Conflicts between Communities and Industry and Conflict Management from Evidence-Based Solutions: A Case Study of Zinc Mine Project, Mae Sod District, Tak Province, Thailand

Chaiwat Phadermrod[*], Sidthinat Prapbudhanitisarn[**], Somporn Sa-ngawongse[***], Tawee Chaipimonplin[****]

Abstract

This study was conducted to 1) study and analyze causes and results of conflict solving between zinc mine project and the community in the case of cadmium- contamination in Mae Tao watershed, Mae Sod District, Tak Province over the past 10 years, 2) prove the results of conflict resolution between both parties (Project and the community) by using new evidence-based concepts to minimize conflicts between zinc mine project and the local community with respect to cadmium contamination in Mae Tao watershed in the past 10 years (2004-2014); as the problems involved many aspects in terms of such as economy, society, watershed structure, distribution of mineral deposit and mining, cadmium contamination in paddy soil, cadmium contamination in rice and cadmium contamination in human health status. This upon the least case of evidence-based information study found that case 1: problem concerning cadmium contamination in paddy soil in Mae Tao watershed has not yet been dealt with and conflicts are likely to arise again in case there appears stimulus, case 2: upon the use of evidence-based information to moderate extent, problem about cadmium contamination in rice grown in Mae Tao watershed was partially resolved and case 3: by criteria of using evidence-based information to the greatest event and the past that come related issues have been solved, cadmium accumulation in urine of people residing nearby and around Mae Tao watershed was believed not to get worse to cause Itai-Itai disease. Evidence base concept apparently gives a new neutral power in analysis of conflict resolutions in three case studies. However, the degree of success in conflict management by this approach depends on the complexity of the problems in individual case. The present study provides a convincing conclusion that the more the evidence-based knowledge the greater the success in conflict resolution.

Keyword: Cadmium Contamination, Conflicts Management, Evidence-Based Solutions, Zinc Mine Project

Background and Significance of the Study Problems

During the past few decades, many mega-projects were developed and invested in Thailand such as Suvarnabhumi Airport Project, reservoir and dam construction of Department of Irrigation and Map Ta Put Industrial Estate, etc. These projects were aimed to stabilize and

[*] Doctoral Student, Sustainable Land Use and Natural Resource Management Program, Faculty of Social Science, Chiang Mai University

[**] Lecturer, Department of Social Science and Development, Faculty of Social Sciences, Chiang Mai University

[***] Associate Professor, Faculty of Social Sciences, CMU-SLUSE Academic Center, Chiang Mai University; Email: somporn.s@cmu.ac.th

[****] Lecturer, Department of Geography, Faculty of Social Sciences, Chiang Mai University

strengthen the economy; yet they originated conflicts with human community and caused environmental impacts in the light of incompatible development goals and environmental preservation and the lack of sound management instruments marked as an example, pollution problems from factories in Map Ta Put Industrial Estate, Mueng District, Rayong Province have remained unsolved since its established in 1981 in the absence of land use plan leading to an environmental crisis petitioned by villagers, students and monks (Veerawattananon, 1998).

Another case is air pollution from Mae Moh Power Plant in Lampang Province which has used lignite as fuel to generate electricity leading to Sulfur Dioxide gas spreading to nearby communities (Jiraphatpimon, 2004) Similarly, the proposed Kaeng Sue Ten Dam construction project in Prae Province in 1973, had to face fierce opposition but it was seriously re-considered in 1989 to go ahead block Yom River in Song District, Prae Province and store water for the benefits of agriculture around upper part of Chao Phraya River Basin. Local villagers believed that it would mitigate recurrent flood in such area; however, those who would be adversely affected by dam construction and Non-Government Organization (NGOs) and public organizations protested against the project as fertile natural resources and forest would be damaged (Rattanpienthamma, 2005).

The case of cadmium contamination in the paddy area around Mae Tao watershed, Mae Sod District, Tak Province has been challenging for the present investigator for evidence-based knowledge reason. After the government granted the mining permit this area in 1982 the mine began separating in 1984 and adhering to the conditions required by the government. During 1998-2003, International Water Management Institute (IWMI) cooperated with Department of Agriculture to monitor level of cadmium in soils and rice in 2 villages namely Pa Dah and Mae Tao Mai in Phra That Padaeng Sub-district. Cadmium contamination in the environment was detected and a report was presented to Ministry of Natural Resources and Environment. In 2004, Ministry of Natural Resources and Environment established an ad hoc working group to deal with cadmium contamination in Mae Tao watershed, Mae Sod District, Tak Province to verify contamination and find causes of such incident. It was concluded that cadmium was originated from 1. natural process and 2. human activities such as land clearing of digging without measure control to prevent sediment transport that could more cadmium with water.

Later, there were many reports conducted by relevant academic institutes and government sectors but no conclusion was made on the sources of cadmium. Most reports reflected impacts on agricultural area like soils having cadmium exceeding the standard (3 milligrams/kilogram), impact on agricultural output particular rice which had cadmium higher than the standard (0.2 milligram/kilogram) and impact on health and sanitation of 7,730 local people whose health was examined; with the result that 10% of them were overexposed to cadmium (5 microgram/gram Creatinin) (The Ad hoc working group for controlling cadmium contamination around Mae Tao watershed, Mae Sod District, Tak Province; Ministry of Natural Resources and Environment, 2004) that needed tracking and monitoring for healthcare. Local people became panic and concerned with their health, including traditional way of life of rice farming. The government responded by establishing Mae Tao Watershed Development Plan involving various government agencies for an integrated offer to solve problems and deal with impacts on the environment and human health. The mines as a private sector located in locality played a role helping people in many terms such as career changes until 2009, Lawyer Council supported a group of villagers in Mae Ku Sub-district to petition to Pitsanulok Administrative Tribunal against the government that supervised mining business and conduct prosecution to Civil Court against these 2 mines

located in area. (S.P.S. Consulting Service, 2012) causing more intense conflicts as each party had its own standpoint.

The economic development project and the mega projects, the economy was developed and projects with or without environmental impact study that affected environment and society would result in conflicts between industrial project owner with support of government and people who were affected including non-government organizations and academicians. Management to solve problems of conflict was just to mitigate problems and they could get recurrent repetitiously.

Relevant Concept, Theory and Research

Situation of conflicts in Thailand was a result of incompatible concept, ideology, belief and practices of development and preservation by convincing the society with discourse that 2 concepts would simultaneously occur. Society-level conflict arises from using power and authoritative relation between the advantageous/more powerful and the disadvantageous/less powerful. Concept of Political Ecology is to emphasize on studying conflicts of resource management and finding alternatives to solve such problems. Understanding physical ecology that caused problems and conflicts and recognizing environmental problems, structure and considering authoritative relation for natural resource management were knowledge to determine political economy annexed with Social Ecology (Wittayapak, 1999). From studying such conflicts, we would emphasize on authoritative relation by giving power to the inferior or disadvantageous to be propulsion for demolition or reconstruction in terms of discourse and using social and cultural capital as case study of community forest, problems still were found 1) for theoretical explanation, although having high logical significance, it was hard to be transferred to implementation. Although there was decentralization through New Social Movement such as claiming from conservation group or community forest, there were still problems but they were temporarily stagnant and sometimes, they were opposed by the authority. Solution to such conflict was to manage with discourse and subject matter was combining modern knowledge and truth from incomplete fact by power system. Therefore, the theoretical point the researcher would search for was to manage with discourse of capitalism and government that has changed. Management was to be against discourse with evidence-based information and theoretically, it was new power. If such power is used to manage conflicts, it is more possible that whole or partial truth will create discourse for capitalists and government and some or total part will bring righteousness to the affected and such righteousness would be able to resolve conflicts.

Evidence-based concept is largely popular in medical field to discover real causes of disease occurring to patients that would lead to right diagnosis and treatment and in Forensic Sciences to find clear evidence for judgment that the offender could not argue. Furthermore, it can be used as tools and instruments to resolve particular conflict in crime scene and it is an operation opposite to Post Structuralism that would clarify issue by interpreting discourse and merging with movement to transform power to needed changes. But in using evidence base emphasized on problems and found evidence base of each issue of conflicts every stakeholder is likely to agree leading to resolution of each conflict. Therefore, when gathering trivial issues, they would create overall image of conflict management and become sustainable guidelines.

Conceptual Framework

Studying power and authoritative relation that affects solving conflict is involved in management from industrial project development and result of solution using concept of power from evidence base to resolve such conflicts. Nevertheless, the investigator used conceptual framework to explain model of developing industry project for the development of nation's economy but it possibly affects society and environment. This study aims to conduct comparative analysis on the authority of government sector to resolve environmental problems and social power of public sector and non-government organizations (NGOs) along with academicians to answer questions of the study about which power influences conflict solution from doing research and linking to analysis in authoritative context of using power for negotiation. Then, evidence base would be used as an instrument to manage trivial conflicts to create mutual understanding among sectors. Conceptual Framework of study is shown as below:

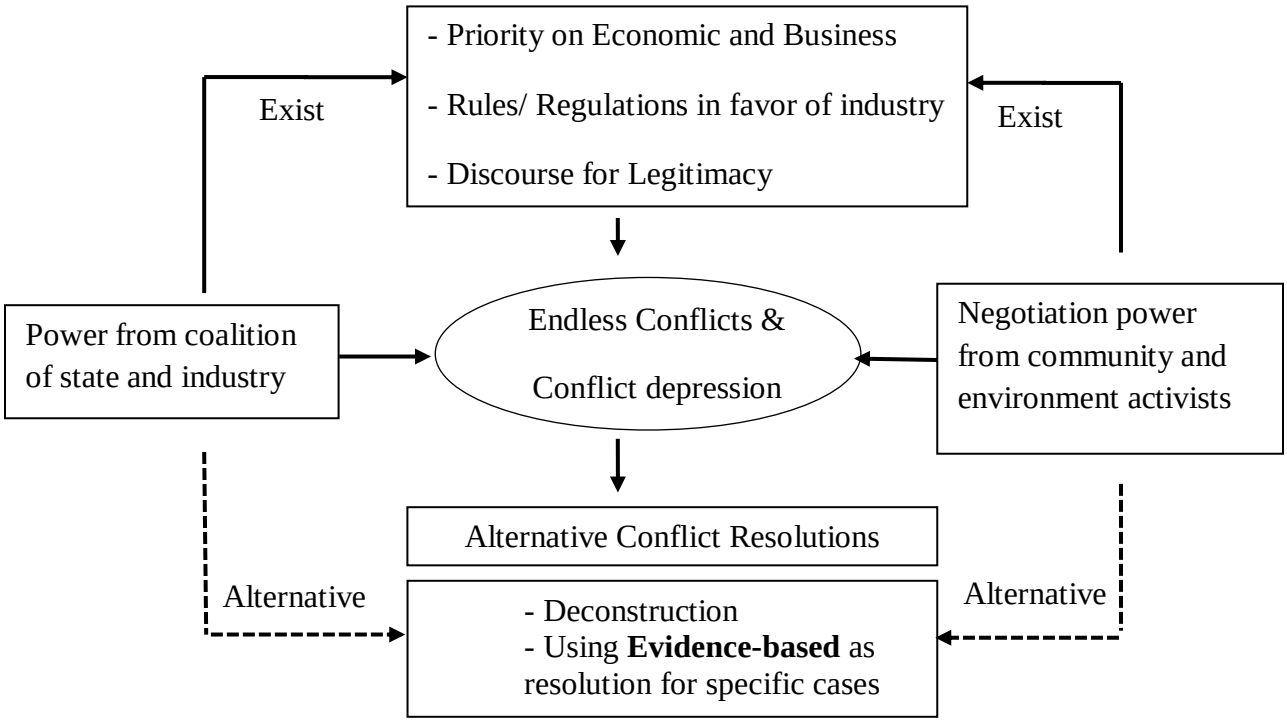

Figure 1 Conceptual Framework

Data Gathering and Analysis

To answer the research questions and to meet the specified objectives, relevant data and information, including primary source and secondary source were collected from relevant documents on environmental impact analysis (EIA), researches, government and public reports, non-government organization and mining project. Such data would be analyzed in accordance with guidelines of evidence based comprising of completeness of evidence, 3 dimensional elements of evidence base which were 1. Credibility of data source and presenter 2. Validity of problem analysis and 3. Reliability of data along with acceptance of stakeholders. When considering with hypothesis, it could be separated into 3 cases; case 1: issue with low evidence base and many discourses resulting in mutual agreement/Operation that could diminish conflicts

to low level. Case 2: issue with moderate evidence base and moderate discourse resulting in mutual agreement/operation that could reduce conflicts at moderate degree and for case 3: issue of many evidence bases along with many discourses resulting in mutual agreement/operation that could mitigate conflicts at high level

.

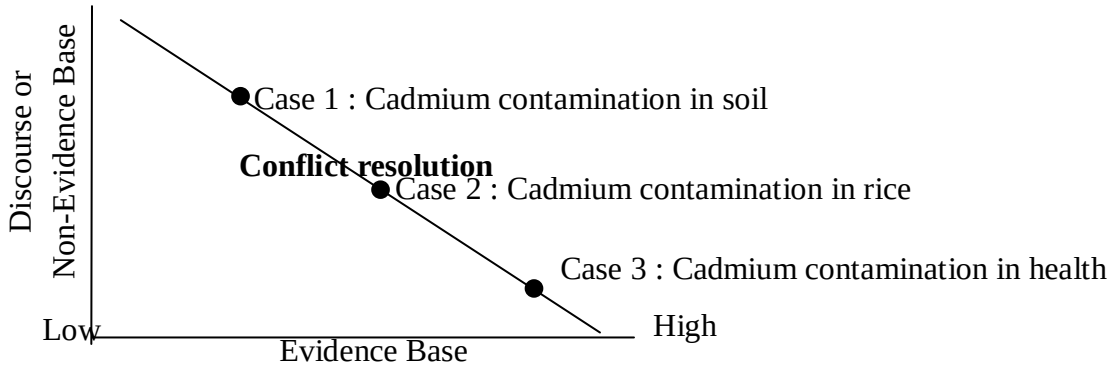

Figure 2 3 Case Studies and Evidence Base with Discourse (Non-Evidence Base)

Problems, Conflict Management and Result in case of Cadmium Contamination in Mae Tao Watershed

Origin and Features of Conflicts

During 1998 -2003, International Water Management Institute : IWMI cooperated with Department of Agriculture to study cadmium contamination in soils and agricultural crops in area of Mae Tao Watershed, Mae Sod District, Tak Province and found that quantity of cadmium in soils was higher than European Standards and 80% of rice samples surveyed in such area had higher cadmium than Standards of Japan and Food and Agriculture Organization of United Nations so it was not suitable for consumption as it possibly caused danger to health.

In December 2003, International Water Management Institute presented the results of study to Ministry of Natural Resources and Environment and then in January 2004, Ministry of Natural Resources and Environment appointed special commission team to solve problems of cadmium contamination in Mae Tao Watershed, Mae Sod District, Tak Province. This team surveyed such area and presented to Ministry of Natural Resources and Environment to find solution; the result of surveying agricultural areas found that soil in the paddy field had higher cadmium than European Standard (3 milligram/kilogram). In terms of agricultural products, it was found that rice which is major crop in local area had cadmium beyond the European standard (0.2 milligram/Kilogram) and that would had impact on health, sanitation. From examining health of 7730 population in the contaminated area, it was found that about 10% had higher cadmium than normal level which were needed to monitor and follow up for healthcare.

Since December 2004, mass media published news of cadmium contamination in Mae Tao Watershed and this affected confidence of foreign countries toward rice export of Thailand resulting in concern among people in area that utilized land to grow rice including contaminated paddy and cadmium level in body and this extensively caused panic in society which also affected rice export level of Thailand as well as relevant academic circle and government sectors.
After that, many studies were conducted in area and found that the report of relevant academic institutions and government sector concluded origin of cadmium with 2 concepts which were 1. Natural process and 2. Human activities such as stripping without sediment control measures.

From studying, it could not be confirmed the amount of cadmium contaminated in rice and food plants; the government needed to order farmers not to grow food plants during first 2 years (2004-2008) and the government must consider total affected area from route of Mae Tao Creek in area 3; districts were Phra That Pha Dang, Mae Dang, Mae Ku consisting of 12 villages with total area of 13,237 rai and 14,398 population in 7,532 households.

According to the study of conflicts in case of cadmium contamination in Mae Tao watershed in the past 10 years (2004-2014), it was found that a problem related to many fields of science, importantly, in terms of economy, society and environment. There was an issue of cadmium contamination in Mae Tao Watershed that was mutually associated with other parts of the ecosystem such as, water in Mae Taostreams, underground water, sediment in Mae Taostreams, soil in paddy, soil in mines, agricultural plants (rice, peanut, onion, garlic), aquatic animals in Mae Tao streams and health(Itai-Itai disease, accumulation in bones and kidneys), etc.

To be able to analyze and visualize situation of conflicts based on Evidence Base Search to solve conflicts, the researcher presented 3 cases study from affected area or sources with cadmium contamination which are 1) cadmium contamination in paddy's soils 2) cadmium contamination in agricultural products which the only case of cadmium contamination is in rice and 3) human' health to be considered in case of the fact that cadmium caused people in community sick of Itai-Itai disease until death.

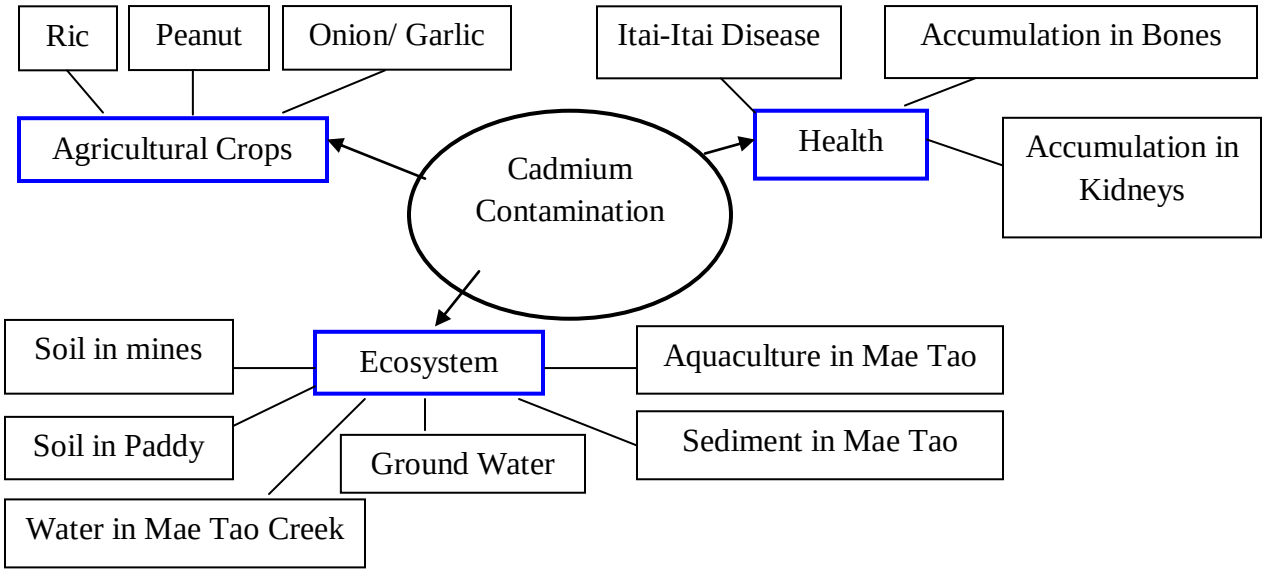

Figure 3 Issues relevant to Cadmium Contamination in Mae Tao Watershed

Evidence Base Evaluation

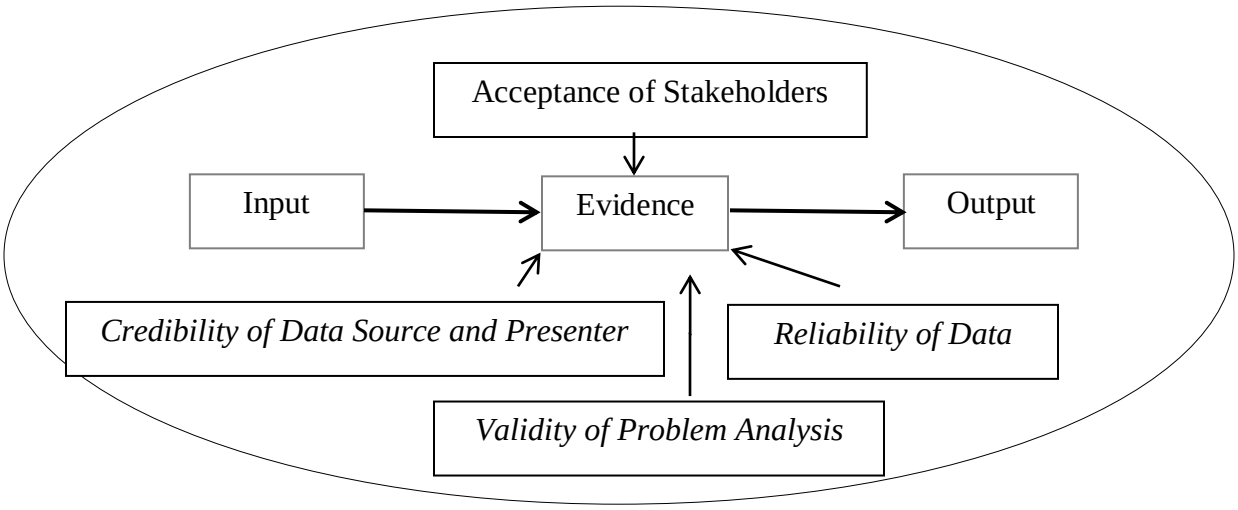

Figure 4 Elements of Evidence Base Evaluation

Evidence Base evaluation needs to be considered with following criteria 1) completeness of evidence and 2) elements of evidence base used to verify conflicts of 3 dimensions which are 1. Credibility of sources and data presenter 2. Validity of problem analysis and 3. Reliability of data. Then, it would be considered to accept results gained from evidence by 3 groups of stakeholders (Mining Project, Community and Government Sector)

Result of Evidence Evaluation based on Evidence Base Search

When evaluating evidence with completeness of evidence and elements of evidence base to prove conflicts with 3 dimensions which are 1. Credibility of source and data presenter 2. Validity of problem analysis and 3. Reliability of data and acceptance of evidence result (as shown in the table 1-4) to explain existence and absence of conflicts of 3 case studies, it was found that when stakeholders of 3 sides confronted and fought with each other with power of truth of story happening in area (evidence base), case 1 has not been resolved (some villagers still believed that mining resulted in cadmium contamination in soils, so, they still wanted mining undertakers to pay recompense and have not realized level of cadmium contamination in their own farm because results of contamination zoning derived from many sources). If there is stimulant in such issue, it will cause recurrence of conflicts. Case 2 has partial resolution (some villagers stopped growing rice in contaminated area and the rest still turned to grow rice in the same area before there was news related to this issue published in 1997); if there is stimulant of some issues that have not had resolution yet, conflicts will be recurrent and for case 3, it has resolution relevant to cadmium contamination in urine of people residing around Mae Tao Watershed; nevertheless, it could not be developed to cause Itai-Itai disease like the case of cadmium contamination in Jinzu River, Japan; but to continually search for truths and knowledge, Mae Sod Hospital has traced the result of cadmium accumulation in kidneys and bones of people who had high cadmium in urine so as to further monitor events of cadmium accumulation in human's body.

Table 1 Evidence-Base Evaluation in the case study 1**:** Cadmium contamination in soil

Acceptance of Stakeholders	Non evidence base	Partly evidence base	Mainly evidence base	Complete evidence base
High	0 (0.00)	0 (0.00)	1 (3.33)	8 (26.67)
Medium	2 (6.67)	4 (13.33)	8 (26.67)	5 (16.67)
Low	0 (0.00)	0 (0.00)	2 (6.67)	0 (0.00)
	2 (6.67)	4 (13.33)	11 (36.67)	13 (43.33)

Table 2 Evidence-Base Evaluation in the case study 2**:** Cadmium contamination in rice

Acceptance of Stakeholders	Non evidence base	Partly evidence base	Mainly evidence base	Complete evidence base
High	0 (0.00)	0 (0.00)	1 (5.26)	3 (15.79)
Medium	2 (10.53)	4 (21.05)	6 (31.58)	3 (15.79)
Low	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
	2 (10.53)	4 (21.05)	7 (36.84)	6 (31.58)

Table 3 Evidence-Base Evaluation in the case study 3**:** Cadmium contamination in human health status

Acceptance of Stakeholders	Non evidence base	Partly evidence base	Mainly evidence base	Complete evidence base
High	0 (0.00)	0 (0.00)	1 (4.76)	8 (42.86)
Medium	2 (9.52)	4 (19.05)	3 (14.29)	2 (9.52)
Low	0 (0.00)	1 (4.76)	2 (6.67)	0 (0.00)
	2 (9.25)	5 (23.81)	6 (19.05)	10 (52.38)

Discussion

To resolve conflicts between stakeholders from economic development project with instruments and methods currently used such as fight with legal power, government's power, power from public aggregation, decision by middle-man or arbitrator cannot explain existence or absence of conflicts; whereas, theory of searching evidence base could clarify the existence and absence of the said 3 conflicts. Although such theory expresses explanation, to manage conflicts with evidence base needs consideration in 3 dimensions which are 1) Completeness of evidence 2) Element of Evidence Base consisting of 1. Credibility 2. Validity and 3. Reliability including acceptance of stakeholders depending on stakeholders or mediators who would consider evidence base for a negotiation.

Recommendation

Using evidence base solution as instruments or power to manage different conflicts depends on difficulty and complexity of each conflict, nevertheless, evidence base solution cannot be used to manage total conflicts but according to theories discovered in this study, the more we increase evidence base, the more conflicts (from these 3 case studies) can be resolved as represented in figure 5.

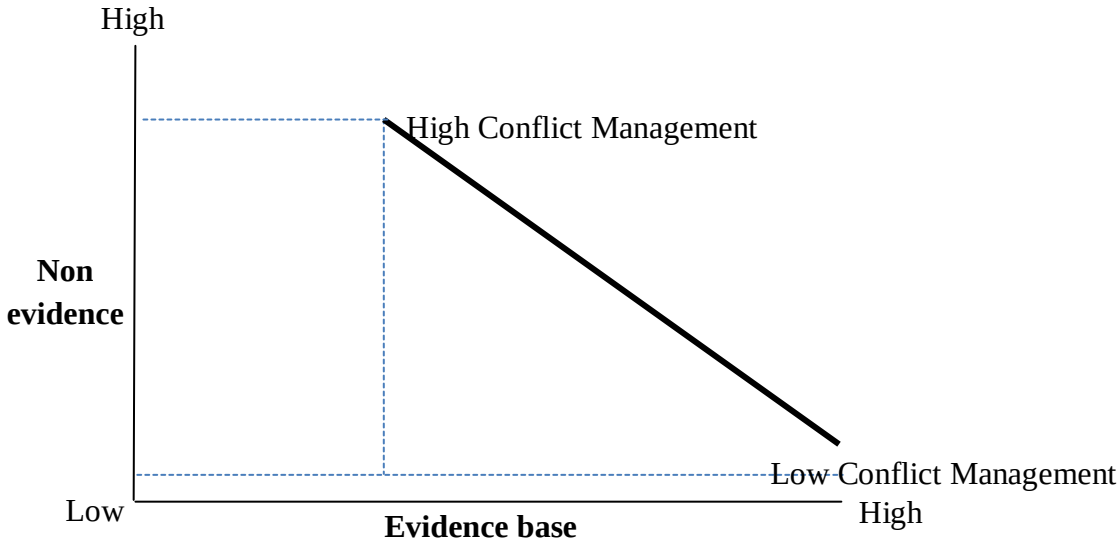

Figure 5 Result of Conflict Management with Evidence Base

Reference

ASEAN Institute for Health Development. 2004. **Report on the Solving of the Cadmium Contamination in the Area of Huai MaeTao.** Tak: Pollution Control Department, Ministry of Natural Resource and Environment.

Charoensin-oran, C. 2011. **The Discourse of Development: Power, Knowledge, Truth Identity and the Other**. Bangkok: Viphasa Press.

Ganjanapan, A. 2000. "The Access Right in Resource: Studies Status about how to think." in **Dynamics of Community in Resource Management: Paradigm and Policy.** Bangkok: Thailand Research Fund, pp. 25-88.

Jirapatpimon, B. 2004. **Industrial Sociology**. Chiang Mai: Department of Sociology and Anthropology. Faculty of Social Sciences Chiang Mai University

Padaeng Industry. 2011. **Report of Analysis and Environmental Impact Assessment and Health, Zinc mining project of Padaeng Industry Company Limited.** Tak: Padaeng Industry Company Limited.

Prabudhanitisarn, S. & Dontree, S. 2002. **Problems of Land Use and Sustainable Natural Resource Management in Community Level, Long Watershed, Song District, Phrae Province.** Chiang Mai: Kanaeungnit Printing.

Rattanpienthamma, W. 2005. **The Environmental Management**. Bangkok: Wattana Panich.

Tak Province. 2004. **Report of the study of Cadmium Contamination in the Area of Huai MaeTao, Mae Sot district, Tak Province**. Bangkok: Natural Resources and Environment, Tak Province.

Veerawattananon, V. 1998. **Environment and Development.** Bangkok: Faculty of Education, Srinakharinwirot University.

Wittayapak, C. 1999. **Three Decades of Community Forest among the Confusion of Thai Society**. (Book of the General Assembly of Community Forest in the North on 14-15 January, 1999 at Baan Tung Yao Community Forest).