates the room to be able to host around 20 participants besides the EIAC. The EPA considers that there are 60 minutes for 20 participants, which gives three minutes to every participant. This reasoning³¹ seems to make sense, but was criticised by many respondents, who stated that it is too short to fully present an opinion (Respondent #6, #7, #8, #10, #14).

- Subject and Language of Communication

The whole institutional settings make you focus on the environmental impact statement. In the EIA, the agenda is also based on this statement. (Respondent #7)

A member of the TEAN (Respondent #7) argued that the institutional setting, only

²⁹ <http://atftp.epa.gov.tw/EIAforum/Default.aspx>

³⁰ see Regulations on Participation in the EIA Reviewing Meetings, see <http://ivy5.epa.gov.tw/epalaw/docfile/033180.pdf>

³¹ Three-minute limits do not apply on the EIA Committee, relevant government agencies, and the developers

reviewing the environmental impact statement, narrowed the scope of the agenda. According to the EIA Act, the EIAC decides on the CTSP-IV project's approval, which is based on the environmental impact statement, a document with which the EIAC starts with and reviews in the EIA process, prepared by the CTSPA. An EIAC member (Respondent #5) expressed the same feeling that only focusing on the environmental impact statement constrained the scope of the EIA.

Some of experts in the project team meeting always discussed something very detail such as concentration of NO_x and SO_x³². (...) The EIA should be approached from a broader aspect instead of picking errors in the environmental impact statement. Of course errors should be corrected, but those works should be done by the bureaucrats in the EPA. (Respondent #5)

In other words, he observed that experts emphasised too much on the details and error correcting. He suggested that experts should not be constrained by the content written in the environmental impact statement. Instead, according to him, experts should use their expertise to look beyond the content and assess the project as a whole before making decisions.

Besides the constraint on the agenda, a respondent (Respondent #7) felt that the form of the statement restricted the types of knowledge in the project team meetings. According to article 4, the EIA Act³³, statements should be scientific and objective whilst the environmental impact statement is required to be written in the form of a scientific report. This respondent stated why she thought the form of the environmental impact statement restricted the types of knowledge,

I think different actors are able to understand each other's language for sure. I have asked the EIAC members, and they said that as experts they understood what local people were discussed. But the problem is that it is difficult to translate what local people have discussed into scientific language and write in the form of scientific report. If it could not be written in the form of scientific report, then it would become just some 'sayings' which are not included in the agenda. (Respondent #7)

As could be read, she believed that the communication problems in the decision-making process were not a result of the differences between local and scientific language. Namely, the problem was that scientific language was the major language in the environmental impact statement. If local knowledge could not be translated into scientific language, it would not be taken into account in the decision-making process. She argued that the rigid writing form of the environmental impact statement resulted from the exclusion of local knowledge.

³² NO_x is for Nitrogen Oxide and SO_x is for Sulfur oxide. Both of those two air pollutants.

³³ The EIA Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

Types	Rules	Characteristics	Effect
Position and Boundary Rules	Selection of the EIAC Members	Formal rules.	Issues in the agenda were constrained due to a lack of EIAC members in certain disciplines which are relevant to the CTSP-IV project
Information Rules	Information Channels	Formal	Local stakeholders did not receive information from the EPA, and were not informed to participate the meetings
	Time Restriction in Communication	Formal	Insufficient communication
	Subject and Language of Communication	Informal	Scientific language is the major language used in discussion

Table 2 Types of rules in the first round

5.4 Knowledge Strategies

With regards to effluent issues, the major type of knowledge used in the discussion was scientific, which was mainly used by the EIAC members. They especially focused on assessing the CTSPA's methodologies for water quality simulation whilst they also concentrated on monitoring of water pollutants regulated in the water quality standards. The EPA gave opinions with both scientific knowledge and bureaucratic arguments. The EPA emphasised on the CTSPA's plans for pollution mitigation and examined whether the CTSPA's plans complied with the law. ENGOs also gave their comments based on scientific knowledge and bureaucratic knowledge and paid attention to pollutions as a result of effluent and whether the CTSPA violated any laws. Furthermore, ENGOs also shared information with local stakeholders from Fuxing and Fangyuan town. Local stakeholders from Changhua County provided more local knowledge and demonstrated local conditions in reality. The Changhua County government agencies contributed little relevant knowledge.

In order to minimise potential pollution from effluent, the EIAC members reviewed on the environmental impact statement and examined water quality standards. Their examination on the water quality standards focused on pollutants in detail. EIAC member EI1 and EI2 considered that the water quality standards proposed by the CTSPA did not suffice (Environmental Protection Administration 2009d: 4, 7), because

the CTSPA did not fully consider local conditions in Changhua County of which the major economic activities are agriculture and aquaculture. EIAC member EI1 and EI2 indicated that there were many pollutants, such as heavy metals, environmental hormones and total toxic organics (TTO), which could have huge impacts on agriculture and aquaculture, but that those items were not in the CTSPA's water quality standards (Environmental Protection Administration 2009d: 8; 2009f: 8). The EIAC members also suspected the methodologies of the CTSPA for monitoring water quality. EIAC member EI2 directly pointed out that the monitoring methodology of heavy metals was inappropriate to evaluate its impacts on the quality of the water (Environmental Protection Administration 2009d: 8). He considered that it was wrong because this method neglected the accumulated effects of heavy metals.

The EPA also made their effort to reduce potential pollution from effluent by supervising the CTSPA's plans. The EPA focused on examining the technologies and management strategies the CTSPA adopted for pollution mitigation. The EPA provided suggestions, which were mainly based on bureaucratic knowledge. Bureaucrats from the EPA underlined the relevant regulations (Environmental Protection Administration 2009d: 20) and indicated many detail in the regulations to remind the CTSPA of administrative procedures the CTSPA should follow (Environmental Protection Administration 2009d: 20). Unlike the EIAC, the EPA seldom addressed the detail items in the water quality standards; however, the EPA was concerned with the EIAC's opinions. The EPA often gave suggestions based on the EIAC members' comments; for example, the issues of environmental hormones and TTO were discussed. Following the opinion of the EIAC, the EPA also stressed the importance of these two items and requested the CTSPA to draw up regulations on them (Environmental Protection Administration 2009e: 11). Next to the EIAC, the EPA was also concerned with the opinions from several ENGOS. The EPA reflected on the administrative issues raised by an ENGO member (Environmental Protection Administration 2009d: 23).

ENGOS used different sources of information and gave plenty comments to slow down the EIA process so that local voices can be brought in. A respondent from ENGOS explained their strategies in the first round:

At the beginning, because there was no public explanation meetings in the coastal area, local stakeholders did not know about the CTSP-IV project. Our function was to slow down the decision making process. If no one tried to slow it down and tried to express different opinions, the project would be approved very quickly. (Respondent #8)

There were mainly two types of comments given by ENGOs. The first type dealt with administrative procedures. ENGO member EN1 demanded to conduct an EIA for government policies on industry policies before proceeding the EIA of the CTSP-IV project (Environmental Protection Administration 2009d: 25-26). The chairman of EIAC had once considered this comment and included it in the agenda. However, it was turned down by the EIAC in the same meeting (Environmental Protection Administration 2009d: 1). The second type of comments related to scientific evidences and addressed effluent issues. ENGOs prepared scientific evidence from PhD dissertations and research reports to indicate that the current technologies were still not able to deal water pollution from high-tech industries (Environmental Protection Administration 2009f: 26-27). ENGOs succeeded in slowing down the EIA process by repeatedly emphasising on the severe impact effluent would have in each project team meeting (Respondent #6). The chairman of the EIAC decided to hold additional expert meetings on effluent issues, instead of making final decisions on the CTSP-IV project (Environmental Protection Administration 2009e: 2).

ENGOs, at the same time, tried to share information with local stakeholders in Fuxing and Fangyuan town to let them understand their stakes in the CTSP-IV project. The CEPU, a local ENGO, contacted local fishermen and shared experiences and information with them (Respondent #6). The CEPU invited them to attend the project team meetings,

I invited those fishermen to attend the project team meetings. (...) In the meetings, those fishermen knew this information which they had never heard before. Then they believed it is true that pollutions from the CTSP-IV project would damage their oyster farms. (...) They became very active in attending project team meetings and protested against the CTSP-IV project. (Respondent #6)

ENGOs were also successful to inform local stakeholders and, consequently, brought them into the decision-making process.

Local stakeholders from Fuxing and Fangyuan town presented their local knowledge in the meeting and challenged the CTSPA on effluent pollution. They doubted the CTSPA's prediction on water quality and their water quality standards (Environmental Protection Administration 2009e: 14-16). Fisherman FXS1 in particular challenged the CTSPA's prediction on the water quality (Environmental Protection Administration 2009e: 15-16). In the environmental impact statement, the CTSPA stated that pollutants could be diluted and effluent would not have a severe impact on the coastal area (The Central Taiwan Science Park Administration 2010: 197). The fisherman used his local knowledge to point out that pollutants would be difficult to dilute by the sea water.

From the fisherman’s daily observation, he indicated that the low tide period lasts 7 hours. During this period, there would be no water to dilute pollutants and its impact would be intensified (Environmental Protection Administration 2009e: 15-16). He argued that the reality would not be the same as simulations in the laboratory, and criticised that the CTSPA did not take local conditions into account. Moreover, some residents had heard of the bad reputation of the CTSPA and were afraid that the CTSPA would not keep their promise to minimise water quality (Environmental Protection Administration 2009e: 14). EIAC member EI5 had reflected on the problem in previous meetings. He suspected the possibility of pollution and required the CTSPA to do further simulation and improve their water quality standards.

Actor	Knowledge Strategies			
	Major Types of Knowledge	Purpose	Target	Reaction
EIAC Members	scientific	provide information to minimise impact	the CTSPA	suggestions were adopted
ENGOS	scientific, bureaucratic	slow down process	the EIAC	additional expert meetings were held
		inform local stakeholders	local stakeholders (Fuxing and Fangyuan Town)	Local stakeholders started to participate
Local (Fuxing Town)	local	counter prove	the CTSPA	little reaction

Table 3 Table of knowledge strategies in the first round

5.5 Analysis of Knowledge Integration

In the first round, frames on the CTSP-IV project affect ENGOS’ knowledge strategies. ENGOS were against the CTSP-IV project and perceived that the CTSP-IV project should be rejected. In this regard, data and evidences ENGOS collected focus on counter proving the CTSPA’s capability on dealing with effluent pollutions. Frames on the CTSP-IV project also influence local stakeholder from Fuxing and Fangyuan town. Although those stakeholders supported the CTSP-IV project, they were afraid of potential pollution from the CTSP-IV project. In this regard, they were especially aware of the differences between water quality prediction and the condition in reality, and

challenged the CTSPA's methodologies on water quality prediction. On the other hand, frames have little effect on the EIAC members. EIAC members did not try to prove or disprove impact from effluent. They emphasised on how to minimise impact. In this case, EIAC members in this round performed similar to 'Science Arbiters (Pielke 2007),' who emphasise on providing knowledge and answering factual questions.

In terms of institutional arrangements, actors raised issues on position, boundary, and information rules. One respondent (Respondent #9) considered position and boundary rules of selecting the EIAC members determines whether issues can be included. However regarding to effluent issues, no respondent specifically reflected on this problem. Information rules have major impact in this round. Information rules influence actors' participation and quantity of communication, such as length of communication. Local stakeholders from Fuxing and Fangyuan town did not attend meetings until they were informed by ENGOs. Although rules constrained participation, actors developed strategies to overcome restrictions. ENGOs actively contacted local stakeholders, provided information, and invited them to the project team meetings. Constraints were successfully overcome. However, actors had not yet found a way to break the three-minute time limit.

The most effective knowledge strategies in this round is ENGO's strategies on slowing down decision making processes by throwing out large amount of information. Those strategies not only increase occasion for communication and interaction, but also bring in more local knowledge. By raising issues and providing evidences from scientific research in the project team meetings, EIAC members recognised different discourses on effluent issues and decided to have expert meetings for clarifying controversies. Because the process was slow down, with assistance by ENGOs, local stakeholders from Fuxing and Fangyuan town were able to attend the project meeting before the EIAC made the final decision and ended the decision making process.

The level of knowledge integration in Round I: Medium

In the first round, there were three types of actors, however most of local stakeholders from Fuxing and Fangyuan Town participated until the fourth project meeting. In this regard, the level for the criterion I is medium. In terms of knowledge strategies, there is only scientific knowledge used in EIAC members' strategies. The purpose of strategies had little intention to integrate local knowledge as some EIAC members' suggested the CTSPA to take local conditions into account. The CTSPA did improve their water quality standards based on the EIAC members' suggestions. Both of two strategies

from ENGOs included two types of knowledge, scientific and bureaucratic knowledge. Two strategies aimed at bringing local knowledge into the decision making process, and they functioned successfully. The EIAC member decided to hold another expert meetings, and local stakeholders were informed and participated from the forth project team meeting. Local stakeholders from Fuxing and Fangyuan Town only used local knowledge to point out faults in the CTSPA’s environmental impact statement. The purpose of strategies did not aim at knowledge integration. The CTSPA had little reaction on their claims. In sum, the level of criterion II is low, criterion III is medium, and criterion IV is high. In general, the level of knowledge integration in the first round is medium.

Knowledge Integration Level in Round I: Medium (- +)			
Criteria			
I	II	III	IV
Types of actors	Types of knowledge used in strategies	Purpose of strategies	Other actors’ reaction on strategies
- + (M)	- (L)	- + (M)	+ (H)

Table 4 The level of knowledge integration in the first round

CHAPTER 6

Round II: 1st to 3rd Expert Meeting

6.1 Description of Round II

ENGOS succeeded in focussing attention to effluent issues in the first round. Since the effluent issues had become a controversial topic, the chairman of the project team meetings decided to hold expert meetings specifically for the effluent issues. There were in total three expert meetings for the CTSP-IV project within one month; they took place on the 9th, the 16th and the 30th of June. Experts for these meetings were nominated by the Changhua County government, the Fishermen's Association, ENGOS and the CTSPA. Each group was allowed to recommend three experts in the field of effluent issues. These fields included waste water treatment, water management, fisheries science, and aquaculture. In terms of the EIAC members, the chairman and some members with experience in one of these fields participated in the expert meetings. Major actors related to effluent issues were the CTSPA, experts of the EIAC, other nominated experts, Changhua County government agencies, Changhua County citizens, Yunlin County government agencies, and ENGOS. Yunlin County government agencies started to participate from the third expert meetings onwards.

In the first meeting, experts continued assessing water quality standards and provided suggestions for improvement. Besides detail items in the water quality standards, some experts put new issues on the agenda. Some experts raised awareness on the management of chemical substances used by industries. Compared to the topic of water quality standards, the discussion on effluent issues focused more on the choice of locations for the discharge of effluent. Originally, discharge was supposed to take place at the lower reaches of the Old Jhuoshuei River in Changhua County. After severe protest from Fuxing Town people, the Mayor of Changhua County requested the CTSPA to submit alternative plans (Environmental Protection Administration 2009h: 14). In the second expert meeting, the CTSPA proposed an alternative plan on the location for effluent discharge (Environmental Protection Administration 2009b: 1). It proposed to discharge effluent into the lower reaches of the Jhuoshuei River in Yunlin County (Figure 8), which, as a consequence, Yunlin County became a stakeholder in

the CTSP-IV project. However, the Yunlin County was not informed by the CTSPA until the third expert meeting at which the Yunlin County received some information. In the second meeting, one expert (Environmental Protection Administration 2009b: 6) suggested another alternative, which proposed to discharge effluent into the ocean near the shores of Changhua County (Figure 8). In the third meeting, the CTSPA decided to abandon the Old Jhuoshuei River plan, and only consider the new Jhuoshuei River plan and the ocean plan. Experts discussed the advantages and disadvantages of the two plans. Local stakeholders from Fuxing Town and ENGOs tried to convince experts to reject the Old Jhuoshuei River plan. Yunlin County EPB was confused and asked for more information of the Jhuoshuei River plan and demanded the CTSPA to invite all the other relevant Yunlin County government agencies to attend the next project team meeting.

At the end of the third meeting, the experts concluded that the CTSPA were required to establish regulations on chemical substances used by industries (Environmental Protection Administration 2009i: 1). However, they could not conclude on the choice of plans. Instead, they told the CTSPA to prepare a more understandable environmental impact statement on the Jhuoshuei River plan and the ocean plan for the EIAC to review in the next project team meeting.



Figure 8 Plans of locations for discharging

Plans	Location for discharging	Person who purposed the plan	When the plan was purposed	Whom were affected by the plan
The Old Jhuoshuei River plan	Old Jhuoshuei River in Changhua County	The CTSPA	The 1st project team meeting	Fishermen in Fuxing and Fangyuan Town in Changhua County
The Jhuoshuei River plan	Jhuoshuei River in Yunlin County	The CTSPA	The 2nd expert meeting	Fishermen and farmers in Yunlin County
The ocean plan	ocean	Expert EX1	The 2nd expert meeting	only minor impact on the ocean

Table 5 Three plans of locations for discharging

6.2 Frames of Actors – perceptions on the CTSP-IV project and other actors

In the second round, actors that had participated in the first round, such as the Changhua County government, did not change their perceptions on the CTSP-IV project. However, the Changhua County government, which had first advocated for the project, began to show their concern on local fishermen in Fuxing and Fangyuan Town and required the CTSPA to prepare compensation plans for the fishermen (Environmental Protection Administration 2009h: 13). Local stakeholders from Fuxing town held stronger perceptions that effluent from the CTSP-IV project would damage the local environment and that it would have an impact on its livelihood. Their distrust and dissatisfaction of the CTSPA intensified. Fisherman FXS5 said that he would protest against the Old Jhuoshuei River plan until he would fall dead (Environmental Protection Administration 2009h: 17-18). Local stakeholder FXS6 from Fuxing town expressed his discontent on the EPA because the EPA had not invited them to previous project team meetings (Environmental Protection Administration 2009h: 19). He also showed their appreciation for ENGOS that invited them to participate in the expert meetings. ENGOS were still firmly against the CTSP-IV project and distrusted the CTSPA.

In terms of new participants, experts did not show specific preference on the CTSP-IV project in the meetings. Most experts also did not express any particular perception on others. However, expert EX1 showed his concern on local fishermen in Fuxing and Fangyuan Town (Environmental Protection Administration 2009h: 7). In each meeting, expert EX1 raised others' awareness on local fishermen. He considered that the CTSP-IV project would increase difficulties of fishermen's lives and argued that the CTSPA should compensate fishermen if there were any impact on the fishermen's oyster farms (Environmental Protection Administration 2009b: 6). The Yunlin County EPB disagreed on the Jhuoshuei River plan and expressed their dissatisfaction with the CTSPA after their proposal of the Jhuoshuei River plan with consents from Yunlin County (Environmental Protection Administration 2009i: 10).

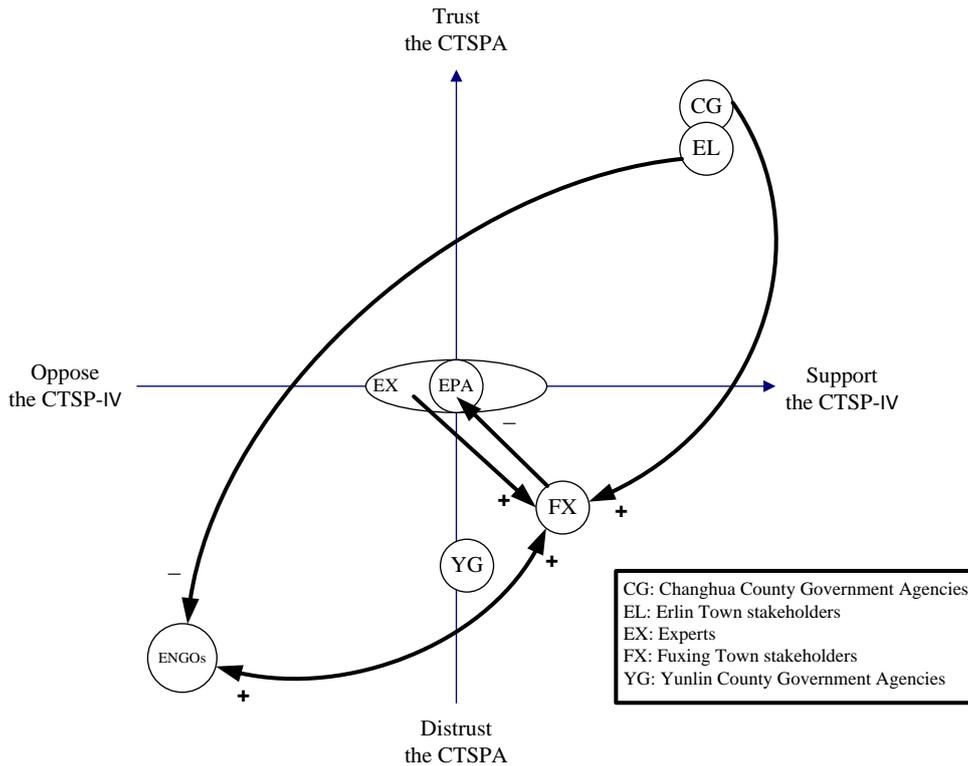


Figure 9 Actors' frames on the CTSP- IV and on other actors in the second round

6.3 Institutional Arrangements – the rules of the game

-- Selection of Experts

Experts all have their expertise. I like expert meetings a lot. But it also depends on how it functions, because you can control the list of nomination. If experts who you nominate are very professional, they are able to lead the meetings and other experts will listen to them, believe in them. And quality of the EIA will be better. (Respondent #6)

A member of the CEPU (Respondent #6) considered that experts are able to control expert meetings and determine the agenda. A very apparent distinction between expert meetings and project meetings is that in expert meetings, experts are recommended by stakeholders, developers, and central and local governments instead of being selected by the EPA³⁴. A respondent from the TEAN gave an example of how experts brought in new issues in the agenda:

In expert meetings, a lot of experts would provide very different research results.

³⁴ Article 3, Regulations on the Project Team Meetings, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=1330>

(...) We had been telling the EIAC members that there was pollution here and there, but they thought it was only our practical experience, not academic research. Until one expert told everyone that his research shown there was pollution here and there. Other experts started to discuss this issue, and more and more dialogues were carried out. (Respondent #8)

The CEPU member (Respondent #6) further stressed the importance of experts' role in bringing local knowledge into discussion:

Those experts are similar to the EIAC members, but they are not totally the same. Those experts are able to understand what you said, and they are even better at this. Because some of experts do a lot of research and collect local data, they have better understandings on what you say. So I think expert meetings are more important than project team meetings. (Respondent #6)

She indicated that some experts were able to recognise the value of local knowledge, and conducted research to bridge the gap between local and scientific knowledge. In addition, she considered that these experts had good understanding of local situations and could easily translate local knowledge into formal language. An environmental layer (Respondent #12) had opposite viewpoints and believed that expert meetings would exclude local knowledge,

Expert meetings intentionally exclude local knowledge. If you cannot use scientific terminologies to communicate with experts, they will not take you seriously. Gradually local knowledge is excluded. (Respondent #12)

He was concerned with the problem that differences in local and scientific language would become the reason for eliminating local knowledge.

Although these two respondents (Respondent #6, #12) had different views on the setting of the expert meetings, they both indicated that rules of nominating experts³⁵ are not proportional even. Experts are nominated by three groups of actors³⁶, which can recommend a maximum of two experts. These three groups consist of civic bodies, developers, and government agencies. Respondents indicated that developers and government agencies often hold the same positions in supporting the development projects, whereas civic bodies often hold oppositional positions. The two respondents considered that the proportion of supporters and non-supporter is two to one, which favours the developers.

³⁵ There are three groups of actor which can recommend expert to participate meetings. Those are civic bodies, the developer, and the local government. See Article 3, Regulations on the Project Team Meetings, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=1330>

³⁶ See Article 3, Regulations on the Project Team Meetings, see <http://ivy5.epa.gov.tw/epalaw/search/LordiDispFull.aspx?ltype=03&lname=1330>

- Communication with Experts

If participants were professional and their opinions were based on a solid ground, then I would accept them and ask them to give more explanations. (Respondent #4)

I think if we ENGOs can speak in more professional ways with sounding evidences, then experts will put more efforts on reviewing the project. If you do not talk in professional ways, experts will think that you are not able to understand what they say. Then they will not take you seriously and also will not assess the project thoroughly. So I think it is very important that ENGOs show their expertise. (Respondent #6)

There are no guidelines that regulate the way in which participant present their opinions. According to article 6, paragraph 4 in Regulations on Participation in the EIA Reviewing Meetings³⁷, participants should give opinions within the scope of issues in expert meetings. Although there is no formal set of rules, in reality some implicit rules on communication do exist. An EIAC member (Respondent #4) who also participated in expert meetings hoped that participants would present in a professional way, with which he meant logical reasoning. If participants were able to meet his expectation, they might be eligible to more speaking time. In addition, he mentioned, “*if participants are able to calm down and discuss issues in an objective way, it is better.*” On the other hand, a respondent from an ENGO (Respondent #6) observed some implicit set of rules and developed her strategies to communicate with experts. She assumed that acting professional and providing valid evidence would be the best way to communicate with experts.

- Decision Making in Expert Meetings

In the discussion on the location for discharging, there were some experts who did not agree on any of the proposals from the CTSPA and suggested that there should not be any effluent. But at the end of expert meetings, the EPA requested experts to choose at least one from all the proposals. Experts had to choose one instead of rejecting all. (Respondent #8)

³⁷ see Regulations on Participation in the EIA Reviewing Meetings, see <http://ivy5.epa.gov.tw/epalaw/docfile/033180.pdf>

The EPA's created expert meetings to create neutral and in depth discussion on disputed issues so that they could be further clarified (Respondent #1; Respondent #2; Taiwan Institute of Economic Research 2010: 2). In expert meetings, experts are not obliged to decide on the approval of construction projects. An EPA official (Respondent #2) stated that experts only needed to focus on effluent issues and that they should give suggestion for the CTSPA to improve their effluent discharging plans. Experts did not have to make decisions on the approval of the CTSP-IV project. However, a respondent (Respondent #8) observed that experts were forced to make decisions on the three plans in expert meetings instead of purely clarifying disputed issues. She described that the conclusions were made through “*distorted*” processes, and experts were not allowed to reject all the proposals. Another respondent (Respondent #13) had the same observation. She described them as “*conclusions with preconditions*”.

Types	Rules	Characteristics	Effect
Position and Boundary Rules	Selection of Experts	Formal	diverse in knowledge strategies and more experts were aware of local knowledge
Information Rules	Communication with Experts	Informal	professional presentation were preferred by experts
Choice Rules	Decision Making in Expert Meetings	Informal	the scope of decisions was restricted

Table 6 Types of rules in the second round

6.4 Knowledge Strategies

Different experts used different ways to evaluate the three plans on of the location of the discharge of effluent. Expert EX2 only evaluated the Old Jhuoshuei River plan, which was officially in the agenda at the first meeting (Environmental Protection Administration 2009i: 4-5). He focused on the CTSPA's simulation methodologies and compared the results from the simulations to the local conditions. In order to get a better understanding of the local environment, he went to the location in Changhua County where the CTSPA planned to discharge and collected local data, such as tidal periods, river flows, and fishermen's routines related to the Old Jhuoshuei River. He presented data in the form of scientific language by showing a connection between local conditions and scientific simulations. He indicated the impact from local conditions on scientific simulations (Environmental Protection Administration 2009i: 4-5). Based on

his data collection, the expert confirmed the arguments of a local fisherman (FXS1) from the previous project meeting about the lack of water to dilute pollution from effluent at low tide period (Environmental Protection Administration 2009i: 5). Expert EX2 gave comments for the CTSPA to improve the Old Jhuoshuei River plan, and suggested the CTSPA to collect more data for the Jhuoshuei River plan. This expert did not have any opinions on the ocean plan, which was not officially on the agenda. Another expert EX3 assessed the three plans based on the data provided by the CTSPA and commented that the Jhuoshuei River plan was optimal (Environmental Protection Administration 2009i: 3). Expert EX1 who proposed the ocean plan, eliminated the Old Jhuoshuei River plan and the Jhuoshuei River plan (Environmental Protection Administration 2009i: 7). He argued that the ocean plan was the best, because it would create economic development in a sustainable way. He also reflected on other EIA member's doubts of the ocean plan. Expert EX1 emphasised that time and money could be saved by improving the construction design.

Local stakeholders from Fuxing Town highlighted the impacts of the Old Jhuoshuei River plan by explaining the local conditions to experts. Local stakeholder FXS5 argued that there were some streams which were closer to the location of the CTSP-IV in Erlin Town and more appropriate for discharging effluent (Environmental Protection Administration 2009h: 17). In addition to local conditions, he stressed his concern on pollution which he had after being informed by ENGOs. He further argued that some oyster farms had been destroyed by effluent from science parks in the previous EIA cases. In response to those local stakeholders, the Changhua County EPB reflected on their concerns and requested the CTSPA to find an alternative (Environmental Protection Administration 2009b: 9-10). In addition, the Changhua County mayor discussed with EPA and the National Science Council³⁸ on the concerns of the Old Jhuoshuei River plan privately (Environmental Protection Administration 2009i: 10).

Again in the expert meetings, ENGOs tried to slow down the decision-making process by providing a large amount of information relevant to effluent issues (Respondent #6). ENGOs used research reports from the EPA and from experts as references to emphasise pollutions from high-tech industries (Environmental Protection Administration 2009h: 24). ENGOs compared the CTSPA's water quality standards with results of PhD dissertations to indicate the deficiency in the CTSPA's standards (Environmental Protection Administration 2009h: 21). Based on academic research results, they prepared a waste water monitoring plan and demanded the CTSPA to adopt it. The chairman of the expert meeting gave a respondent from an ENGO (Respondent

³⁸ The industrial competent authority of the CTSPA

#6) extra time in the meetings, because the information she provided was very comprehensive. In addition to the presentations in expert meetings, she also sent research reports and dissertations, which she used as evidences, in her presentations to the experts. This respondent (Respondent #6) stated that they, once again, succeeded in slowing down the EIA process, *“They [experts] planned to have only one expert meeting. But we provided too much information. They had to hold the second one.”*

Actor	Knowledge Strategies			Reaction
	Major Types of Knowledge	Purpose	Target	
Expert EX 1	scientific, local	advocate the ocean plan and local stakeholders	the CTSPA, experts	the ocean plan was adopted by the CTSPA
Expert EX2	scientific, local	Bring local condition in evaluation of the Old Jhuoshuei River plan	the CTSPA, experts	the Old Jhuoshuei River plan was abandoned by the CTSPA
Expert EX3	scientific	advocate the Jhuoshuei River plan	the CTSPA, experts	the Jhuoshuei River plan was adopted by the CTSPA
Local Stakeholders (Fuxing Town)	Local, scientific	Share local information and highlight impact of the Old Jhuoshuei River plan	experts	experts were aware of local knowledge
ENGOS	scientific	slow down process	experts	more expert meetings were held

Table 7 Knowledge strategies in the second round

6.5 Analysis of Knowledge Integration

In the second round, the changes in the frames of the Changhua County government affected the scope of discussion. The Changhua County government slightly changed

their frames on local stakeholders from Fuxing and Fangyuan Town. It was aware of local stakeholders' concerns on effluent pollutions. Hence, the Changhua County government also changed their attitudes towards the CTSPA from full support to require the CTSPA to modify their plans. The Changhua County government successfully persuaded the CTSPA to change their plans from the Old Jhuoshuei River plan to the new Jhuoshuei River plan. This altered the scope of discussion, and brought in new stakeholders. Frames on others also influenced the ways in which experts evaluated the plans of locations for discharge. With concerns for local fishermen, Expert EX1 proposed an alternative (the ocean plan) instead of evaluating the existing plans. He strongly advocated the ocean plan and argued that it could reduce the impact on local aquaculture when compared to other two plans. This alternative also affected the scope of discussion in the following meetings.

Position and boundary rules had a significant impact in this round. The rules of selecting experts for the expert meetings brought in new experts with different knowledge perceptions. Expert EX2 is the most obvious example. Unlike the EIAC members, he paid more attention to the local conditions rather than focusing only on simulation results. He intentionally bridged scientific knowledge and local knowledge. In terms of information rules, a respondent from an ENGO (Respondent #6) described the implicit communication rules that she detected. She developed her strategy with a view to improve communication with experts. She presented her argument with sound scientific evidence. Her strategy worked and she even broke the three-minute time limit which other actors could not overcome. This increased her interaction with experts. The implicit choice rules regulated the action that expert must make their decisions on the three plans of locations for discharging. Regardless of what had been discussed in the process, the choice rules constrained the scope of discussion in the end.

In the knowledge interaction, experts presented more strategies than the EIAC members in the first round. Expert EX 1 is a typical 'Issue Advocate (Pielke 2007)' who only advocated the ocean plan and ignored the others. Expert EX2 acted as an 'Honest Broker (Pielke 2007)' who provided all information based on the scope of discussion. Diversity also showed on the types of knowledge and knowledge perceptions. Expert EX1 and expert EX2 emphasised more on local knowledge compared to the other EIAC members and experts. They were also more aware of reflecting on local conditions in scientific simulations. Knowledge interaction was more active in this round. Expert EX2's strategies have had the most effect on integrating local and scientific knowledge. Expert EX2 recognised local stakeholders' concerns, and went into the field to collect data. Based on local data, he was able to

distinguish differences between scientific prediction and reality. He translated implicit local knowledge into scientific language and showed how local conditions influence scientific prediction. His results legitimised the fisherman’s (FXS1) argument. This way, he bridged the gap between local knowledge and scientific knowledge.

All three types of actors fully participated in the second round. In terms of actors’ strategies, Expert EX1 and expert EX2 both applied scientific and local knowledge to introduce local conditions into scientific simulations. The CTSPA accepted suggestions from expert EX1 but turned down the Old Jhuoshuei River plan. Expert EX3 assessed the plans only based scientific knowledge and did not have any attention to integrate local knowledge. The CTSPA accepted suggestions from expert EX3. Local stakeholder from Fuxing Town shared local information and used scientific knowledge learnt from ENGOS to highlight potential pollution in the local area. ENGOS’ strategies focused on using scientific data and reports to high local impact and slow down the decision making process. There was little intention to integrate local knowledge and scientific knowledge. Experts were informed and concerned with impact on local stakeholders by information presented from local stakeholders and ENGOS. In sum, the level of knowledge integration in the second round is high.

Knowledge Integration Level in Round II: High (+)			
Criteria			
I Types of actors	II Types of knowledge used in strategies	III Purpose of strategies	IV Other actors’ reaction on strategies
+ (H)	- (L)	+ (H)	+ (H)

Table 8 The level of knowledge integration in the second round

CHAPTER 7

Round III: 5th to 8th Project Team Meeting

7.1 Description of Round III

After three expert meetings, the chairman decided to move on and proceed to the next project team meetings. One week later, the fifth project team meeting was held on 7 July 2009. In the third round, in total four project team meetings from July 2009 to October 2009 and one EIAC conference on 30 October were held. Discussions mainly took place in the project team meetings. The EIAC conference was intended to confirm the final decisions that were made in the project team meetings, and to declare the final decisions officially. Major actors related to effluent issues in this round are the CTSPA, the EPA, EIAC members, experts from the previous expert meetings, Changhua County government agencies, Changhua County citizens, Yunlin County government agencies, and ENGOs. In addition, Yunlin County councillors and members of the Legislative Yuan started to participate in the meetings and became actively involved in effluent issues.

In the fifth project team meeting, which was on effluent issues in the CTSP-IV project, the EIAC members discussed on the basis of the results of expert meetings. In terms of chemical substances management, both the EIAC members and ENGOs required the CTSPA to establish management plans based on REACH³⁹, the European Community Regulation on chemicals and their safe use (EC 1907/2006). In terms of locations for discharge the EIAC had not yet eliminated any plans, including the Old Jhuoshuei River plan which was abandoned by the CTSPA, and still examined all three of them, even though the CTSPA had declared they would only consider the Jhuoshuei River plan and the ocean plan. The change of location confused some EIAC members who had not attended the expert meetings. Experts from the previous expert meeting continued to evaluate different plans. The Yunlin County government agencies and councillors strongly expressed their disagreement on the Jhuoshuei River plan. Contrarily, the Changhua County government agencies fully supported the Jhuoshuei

³⁹ Abbreviation for the Registration, Evaluation, Authorisation and Restriction of Chemical substances.

River plan. These two groups fought over the locations for discharging and created a hostile environment. Meanwhile, ENGOs still presented different data and information to highlight the impact of effluent on the environment. In addition, they demanded that the CTSP-IV project would proceed to phase II EIA. In the sixth project team meeting, discussions intensified and conflicts between Yunlin County and Changhua County increased. In the seventh project team meeting, it became more violent. Physical conflicts took place in the meeting, which made a discussion impossible. The chairman of the EIAC declared that discussion would not be open to other actors in the next project meeting (Environmental Protection Administration 2009j). The eighth project team meeting did not include other actors so that only the EIAC members could discuss and make the final decisions.

In the EIAC conference on 30 October 2009, the final decisions on the EIA of the CTSP-IV project were announced officially. The CTSP-IV project was conditionally approved with 19 conditions⁴⁰ of which six related to effluent issues (see Appendix 2). In terms of water quality standards for effluents, the standards were stricter than the CTSPA had originally proposed. REACH was also included. In terms of the plans of the discharge of effluent, the EIAC did not decide on the adoption of the plans and only made comments on the Old Jhuoshuei River plan and the new Jhuoshuei River plan. The EIAC also suggested to adopt the ocean plan if the volume of effluent would become larger or the concentration of heavy metals in oyster would increase.

7.2 Frames of Actors – perceptions on the CTSP-IV project and other actors

In the third round, actors maintained their perceptions on the CTSP-IV project. However, their perceptions on oppositional groups became more hostile. In addition, most started to show discontent on the EPA as a result of the exclusion of participants in the last two meeting (Zhu 2009), including ENGOs, the Yunlin County government agencies and local stakeholders from Changhua County. In this round, the Yunlin County government agencies stated that they did not object to the CTSP-IV project, but that they firmly disagreed on the Jhuoshuei River plan because of pollution from effluent. The Yunlin County government agencies worried that the effluent would contaminate their agricultural and aquacultural products, which were the most common economic activities in Yunlin County. The Yunlin County government showed a strong distrust and dissatisfaction towards the CTSPA because of the changes on the location for discharge. The Yunlin County government argued that, if the Jhuoshuei River plan

⁴⁰ In the last project team meeting, 15 conditions were made. 4 additional conditions were decided in the EIA Committee Conferences.

was adopted at the end, the Yunlin County government would run large demonstrations against the CTSPA (Environmental Protection Administration 2009k: 12-13). Yunlin County councillors and members of the Legislative Yuan also expressed their concern on pollutions and expressed their opposition to the Jhuoshuei River plan. In response, the Changhua County government slightly complained about the Yunlin County government's objection on the Jhuoshuei River plan (Environmental Protection Administration 2009k: 11). Regardless of the objections of Yunlin County, the Changhua County government insisted that the Jhuoshuei River plan was the optimal one. Unlike relations between two governments, local stakeholders in Fuxing and Erlin town showed their anger on Yunlin County (Environmental Protection Administration 2009k: 24; 2009l: 43). Local stakeholder FXS5 argued that Yunlin County should not interfere in the affairs of Changhua County (Environmental Protection Administration 2009k: 24). Besides, stakeholders from Erlin Town also argued that ENGOs were not locals and that, also, they should not interfere with the CTSP-IV project.

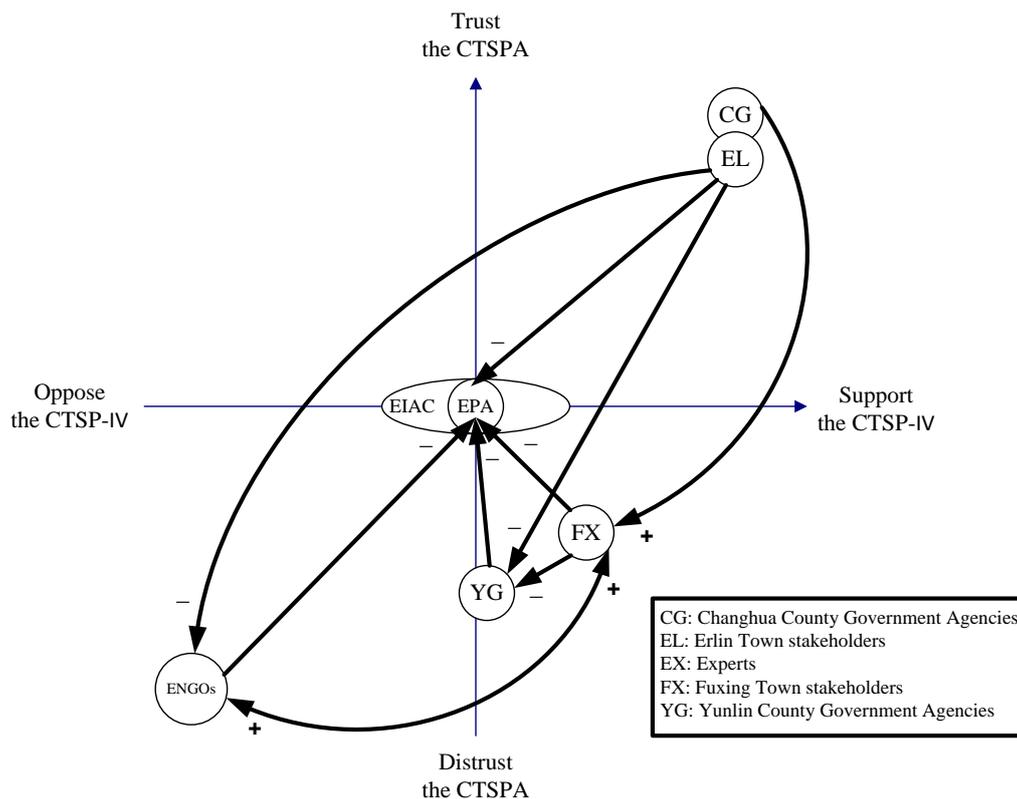


Figure 10 Actors' frames on the CTSP- IV and on other actors in the thrid round

7.3 Institutional Arrangements – the rules of the game

- Information Delivery

Don't you think it is not necessary to hold public explanation meetings in Yunlin County? (Yunlin County Economic Affairs Department)(Environmental Protection Administration 2009a: 14)

In the third round, the CTSPA was criticised, because of the lack of local public explanation meetings. Since the last expert meeting, the Yunlin County government agencies have required the CTSPA to hold public explanation meetings. These meetings are hosted by the developers of the project to explain its development and to collect opinions from the publics. However, based on the EIA Act⁴¹, public explanation meetings are only held after the conclusions of the EIA. Currently, the EPA requests the developers to hold public explanation meetings before the EIA process to let local stakeholder know more about the development project (Respondent #2). The EPA considers that transparency of information in the early stages would minimize the number of disputes in the EIA process. An ENGO member (Respondent #11) especially highlighted the importance of public explanation meetings for local stakeholders. She indicated that issues discussed in such meetings were more relevant and directly connected to local stakeholders' daily lives. In addition, she believed a public explanation meeting to be a primary occasion where local people receive and learn information of the development project. She furthermore labelled them as an occasion where formal language and knowledge can be translated into informal language. She regarded public explanation meetings as suitable and capable to bridge the gap between central and local.

- Interactions in the Project Team Meetings

In each project team meeting, the oppositional groups always repeated their questions. It was a bit wasting of time and too emotional. It affected the EIAC members. (Respondent #4)

I raised my questions, but you ignored me. Again and again, I asked the same questions in the next meetings. (...) Of course some were emotional, because you never replied. But those were still questions needed to be answered. (Respondent #8)

The EIAC member (Respondent #4) felt that, in this round, some actors kept repeating their questions and that they often expressed them in an emotional way. He believed

⁴¹ Article 7, Paragraph 3, the EIA Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

that these emotional expressions would influence the EIAC members in their decision making. The ENGO member (Respondent #4) explained that they had to repeat their questions, because they never received a reply from the CTSPA. According to Article 13-1 of the EIA Act⁴², the CTSPA as the developer has an obligation to reply to questions in the meetings and modify their environmental impact statement based on the suggestions from the EIAC, including questions in papers. However, in the meeting, the CTSPA failed to comply with the Act. This ENGO member also held that “*anger was accumulated*” in the next meeting as a result of unanswered questions, which made interaction difficult. She further pointed out:

At first we raised a lot of questions, they did not reply directly. No reply turned out to be no room for discussion. No room for discussion, suddenly we found out that our questions were in the conclusions. (Respondent #4)

In the end, the questions were answered. However, they were not able to discuss with the CTSPA or the EIAC members, because they were answered in the final conclusions of the EIA of the CTSP-IV project.

- The Power of the EIAC as Decision Makers

It made me felt like we were performing to the EIAC members, and let the EIAC member to decide which one they want to listen to. (Respondent #8)

This respondent from an ENGO expressed her feelings after she her conflicts with local stakeholders that supported the CTSP-IV project. She said that when ENGOs tried to convince them to disapprove of the CTSP-IV project, some local stakeholder would challenge their roles as outsiders, which decreased the legitimacy of claims by ENGOs. She felt that discussion and interaction were not aimed at seeking the truth, but to gain the trust from the EIAC members so that they would take other people’s opinions into account. Article 7 of the EIA Act⁴³ states that only EIAC members hold the power to make decisions on the approval of the project. This makes the EIAC the most powerful actor in the decision-making process.

Furthermore, EIAC members have the power to decide whether the CTSP-IV project should proceed to phase II of the EIA. In the third round, many ENGOs claimed that the CTSP-IV project should go into phase II EIA, because the project would have a significant impact. Article 8 of the EIA Act⁴⁴ says that, if a development project is considered as having “significant impact on the environment”, phase II EIA is required.

⁴² see <http://law.epa.gov.tw/en/laws/379692190.html>

⁴³ see <http://law.epa.gov.tw/en/laws/379692190.html>

⁴⁴ see <http://law.epa.gov.tw/en/laws/379692190.html>

They also believed that phase II EIA was created to include more forms of public participation with legal enforcement (Respondent #6, #8, #10), such as defining the scope of assessment with all relevant actors⁴⁵. Even though article 19 of Environmental Impact Assessment Enforcement Rules⁴⁶ defines what sort of circumstances can be regarded as significant impact, there is still ambiguity in what counts as a “significant impact on the environment”. The EIAC members hold the power to interpret ambiguity. In the eighth project meeting, the EIAC members considered that the potential impact from the CTSP-IV project was not significant and that, hence, phase II EIA was not required. They made the final decisions in the eighth project meeting, and terminated the decision-making process.

- The Power of the EPA as the Competent Authority

Public participation in the phase I EIA is just mercy granted by the EPA instead of legal rights. (Respondent #10)

In the seventh project team meeting, physical conflicts interrupted the meeting. In order to avoid further interruption, the EPA (Environmental Protection Administration 2009j) announced that ENGOs, local stakeholders and other civic bodies would no longer be allowed to attend the coming meetings and would, furthermore, be permitted to give opinions. ENGOs, local stakeholders and other civic bodies would only audit the meeting from another room and were allowed to submit their opinions in paper. As a response to criticism (Zhu 2009), the EPA stated that they had the authority to do so based on article 6, paragraph 1 of the Guidelines for Attending the EIA Meetings⁴⁷. An ENGO member (Respondent #8) stated that the EPA often invented new rules which confused participants. She considered that these new rules excluded participation and created conflicts,

At that time, a lot of conflicts were due to excluding participation. “We want to attend the meetings. We want to speak in the meetings. We want to listen to what the EIAC members say.” Those were what we argued for. (...) We are fighting for democracy rather than finding the truth on the environmental problem. (Respondent #8)

She further described that the interaction in the project team meeting at the end became totally irrationally and out of control.

⁴⁵ Article 10, the EIA Act, see <http://law.epa.gov.tw/en/laws/379692190.html>

⁴⁶ Environmental Impact Assessment Enforcement Rules, see <http://law.epa.gov.tw/en/laws/596015609.html#ch01>

⁴⁷ article 6 paragraph 1, see Regulations on Participation in the EIA Reviewing Meetings, <http://ivy5.epa.gov.tw/epalaw/docfile/033180.pdf>

Types	Rules	Characteristics	Effect
Choice Rules	Information Delivery	Formal	local stakeholders did not receive enough information
	Interactions in the Project Team Meetings	Formal	insufficient interaction
Position Rules	The Power of the EIAC as Decision Makers	Formal	decision making process was terminated by the EIAC
	The Power of the EPA as the Competent Authority	Formal	the EPA changed rules of the game and excluded participation

Table 9 Types of rules in the third round

7.4 Knowledge Strategies

In order to eliminate the Jhuoshuei River plan from the scope of decision making, the Yunlin County government agencies attacked the CTSPA, on the one hand, and persuaded the EIAC on the other. The Yunlin County government agencies attacked the CTSPA and pointed out the CTSPA's faults in administrative procedures and in the environmental impact statements. The Yunlin County EPB (Environmental Protection Administration 2009a: 18-19) indicated that the CTSPA had violated the laws⁴⁸ by not holding public explanation meetings in Yunlin County. Moreover, the Yunlin County EPB pointed out that the CTSPA had broken several laws⁴⁹ by not preparing the pollution management plans for the Jhuoshuei River. In terms of environmental impact statements, the Yunlin County EPB reviewed the methodologies and the prediction results and compared them with local conditions. They argued that some methodologies were inappropriate and prediction results were contradictory to local conditions in reality (Environmental Protection Administration 2009a: 15-16).

To persuade the EIAC members, the Yunlin County Agriculture Department presented data on agriculture and aquaculture to highlight the importance of their economic value (Environmental Protection Administration 2009a: 10). They tried to convince the EIAC that pollution from effluent would have a severe impact on agriculture and aquaculture

⁴⁸ Article 10-1, Environmental Impact Assessment Enforcement Rules, see <http://law.epa.gov.tw/en/laws/596015609.html#ch01>

⁴⁹ Article 12-2, Environmental Impact Assessment Enforcement Rules, see <http://law.epa.gov.tw/en/laws/596015609.html#ch01>

and expected that the EIAC members would reject the Jhuoshuei River plan. Moreover, the Yunlin County Agriculture Department compared their agricultural value with Changhua County. They used this comparison as evidence to show that the impact would be more severe in Yunlin County and, consequently, suggested the EIAC to choose the Old Jhuoshuei River. Yunlin County councillors and members of the Legislative Yuan supported the Yunlin County government agencies through private lobbying (Environmental Protection Administration 2009l: 38). Most EIAC members showed their concerns on agriculture in Yunlin County and tried to minimise the impact by improving water quality standards. However, most of the EIAC members did not reject the Jhuoshuei River. In response to Yunlin County government agencies, both the Changhua County government and local Changhua County stakeholders debated counter to Yunlin County. They addressed local conditions, especially economic development, and argued that Yunlin County government agencies should not obstruct the CTSP-IV project (Environmental Protection Administration 2009l: 39-43). Besides Yunlin County, local stakeholder from Erlin Town also attacked ENGOS (Environmental Protection Administration 2009l: 29-41). They told difficulties of their livelihood and local economic conditions, and argued that ENGOS were outsiders who had no right to interfere local affairs. ENGOS felt this accusation was not correct, but they did not react on that (Respondent #8).

In this round, ENGOS tried to prove that the CTSP-IV project would have a significant impact and demanded the EIAC to either reject the CTSP-IV project or proceed to phase II EIA. Unlike previous rounds, ENGOS primarily focused on legal perspective. ENGOS (Environmental Protection Administration 2009a: 40-46) prepared many legal cases, scientific articles and government reports as evidences to support their arguments and, furthermore, indicated the significant impact the CTSP-IV project would have. In addition to oral presentation, ENGOS also submitted a 25-page report with various supportive documents, such as lists of relevant regulations and news articles. One ENGO member (Environmental Protection Administration 2009l: 108-24) made a list of relevant Master and PhD theses in her report to address the potential impact the CTSP-IV project could have. Most EIAC members did not want to reject the project or proceed to phase II EIA. However, one EIAC member and one expert suggested to go into phase II EIA.

Actor	Knowledge Strategies			
	Major Types of Knowledge	Purpose	Target	Reaction
Yunlin County government agencies	bureaucratic, local, scientific	counter prove	the CTSPA	little reaction
	bureaucratic, local	decrease legitimacy of the Jhuoshuei River plan	the EIAC	little reaction
			Changhua County	fight back
Changhua County government	bureaucratic, local	counter prove	Yunlin County government	fight back
Erlin Town stakeholders	local	counter prove	Yunlin County government	little reaction
		decrease legitimacy	ENGOS	little reaction
ENGOS	bureaucratic	point out how the CTSPA violated laws	the CTSPA	little reaction
	scientific	highlight the impact of the CTSP-IV project	the EIAC	informed

Table 10 Knowledge strategies in the third round

7.5 Analysis of Knowledge Integration

In the third round, frames on the CTSP-IV project, particularly plans of locations for discharge of effluent, had a major impact on knowledge strategies. The knowledge strategies of Yunlin County government agencies were driven by their perceptions of the Jhuoshuei River plan. They were strongly opposed the Jhuoshuei River plan and intended to eliminate it from the scope of decision making. Their knowledge strategies namely addressed the decreasing legitimacy of the Jhuoshuei River plan. The Yunlin County government agencies collected information to persuade the EIAC members and at the same time to attack the CTSPA. Although ENGOS did not have a specific preference for the three plans, ENGOS expected the CTSP-IV project to be either rejected or that phase II EIA would be required. They also collected large amount of information, particularly from a legal perspective to strengthen their arguments.

In terms of rules on information delivery, the CTSPA was criticised for breaking the rules and for failing to hold public explanation meetings. However, unlike the first round, criticism became the attacking point of other actors. The Yunlin County government agencies used this point to diminish the legitimacy of the Jhuoshuei River plan. ENGOs attacked this and stated that the administrative procedure of the EIA of the CTSP-IV project was illegal and proposed to reject the project. The CTSPA was, moreover, accused of breaking rules on interaction. The ENGO member (Respondent #8) reflected that it had already happened in the previous rounds, but, also, that it had an accumulated effect. Anger accumulated as process went on and burst out in the seventh project team meeting where physical conflicts occurred. This resulted in the suspension of the decision-making process. The anger was probably due to the changes in rules. The EPA changed the rules of participation to prevent further physical conflicts. Position rules give the EPA the authority to create and change rules in the decision process. Yet, the way in which the EPA exercised their authority restricted participation and blocked interaction. Position rules give the EIAC members the power to decide and determine whether the EIA process should be terminated or continued. This is the reason why actors developed specific strategies to convince the EIAC members.

The level of knowledge integration in Round III: Low

In the third round, all three types of actors attended the meetings, however, in the last meeting, stakeholders except the EIAC members were excluded from the meetings by the EPA. Knowledge actors used for their strategies were different from actor to actor. Although Yunlin County government agencies applied three types of knowledge in their strategies, their purpose did not aim at knowledge integration. Besides Yunlin County, most of actor also aimed at attacking other actors' opinions. There is no intention to integrate different types of knowledge in their strategies. Only ENGO's strategy for highlighting the impact of the CTSP-IV project had some intention in addressing local conditions. Actors' reactions to others' strategies were particularly negative in this round. Many actors adopted counter strategies to fight back. Those lower the level of knowledge integration. In sum, the level of knowledge integration is low.

Knowledge Integration Level in Round III: Low (-)			
Criteria			
I Types of actors	II Types of knowledge used in strategies	III Purpose of strategies	IV Other actors' reaction on strategies
- + (M)	- + (M)	- (L)	- (L)

Table 11 The level of knowledge integration in the third round

Conclusion: How do different factors influence knowledge integration?

In this thesis, I conducted a case study of the CTSP-IV project to understand how frames, institutional arrangements, and knowledge strategies influence knowledge integration in the Taiwanese EIA. The analyses of the case study are divided in to three rounds. In each round, I examine effects of those three factors and the level of knowledge integration.

In terms of frames, actors' frames on the CTSP-IV project and on other actors are presented in (Figure 11). Actors did not change their frame of the CTSP-IV project from the first round till the third round. However, actors' frames on others had some changes over time. In the first round, due to opposite frames on the CTSP-IV project Erlin Town stakeholders had negative perceptions on ENGOs. On the other hand, Fuxing Town stakeholders hold positive perceptions on ENGOs because ENGOs brought them information about the project. In the second round, Changhua County government agencies showed their concerns on Fuxing Town stakeholders and tried to negotiate with the CTSPA on the plants for discharging. Fuxing Town stakeholders expressed their dissatisfaction on the EPA for not inviting them to the project team meetings. In the third rounds, as the alternations on the scope of the plans for discharging, Yunlin County government agencies began actively participated in the EIA process. Also due to different frames on the CTSP-IV project, Changhua County stakeholders presented negative attitudes towards Yunlin County. All actors except the EIAC members were discontent with the EPA because the EPA changed rules and limited participation in the project team meetings. Actors' dissatisfaction reached to the peak and physical conflicts burst out.

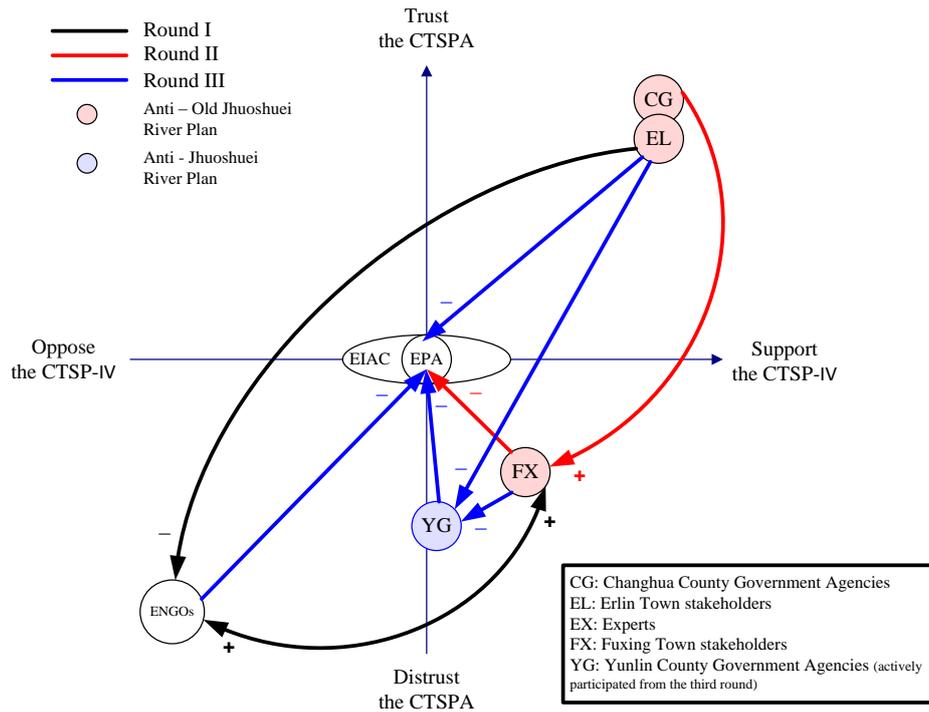


Figure 11 Actors' frames on the CTSP IV project and other from the first round to the third round

Actors reflected impacts from different institutional arrangement in each round (Figure 12). In the first round, actors considered the process of knowledge interaction were influenced most by information rules, especially information delivery channels. Information rules directly have impact on participation, and hence determine actor domains in the first round. Because information on the EIA of the CTSP-IV project was not well delivered to local stakeholders, there was a lack of local knowledge in the first round from the first project team to the third project team meeting. Fuxing and Fangyuan town stakeholders were not well informed so that they did not participate until the fourth project meetings. Information rules affected actor domains.

In the second round, institutional arrangements were slightly different from the first and the third round. The most significant distinction is on position and boundary rules which had impact on actors' knowledge strategies. Actors were able to select experts whom they preferred. Those experts adopted strategies different from the EIA members in the first round and more experts were aware of the importance of local knowledge. In the second round, some institutional arrangements were the same as in the first round, e.g. three-minute limitations. However, actors were more able to cope with restrictions of those rules. Respondent #8 is an example who learnt how to overcome restrictions of the rules. Her strategies to present in a professional way let her gain more time from the chairman of the meetings. So does information delivery rules.

Local people were less affected by the way how information was conveyed, because they had created their own channels to receive information, in this case was from ENGOs.

In the third round, the impact from the power of the EPA and the EIAC members amplified. Position rules regulate the power they had. The EPA changed the rules of participation, altered actor domains in the decision making process. The EIAC members exercised their power to terminate decision making process. In terms of choice rules, although it regulated what the CTSPA should do, the CTSPA did not comply with the rules. The CTSPA failed to hold public explanation meetings. In addition, the CTSPA also failed to reply questions raised by other actors in the meetings. This is a typical rule-in-form (Osrom 2005: 138), which rules exist but actors do not comply with. Comparing to the first round, the effect of rule-in-form amplified. In the first round, some actors had already complained the CTSPA did not answer question properly (Environmental Protection Administration 2009f: 25). Local stakeholders from Fuxing and Fangyuan Town had claimed for holding public explanation meetings in their towns (Environmental Protection Administration 2009e: 14-16). Actors did not use those points to attack the CTSPA. But in the third round, those became the attacking points for other actors to decrease the legitimacy of the CTSP-IV project. Actors' dissatisfaction on the CTSPA intensified as the CTSPA kept breaking the rules, and therefore formed specific strategies to attack the CTSPA. This implies that rule-in-form influences actors' frames on other actors, and therefore affects their choices on knowledge strategies.

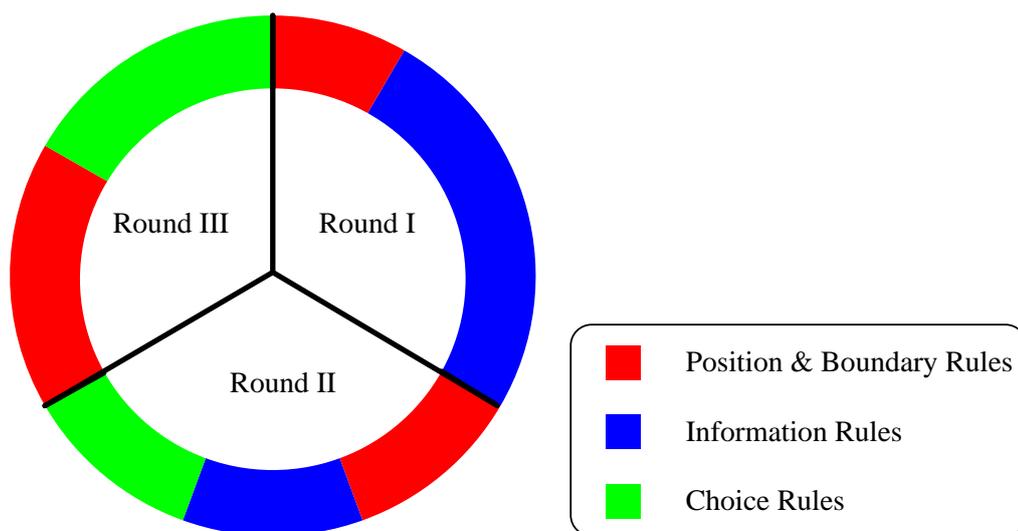


Figure 12 Influential types of rules in each round

In terms of knowledge strategies, actors had little intention to integrate knowledge in the first round. However, other actors' reactions on ENGOs' strategies were very positive. The most successful strategies to integrate local knowledge in this round were from ENGOs. ENGOs tried to provide large amount of information to slow down the decision making process and let local stakeholders are able to participate the meetings so that there could be more local knowledge. The level of knowledge integration is medium. Actors had more intention in bridging different types of knowledge in the second rounds. Not only experts deliberately transferred local knowledge into scientific knowledge, but also local stakeholders shared local information to experts. Those strategies also received position reaction from other actors. Those strategies resulted in higher levels of knowledge integration in the second round. In the third round, the level of knowledge integration is lowest. Actors had no intention to integrate knowledge, but only aimed at attacking other actors' opinions. The actors who had been attacked also presented strategies to fight back. This knowledge fight, especially between Yunlin County and Changhua County, decreased the level of knowledge integration.

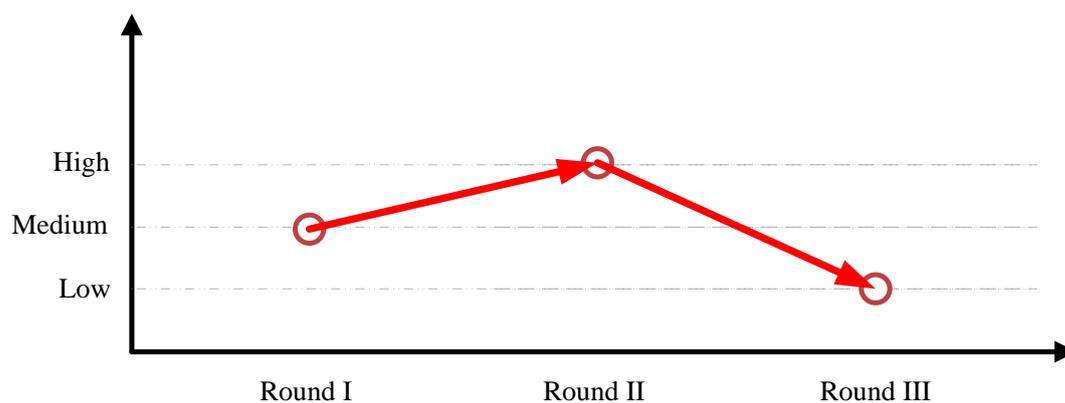


Figure 13 Levels of knowledge integration in each round

To conclude, actors with opposite problems frames are more likely to have negative frames on each other. Those negative frames have impact on their knowledge strategies. Actors often choose attacking strategies towards their opponents and have no intention in knowledge integration. Frames on problems hardly change, but frames on other actors sometimes changes. Effects from Institutional arrangements may lead to the changes in frames on other actors, and hence influence knowledge strategies. The level of knowledge integration is determined more by the purpose of strategies and how other actors react to the strategies. If knowledge strategies aim at knowledge integration and actors positively react on those strategies, it is more likely to have higher level of

knowledge integration.

The research results reflect some differences from the theoretical framework. In Raymond et al.'s (2010: 1771) framework of knowledge integration, they emphasise specifically on actors' frames on problems. However, in this case study, different frames on problems do have impact but not as much as frames on other actors, especially when negative frames on others intensify. Negative frames on others may be formed or intensified due to different reasons. In this case, continuously breaking rules of the CTSPA amplified actors' negative frames on the CTSPA, and thus adopted more attacking knowledge strategies. In addition, there are no direct relations between institutional arrangements and actors' frames. However, in this case show some direct effect from institutional arrangements on actors' frames. The way in which the EPA exercised their power evoked actors' anger on the EPA.

The case study on the EIA of CTSP-IV project presents the dynamic nature of knowledge integration. The levels of knowledge integration change over time, and are influenced by different factors. Not only there are changes in the level of knowledge integration, those factors per se also change. Frames on other actors are altered by institutional arrangements. Institutional arrangements are also different in each round, and can be modified by actors. Knowledge strategies furthermore reflect the changes in other factors. Those dynamics indicate one thing that knowledge integration is not only about knowledge. Moreover, knowledge integration is not a linear process as it is described perfectly in theory.

This research reveals the dynamical aspect of knowledge integration which is different from theory. In addition, it also discovers relations between different factors in knowledge integration which may be implicit in theory. In terms of empirical perspective, the importance of this case study is that it evaluates institutional arrangements of the Taiwanese EIA. The case study examines institutional effects on knowledge integration both of the project team meetings and the expert meeting. It shows that institutional arrangements of expert meetings are more appropriate to integrate different types of knowledge. In order to improve knowledge integration in the Taiwanese EIA, rules should be reconsidered, especially on the selection method of the EIAC members, the information delivery channels, and the enforcements of the rules in the EIA process.

CHAPTER 9

Discussion: How to realise knowledge integration in Taiwanese EIA?

Returning back to the research questions, what are causes of the problems in integrating different types of knowledge in the Taiwanese EIA? Surprisingly, the main cause is not the difference frames on problems as described in the theory. Instead, causes of problems are interrelated effects from the four factors, institutional arrangements, knowledge strategies, frames on problems and others, and actor domains (Figure 14). From the research results, institutional arrangements also have effects on actors' frames on others. Then, how to realise and improve knowledge integration in Taiwanese EIA? My suggestions are presents as in Figure 14. In the bottom right triangle, factors, such as actors' frames and their knowledge strategies are personal choices. Those two factors are able to be influenced, but are less likely to be controlled. On the other hand, in the upper left triangle, factors are more possible to be controlled. Formal institutional arrangements are set by government agencies, especially the EPA. Actors domains are also be able to be improved by effective information delivery. In this regard, my suggestions to the EPA are to focus on improving formal institutional arrangements. Those formal institutional arrangements of the EIA should especially prevent actors forming negative frames on others and increase actor domains, such as regulations on information delivery and participation. In addition, the EPA should also pay attention to the rules of selecting EIAC members, because EIAC members' attitude towards different types of knowledge is decisive in knowledge integration. Besides institutional arrangements, the EPA should create more open and friendly atmosphere in the meetings to reduce conflicts between actors. In terms of ENGOs, local ENGOs in this case played an important role to inform local stakeholders. ENGOs focused more on stakeholders who had similar problem frames, and had less contact with local stakeholders who had opposite problems frames. Local ENGOs can have one step forward and interact with local stakeholders who have opposite frames. In this regard, negative frames on each other may be reduced.

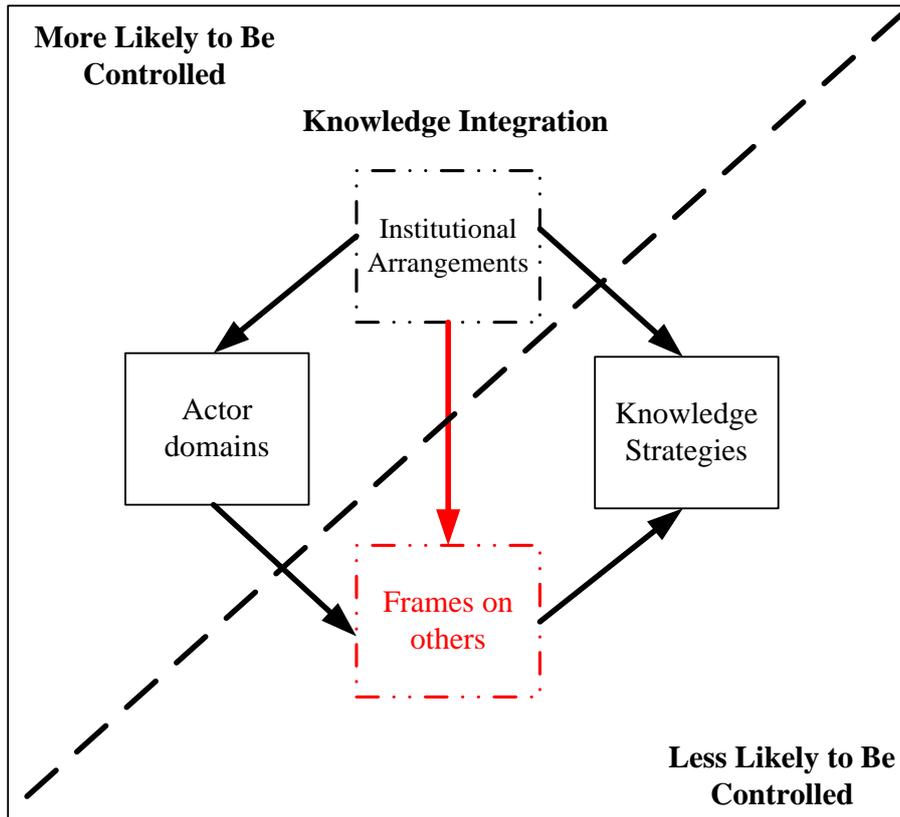


Figure 14 The Modified Knowledge Integration Framework

The shortcoming of this research is effects from politics and political parties are not discussed in the case study. Theoretically the EPA is able to improve knowledge integration in the EIA by adjusting institutional arrangements. However, in Taiwan the impact from politics and political parties are significant. Political impacts also showed in this case. The Major of Changhua County in the second round and the Major of Yunlin County in the third round separately lobbied the CTSPA and the National Science Council (Environmental Protection Administration 2009i: 10; 2009l: 38). They tried to influence decision making by political power. Politics could have significant impact on decision making process and hence no matter how knowledge is integrated and produced it could never be applied in decisions. Another shortcoming of this research is whether the EIA should be the arena for knowledge integration. The original design of Taiwanese EIA aimed at minimising potential impact from the construction projects, and was not designed for knowledge production. In this regards, a lot of institutional arrangements in the EIA indeed constrain knowledge integration. Instead of improving knowledge integration in the EIA, would it be more effective to have another arena specifically for knowledge integration outside the EIA meetings and provide this co-produced knowledge (Edelenbos et al. 2011) in the EIA? This question may leave to other researchers.

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Appendix 1

The List of Name of Participants in Meeting Records and Codes

Code	Name	Role
FXS1	粘麒麟	Fuxing Town stakeholder
FXS2	粘瑞豐	Fuxing Town stakeholder
FXS3	粘張素雲	Fuxing Town stakeholder
FXS4	粘永修	Fuxing Town stakeholder
FXS5	粘禮淞	Fuxing Town stakeholder
FXS6	粘孝存	Fuxing Town stakeholder
FYS1	魏清水	Fangyuan Town stakeholder
EI1	顧洋	EIAC member
EI2	盧至人	EIAC member
EN1	謝和霖	ENGOS
EN2	施月英	ENGOS
ES1	李東義	Erlin Town stakeholder
ES2	張源昌	Erlin Town stakeholder
EX1	陳弘成	expert
EX2	侯文祥	expert
EX3	林鎮洋	expert

Appendix 2

The Conclusions of the EIA on the CTSP-IV Project (relevant to effluent)

(1) The CTSP-IV Project is conditionally approved. The developer is required to comply with following conditions:

1. When the volume of effluent is smaller than 60,000 CMD, waste water is permitted to discharge into tidal flats of the Old Jhuoshuei River or the Jhuoshuei River below the lower tidal line. When the volume of effluent is larger than 60,000 CMD or when copper concentration of oyster at the river mouth is larger than 100 mg/kg, the developer should adopt the ocean plan or other alternatives which have the same effect. In this case, the developer should submit an alternate plan for a new EIA review.

2. Amended Effluent Standards are:

- a. BOD limits: 15 mg/L
- b. COD limits: 60 mg/L
- c. SS limits: 15 mg/L
- d. TN limits: 50 mg/L
- e. Ammonia nitrogen limits: 10 mg/L
- f. TP limits: 10 mg/L

3. TTO is added into Effluent Standards. TTO limits is 1.37 mg/L (items including: 1,2-Dichlorobenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 1,2,4-Trichlorobenzene, Toluene, Ethylbenzene, Chloroform, 1,2-Dichloroethane, Dichloromethane, 1,1,1-Trichloroethane, 1,1,2-Trichloroethane, Dichlorobromomethane, Tetrachloroethylene, Trichloroethene, 1,1-Dichloroethene, 2-Chlorophenol, 2,4-Dichlorophenol, 4-Nitrophenol, Pentachlorophenol, 2-Nitrophenol, Phenols, 2,4,6-Trichlorophenol, Bis(2-ethylhexyl) phthalate (DEHP), Dibutyl phthalate (DBP), Benzyl butyl phthalate (BBP), Anthracene, 1,2-Diphenylhydrazine, Isophorone, Carbon Tetrachloride and naphthalene). The developer should conduct regular monitoring

of wastewater toxicity to ensure water quality of effluent.

4. The developer should prioritize human health protection. Thus based on Environmental Standards for Protecting Human Health in surface Water Classification and Water Quality Standards, when effluent volume is larger than 4,000 CMD, limits for heavy metals are: Lead 0.2 mg/L, Cadmium 0.03 mg/L, Hexavalent chromium 0.35 mg/L, Zinc 3.5 mg/L, Copper 0.15mg/L (only for the Jhuoshuei River plan), Mercury 0.005 mg/L, Arsenic 0.35 mg/L, Selenium 0.35 mg/L, Silver 0.35 mg/L, Indium 0.1 mg/L, Molybdenum 0.6 mg/L, Gallium 0.1mg/L, Stannum 0.5 mg/L.

5. If the developer adopts the Old Jhuoshuei River plan, the developer should conduct following prevention strategies:

a. Based on suggestions from the expert meetings, in order to prevent green oysters, copper concentration in the area for aqua farms should be lower than 0.01 mg/L. Thus, based on the simulations, when the effluent volume is larger than 4,000 CMD, copper limit in effluent is 0.07 mg/L.

b. The developer is required to conduct monthly monitoring of heavy metals which have impact on oysters, including lead, cadmium, hexavalent chromium, copper, zinc, and mercury. The developer is required to submit monthly monitoring results to the EPA.

12. In terms of chemical substance management, the developer should ensure that industries comply with REACH and manage their chemical substances.

(2) Based on the reviewing results, the Old Jhuoshuei River plan and the Jhuoshuei River plan proposed by the developer are both acceptable. The developer should consider environmental, technical, financial, and management aspects, and adopt the optimal plan.

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這麼久了，終於可以寫到這一頁了。如今，儘管總是有改不完的部份，但是在時間內完成了一件事情，或許也可以視為一種成就。我想在最後任性的用中文書寫，用最熟悉的語言來表達我對所有人的感謝。這兩年來，發生了種種的事情，從出發其實就不是這麼的順利，經歷的幾番的掙扎，感謝我爸媽容忍我這個這麼任性的女兒的任性決定。還有伯母、堂哥姊、堂嫂們不斷的關心。來到荷蘭，念了兩個月以後，毅然決然的決定轉系。理由很多，但卻是這兩年來最正確的決定。謝謝琮洁，沒有認識妳、沒有妳的幫忙與鼓勵，第一個學期大概就卷鋪回家了吧！我想要感謝昭儀、侑叡、婷婷、Bee、莉娟學姊、荻如、epo，沒有妳們的越洋支援真不知道這兩年要怎麼樣撐過去。林阿瓜與阿金，遠在巴黎一起努力的好朋友們，想到妳們更辛苦用法文求學，讓我一刻都不敢抱怨與偷懶。特別感謝趙家緯，好在你有來荷蘭半年，又給意見、又牽線又三不五時的打氣，沒有你的幫忙訪談不可能進行的這麼順利。感謝所有的受訪者，樂意的花時間分享自己的經驗，沒有你/妳們這本論文不可能完成。感謝陳恒安老師，透過自己的國外求學經歷不斷的鼓勵我。Nina、Astor 和德容，身為學術界的前輩給了我很多研究建議。再來要感謝所有在 Utrecht 的朋友們，把我當家人一樣讓我就算在國外也不孤單。Doris 和筱垠，一同分享在這邊生活的甘苦。欣璇和書維，我的好戰友們，我們同一年進來、一起努力、也一起畢業。Julie，最全方位照顧人的大姊，總是把我餵飽飽的有力氣繼續奮鬥。Lily 和 Gerben，在 Utrecht 給我們這群台灣學生一個像家一樣可以回去的地方。還有感謝其他所有曾經幫助過我的人。

最後，這本論文要獻給來不及見最後一面的奶奶。