JICA Research Institute

JICA-RI Working Paper

Improving Environmental and Social Considerations of JICA at the Planning Stage

A Quantitative Text Analysis of the Minutes from the Meetings in Public Involvement: A Case of a Bridge Project in Cambodia

Tetsuya Kamijo and Guangwei Huang

No. 111

January 2016

JICA Research Institute

JICA Research Institute

JICA Research Institute
10-5 Ichigaya Honmura-cho
Shinjuku-ku
Tokyo 162-8433 JAPAN
TEL: +81-3-3269-3374
FAX: +81-3-3269-2054

A Quantitative Text Analysis of the Minutes from the Meetings in Public Involvement: A Case of a Bridge Project in Cambodia

Tetsuya Kamijo[*] and Guangwei Huang[†]

Abstract

Previous studies of public involvement in environmental impact assessment were mainly analyzed qualitatively, but quantitative text analysis is developing and being applied to social research. The study examined public involvement by applying quantitative text analysis to the minutes from the meetings of a bridge project in Cambodia. Results of the analysis showed that the discussion about the environmental impacts and alternatives analysis was limited. The study concluded that good and understandable meeting materials, facilitation of discussions, and meetings at an early stage could be key components to improve public involvement, and that good public involvement could rest upon environmental and social awareness of project proponents. Finally the quantitative text analysis showed a valid analysis tool for public involvement. Further research is required to analyze public involvement using quantitative text analysis, focusing on high- or low-interest items to local people, alternatives analysis, and comparisons to other projects.

Keywords: public involvement, environmental impact assessment, quantitative text analysis, minutes from the meetings

[*] Senior Advisor to the Deputy Director, JICA Research Institute (Kamijo.Tetsuya@jica.go.jp)
[†] Professor, Graduate School of Global Environmental Studies, Sophia University (huang@genv.sophia.ac.jp)

The authors sincerely thank the two anonymous reviewers for their valuable comments and suggestions.

Introduction

Public involvement is an integral part of environmental impact assessment (EIA), and Abaza, Bisset, and Sadler (2004) pointed out that timely, well-planned and implemented public involvement and consultation programs contributed to the successful design, implementation, operation and management of proposal actions (66). According to James L. Creighton (2005), benefits of public participation were: improved quality of decisions; minimizing cost and delay; consensus building; increased ease of implementation; avoiding worst-case confrontations; maintaining credibility and legitimacy; anticipating public concerns and attitudes; and developing civil society. But this list was based on his experiences with approximately three hundred public participation cases. The empirical research on the benefits of public participation has been limited until recently (18-19).

Previous studies about public involvement in EIA are mainly qualitative, and point out constraints and proposed countermeasures within that scope. It is difficult to determine how quoted passages catch the attention of analysts or whether they are in fact typical. Quantitative text analysis (QTA), which organizes or analyzes text data quantitatively, is developing and applied to social research. Generally, the quantitative analysis has merits because the analysis methods are systematic, objective, replicable, and valid. Ideally, the quantitative analysis should be used alongside qualitative analysis to grasp not only the whole picture of public involvement but also the people's more specific concerns about the project. The study about public involvement should take advantage of QTA to get new, credible, and valid knowledge to improve public involvement in EIA. This study examined public involvement by applying QTA to the minutes from the meetings of a bridge project in Cambodia for the purpose of acquiring a quantitative understanding of public involvement, focusing on specific subjects of examination, proposing countermeasures and verifying the validity of this analysis method.

1. Literature review

Numerous studies pointed out institutional constraints on implementing public involvement in EIA. Kakonge (1996) explained some concrete constraints, which were: a lack of a legal framework, inadequate government capacity to foster public participation, a lack of transparency, and late preparation of EIA (311-313). Purnama (2003) stated that a critical constraint on public participation in Indonesia was the lack of a formal participation culture and clear representational structure in the community (436-437). Doelle and Sinclair (2006) revealed that a fundamental problem was the lack of recognition of the need for early and ongoing participation and a lack of openness to rethink a project. Okello et al. (2009) indicated that the EIA regulations of public participation in Kenya were good but the practice was poor even though the public had considerable interest in EIA (223). Wilklund (2011) noted a lack of understanding of the process, expertise, and trust (171-172). Lawal, Bouzarovski, and Clark (2013) gave four explanations for the lack public participation in Nigeria: quasi-participation, oil companies hiring people to support their project, inadequate methods for making EIA reports available to the public, and insufficient number of days for the public to lodge complaints, and further pointed out that the lack of funds and value attached to public well-being and the environment had contributed negatively to the effective implementation of public involvement (230-231). Chi, Xu, and Xue (2014) reported that the role of public participation in China remained limited and a lack of participation channels and project information, and the absence of transparent and proper process were identified (1422).

Solutions to low public involvement have been proposed. The World Bank (1993) explained the characteristics of effective consultation are the wide dissemination of information before consultation, the use of two-way communication with wide samplings of affected people, provisions of feedback on results of consultations to participants, and modifications of project (6). Rajvanshi (2003) recommended public involvement at an early

stage, including the incorporation of public views in the impact identification and analytical phases of the EIA (315). André et al. (2006) introduced operating principles for public participation. Public participation should be: initiated early and sustained; well planned and focused on negotiable issues; supportive to participants; tiered and optimized; open and transparent; context-oriented; and credible and rigorous (2-3). Momtaz (2006) learned from the experience of Bangladesh and focused on the important role of NGOs in organizing local people for involvement in the decision making process and donor agencies in supervising the process (93-94). Nadeem and Fischer (2011) recommended enhancing the effectiveness of public participation by applying a more proactive approach before site selection (36). Roach (2013) identified ways in which EIA practitioners could seek to improve communication to enable better public understanding (225). To and Chung (2014) recommended embracing Web technologies to enable the public to participate in making crucial decisions in EIA (10).

There are also researchers focused on public understanding, public concerns, and the meaning of public involvement. Sullivan et al. (1996) examined the public understanding of an environmental impact statement (EIS) in the United States and found a poor level of understanding (171). Sinclair and Diduck (2000) explored the public involvement in EIA of a hydro power development in India and found that public concerns focused on safety issues (blasting) and new road construction and jobs, with little consideration of environmental impacts (63). Glucker et al. (2013) reviewed a range of EIA literature and concluded that there was a broad consensus that public participation is a key to effective EIA, but no consensus concerning the meaning, adequate breadth, or the objectives of public participation in EIA (109).

The research conducted so far has been qualitative. The quantitative research including a causal relationship between alternatives analysis and public involvement, and QTA of public discussion, is carried out recently. Mwenda et al. (2012) documented trends in public participation in Kenya using a consultation and public participation index and concluded the

relative low public participation within EIA. This is solely quantitative analysis about public involvement at the present. Kamijo (2015a) indicated a causal relationship between alternatives analysis and public involvement with a causal model with path coefficients. Kobayashi, Ohnuma, and Mori (2014) analyzed statements in group interview about energy-saving behavior in Japan using QTA and reported the qualitative change during a period of one year (42). Nakatani, Akemura, and Moriguchi (2014) analyzed the minutes of a conference of the Advisory Committee on Energy and Natural Resources in Japan before and after the Great East Japan Earthquake using QTA and reported that nuclear problems and the demand side of energy had separately been discussed, and power technologies were discussed after the disaster (113).

The literature shows many constraints on public involvement in EIA, such as the inaccessibility of information, a lack of familiarity with EIA and participation culture, passive attitudes of the public, and little consideration for environmental impacts. Suggestions for improvement proposed by the literature include involving the public at an early stage, highlighting public concerns, inviting the participation of NGOs, setting meeting places convenient for the public, and utilizing a website. However most of the previous studies are qualitative and don't show any objective evidence for these conclusions. The minutes from the meetings attached to EIA reports, which have never been analyzed, could be valuable information to understand the overview of public involvement including constraints and countermeasures. Accordingly this study used QTA to analyze the minutes from the meetings, in order to understand the quantitative overview of public involvement, obtain knowledge to improve its process, and to demonstrate the validity of this analysis method.

2. Data and methods

2.1 Second Mekong bridge project in Cambodia

The Japan International Cooperation Agency (JICA), which assists and supports developing countries as the executing agency of Japanese official development assistance (ODA), began applying guidelines for environmental and social considerations to development projects in April 2004. In particular, a screening to classify projects into three categories, analysis of alternatives, information disclosure, and public involvement were institutionalized (JICA 2010). The JICA conducted the feasibility study on the second Mekong bridge project in Cambodia from April 2004 to March 2006, in response to the request from the Royal Government of Cambodia (JICA 2006). The above-mentioned JICA guidelines were applied to this study. The bridge was completed in April 2015 with the grant assistance of Japan.

The minutes from the meetings for this project were analyzed for this study. There were two reasons for the choice of this project. First, the minutes from meetings to be analyzed by QTA were available, with fully transcribed statements of speakers in accordance with the order of speech. Second, the institutional constraints on public involvement were improved in collaboration with JICA, suggesting that the analysis of the process might yield some new findings. Practically the meetings were well-prepared and executed. The meeting's materials were prepared in the local language, and disseminated near the project site and through a website; many categories of stakeholders participated in meetings including local people, minorities, representatives from NGOs, the ferry service, a university, the media, and the private sector, in addition to the Ministry of Public Work and Transport (MPWT), which was a proponent of the project. Meetings were held 15 times in total at Phnom Penh and the project site. The JICA participated in all meetings in a supervisory role, and environmental impacts and alternatives analysis were explained to local people by the MPWT and consultants.

Prior to the construction of the bridge, a ferry service was the only available method to

cross the Mekong river at Neak Loeung, about 50 kilometers south-east from Phnom Penh; cars waiting for the ferry crossing at Neak Loeung caused traffic on the National Road No. 1. During busy seasons cars had to wait for up to seven hours to board a ferry. Neak Loeung encompassed six communes and 16 villages, with approximately 7,500 households. The project proponents (the MPWT and consultants) compared three bridge routes (A, B and C) and selected the route A before public discussions. The four options for improving transportation that were analyzed and discussed included no action, ferry improvement, bridge construction (route A), and ferry improvement plus bridge construction (route A). The alternatives analysis technique was an analytic hierarchy process (AHP) that compared 13 criteria: stability, safety, sustainability, traffic demand, investment efficiency, regional economy, noise and vibration, traffic accidents, other environmental impacts, resettlement, land use, local livelihoods, and other social impacts. The option of ferry improvement plus bridge construction (route A) was selected after public involvement, and the AHP score was .500. The second, third and fourth options were a bridge (route A), ferry improvement, and no action, with AHP scores of .235, .196 and .069 respectively.

Stakeholder meetings were held at three stages from May 2004 to January 2006 at Phnom Penh and Neak Loeung (the project site), with a total of more than 1,596 participants representing many stakeholders (Table 1). The first stage explained the project and public consultation process, and discussed the scope of the environmental and social consideration study (ESCS). The second stage discussed alternatives analysis including alternatives, criteria, and AHP; selected the best option; and discussed the scoping of the initial environmental examination (IEE) level study and explained its result. The third stage discussed the EIA level study and an outline of the resettlement action plan (RAP). The information about each agenda was prepared, translated into the Khmer language, and disclosed at commune offices near the project site and the MPWT in Phnom Penh, and delivered at meetings and individually on demand. Information was also available through a website in English and Khmer. The

government, university, and private sector stakeholders participated in meetings at Phnom Penh, and local people and minorities participated in meetings at Neak Loeung. NGOs and members of the media also participated. The MPWT encouraged local people to participate by sending invitation letters.

Table 1. An overview of stakeholder meetings

Stage	Date and place	Agenda	Attendance and stakeholders
1st stage	May 24, 2004 Phnom Penh	Outline of project and ESCS, JICA ESC guidelines, public consultation process, and scope of IEE and EIA level study	142 (MPWT, ministries and agencies, local governments, communes, Neak Loeung ferry, NGOs, universities, private sector, embassies, JICA)
	June 21, 2004 Neak Loeung		107 (MPWT, ministries and agencies, 76 local people, Neak Loeung ferry, NGOs, JICA)
2nd stage	Oct. 7, 2004 Phnom Penh	Alternatives analysis method, final scoping of IEE level study, and regional development scenario	71 (MPWT, ministries and agencies, local governments, Neak Loeung ferry, universities, media, donors, embassies, JICA)
	Oct. 28, 2004 Neak Loeung		55 (MPWT, 41 minorities (39 Vietnamese and two Muslims), NGOs, JICA)
	Dec. 27, 2004 Phnom Penh	AHP, alternatives, criteria, and interim result of IEE study	83 (MPWT, ministries and agencies, local governments, communes, Neak Loeung ferry, NGOs, universities, media, donors, private sector, JICA)
	Dec. 28, 2004 Neak Loeung		132 (MPWT, 79 local people, two Chams, JICA)
	Mar. 10, 2005 Phnom Penh	Best option selected, final result of IEE study, and consensus process	Not available
3rd stage	June 3, 2005 Phnom Penh	Outline and scoping of EIA level study and public consultation of RAP	82 (MPWT, ministries and agencies, local governments, communes, Neak Loeung ferry, universities, media, donors, private sector, embassies, JICA)
	June 7, 2005 Neak Loeung		114 (MPWT, ministries and agencies, 98 local people, NGOs, JICA)
	June 8, 2005 Neak Loeung		Over 100 (MPWT, 100 local people, JICA)
	July 11, 2005 Neak Loeung		Over 172 (MPWT, 172 local people, JICA)
	Sep. 20, 2005 Phnom Penh	Interim result of EIA level study, preliminary bridge design and outline of RAP	92 (MPWT, ministries and agencies, local governments, communes, Neak Loeung ferry, universities, media, donors, private sector, JICA)
	Sep. 21, 2005 Neak Loeung		Over 122 (MPWT, 122 local people, NGOs, JICA)
	Jan. 24, 2006 Phnom Penh	Final results of EIA level study, feasibility study including bridge design, and a draft framework of RAP	83 (MPWT, ministries and agencies, communes, Neak Loeung ferry, universities, embassies, JICA)
	Jan. 29, 2006 Neak Loeung		Over 240 (MPWT, ministries and agencies, 240 local people, JICA)
	Total		Over 1,595

Source: Data from JICA 2006.

Minority people (3,449 Vietnamese and nine Cham) lived in the area affected by the project, and the MPWT held meetings for minority groups three times in October and December 2004, and March 2005. The MPWT invited NGOs to stakeholder meeting in Phnom Penh including the NGO Forum, Cambodian Cooperation Committee, Resettlement Action Network, and Mekong Watch. The presentation was made using PowerPoint and a simultaneous interpreter between Khmer and English was arranged. The meeting was recorded in its entirety and transcribed fully, and the minutes from the meeting were prepared and disclosed to the public at commune offices and the MPWT. When the option of ferry improvement plus bridge construction (route A) was selected at the stakeholder meeting in March 2005, the MPWT invited public comments for one and a half months and received 22 comments (17 communes, one private company, one university, one NGO, and two government organizations). The main comments about the selected option were: a schedule of construction, mitigation measures for resettlement, bidding system, and the vessel clearance of the bridge 37.5 meters high over the maximum water level in the rainy season.

2.2 Quantitative text analysis

The minutes from meetings were changed to text data and analyzed using QTA via KH Coder, free analytical software (Higuchi 2014). The QTA is a method of content analysis that organizes or analyzes text data using quantitative analysis methods. This is in contrast to the qualitative analysis method often employed, in which analysts quote typical passages from the original data and interpret them. In this method, it is difficult to determine how quoted passages catch the attention of analysts or whether they are in fact typical. The QTA, on the other hand, provides a quantitative overview of text data that accounts for quoted passages. Another benefit of the method is that it allows analysts to search the data and find potential problems overlooked or hardly noticed by a normal reading of the text. The method is limited

in that it can be difficult to grasp very subtle matters.

The KH Coder not only counts a term frequency (TF) of a word but also shows the hierarchical cluster analysis (HCA) by Ward's method using the Jaccard distance, characteristic words for each stage of meetings using the Jaccard similarity coefficient, and an appearance ratio for each coding focused on a specific subject. The idea of HCA is to build a binary tree of the data that successively merges similar groups of points; visualizing this tree provides a useful summary of the data. According to Romesburg (1984), Ward's method is one frequently used method of HCA. The Jaccard similarity coefficient is a statistic used for comparing the similarity of sample sets. The coefficient takes a value between from zero to one, approaching one as sample sets are shown to be more similar. The Jaccard distance, which measures dissimilarity between sample sets, is complementary to the Jaccard similarity coefficient and is obtained by subtracting the Jaccard coefficient from one. Characteristic words are ones that have a high probability of appearing at each stage compared with the entire data. The appearance ratio is calculated by dividing the number of paragraphs in which a specific coding appears by the total number of all paragraphs.

First the 150 words that appear most frequently were extracted and were the analysis target data for this study. Then the HCA was conducted to search for main topics of discussion. The ten characteristic words of each stage including as many coding related words as possible were selected and helped to clarify the meaning of each stage. Finally coding rules were prepared to focus on specific subjects and an appearance ratio of six codings consisting of two sets of three codings (environmental issues, social issues, development issues, impact, compensation, and alternative) was indicated at each stage. The three codings from the first set were environmental, social, and development issues. These were chosen in order to compare the portion of discussion about environmental issue with the other two issues in order to examine the balance between the three components of sustainable development. The three codings from the second set were impact, compensation, and alternative. These codings indicated how much

environmental impacts were considered compared with social impacts and compensation as well as how much alternatives were discussed. Previous research mentions that local people tend to show more interest in social impacts than environmental impacts, and there may be a causal relationship between alternatives analysis and public involvement. To carry out detailed analysis of the reaction of a stakeholder in regard to the three codings of impact, compensation, and alternatives, the number of paragraphs in which each category of stakeholders spoke was counted (local people, MPWT, a consultant, a NGO, an university, a commune, a facilitator, business, a district, and others). Furthermore specific impact items were picked up at each stage to understand the interests of each stakeholder. Articles, pronouns, figures, punctuation marks, and so on were excluded from the analysis as they are unnecessary words.

3. Results

3.1 The top 150 words and the hierarchical cluster analysis

The top 150 words and their TF were shown in Table 2. Words used to describe the project, such as “people” (276 times), “construction” (210 times), “government” (142 times), and “JICA” (114 times) appeared very often. Words to express inquiry or explore the project’s influence, such as “question” (118 times), “affect” (109 times), and “impact” (103 times) also appeared frequently. In addition the word “compensation” (62 times), which local people were very interested in, also appeared. The HCA showed 12 clusters of related words (Table 3), which were interpreted as the main topics of discussions. The number of clusters was set at 12 in order to allow for easier interpretation of the meaning of each cluster; an increase in the number of clusters would have made this more difficult. Words that were spelled the same but that conveyed different parts of speech were counted separately. For example the word “work” was counted as both a noun and a verb in cluster five; the word “future” also was also counted twice as a noun and an adjective in cluster seven.

The meaning of each cluster was interpreted by taking into account the words included in its cluster. For example in cluster number one words related to compensation were gathered. In cluster number eight the word "plan" never appears, but this was interpreted as the meaning of the cluster based on the other words included. The twelve clusters were interpreted as compensation, construction, traffic, presentation, work, alternative, future, plan, resettlement, participation, question, and impact. The HCA avoided the preconceptions of an analyst as much as possible and helped to provide an overview of the discussion and suggest some topics for analysis.

Table 2. Top 150 words most frequently appearing

Words	TF	Words	TF	Words	TF	Words	TF	Words	TF	Words	TF
people	276	best	39	answer	25	business	18	future (adjective)	14	believe	11
construction	210	location	39	option	25	hospital	18	improve	14	clearly	11
government	142	money	39	work (verb)	25	policy	18	investment	14	different	11
question	118	meet	37	lose	24	work (noun)	18	invite	14	loss	11
JICA	114	social	37	route	24	committee	17	survey	14	Monivong	11
affect	109	presentation	36	answer	23	demand	17	technical	14	resettlement	11
impact	103	support	35	compensate	23	discuss	17	agreement	13	staff	11
cross	87	agree	34	lane	23	express	17	cambodian	13	stop	11
area	82	environmental	33	participant	23	feasibility	17	develop	13	tunnel	11
problem	82	worker	30	benefit	22	market	17	estimate	13	ADB	10
meeting	80	car	29	service	22	request	17	flood-free	13	aid	10
land	79	comment	28	understand	22	information	16	respond	13	evaluation	10
traffic	79	conduct	28	discussion	21	representative	16	advantage	12	expert	10
build	76	economic	28	hour	21	solution	16	course	12	financial	10
time	70	important	28	propose	21	water	16	difficult	12	jam	10
Cambodia	62	job	28	opinion	20	attention	15	environment	12	ngo	10
compensation	62	negative	28	villager	20	border	15	participate	12	official	10
Mekong	59	request	28	economy	19	company	15	past	12	participation	10
stakeholder	59	select	28	guideline	19	consider	15	region	12	positive	10
construct	50	alternative	27	increase	19	consideration	15	report	12	present	10
session	49	criteria	27	move	19	consultation	15	suggestion	12	process	10
need	46	find	27	sick	19	future (noun)	15	transportation	12	relate	10
house	44	solve	27	vietnamese	19	method	15	appropriate	11	save	10
cost	40	development	26	accident	18	relocation	15	base	11	sell	10
country	40	hear	26	avoid	18	village	15	behalf	11	truck	10

Source: Prepared by the author.

Table 3. Hierarchical cluster analysis for top 150 words

1. Compensation		3. Traffic		policy	18	Monivong	11	comment	28	transportation	12
affect	109	traffic	79	work (noun)	18			participant	23	appropriate	11
problem	82	car	29	committee	17	8. Plan		opinion	20	base	11
land	79	sick	19	market	17	cost	40	guideline	19	different	11
compensation	62	accident	18	company	15	economic	28	express	17	aid	10
house	44	avoid	18	technical	14	option	25	invite	14	relate	10
solve	27	hospital	18	agreement	13	benefit	22	cambodian	13		
answer	25	stop	11	past	12	understand	22	participate	12	12. Impact	
compensate	23	jam	10	clearly	11	propose	21	suggestion	12	impact	103
				expert	10	investment	14	loss	11	session	49
2. Construction		4. Presentation		official	10	flood-free	13	ngo	10	meet	37
people	276	presentation	36	present	10			process	10	social	37
construction	210	hear	26	save	10	9. Resettlement				environmental	33
government	142	service	22	sell	10	economy	19	11. Question		negative	28
JICA	114	hour	21			vietnamese	19	question	118	find	27
cross	87	villager	20	6. Alternative		feasibility	17	location	39	discussion	21
area	82	increase	19	best	39	water	16	conduct	28	consultation	15
build	76	discuss	17	select	28	attention	15	important	28	advantage	12
time	70	representative	16	alternative	27	border	15	route	24	environment	12
Cambodia	62	village	15	criteria	27	consideratior	15	answer	23	region	12
Mekong	59	difficult	12	method	15	develop	13	move	19	report	12
construct	50	tunnel	11	evaluation	10	course	12	request	17	behalf	11
need	46					resettlement	11	information	16	believe	11
country	40	5. Work		7. Future		ADB	10	solution	16	staff	11
money	39	support	35	lane	23	financial	10	consider	15	participation	10
agree	34	worker	30	demand	17			relocation	15	positive	10
request	28	job	28	future (noun)	15	10. Participation		improve	14	truck	10
development	26	work (verb)	25	future (adjective)	14	meeting	80	survey	14		
business	18	lose	24	estimate	13	stakeholder	59	respond	13		

Source: Prepared by the author.

3.2 Characteristic words of each stage

In order to analyze public involvement, a list of the top 10 characteristic words in each stage was identified, as indicated in Table 4. The number next to each word in the table was the Jaccard similarity coefficient listed in descending order. The words in the list had a high probability of appearing at each stage compared with the entire data. However, these were not merely words that appeared very often but that characterized each stage of meetings. Looking at three stages as a whole, six words appeared twice: the words “construction”, “JICA” and “compensation” appeared at the first and third stages; the word “impact” appeared at the first and second stages; and the words “government” and “question” appeared at the second and third stages. These six words may be more characteristic than other words. The actual meaning of QTA was confirmed by reading the sentences that included the characteristic words.

For example, after the project explanation by the MPWT during the first stage, one commune chief expressed a favorable opinion, one local person asked about compensation, and one NGO explained its participation in the project. The project appeared to have been generally supported while local people asked mainly about compensation, and NGOs joined the discussion. Their remarks were as follows. The characteristic words have been underlined.

MPWT: When our people learned that JICA would conduct a study on a construction of a bridge we received supports from more than a thousand families in the commune.

Local person: I want to ask the government about the compensation, whether it compensates the affected people or it financially supports them.

NGO: I would like to propose that Cambodian government and JICA could cooperate with NGOs to ensure the meaningful participation in the decision making. The alternatives to avoid the negative impacts should be considered.

Table 4. Characteristic words of 1st, 2nd and 3rd stage of meeting

1st stage meeting		2nd stage meeting		3rd stage meeting	
people	.127	cross	.072	government	.072
construction	.084	affect	.059	question	.057
build	.058	government	.059	land	.044
JICA	.055	meeting	.056	JICA	.044
impact	.050	question	.054	construct	.042
compensation	.042	impact	.051	traffic	.041
Mekong	.033	stakeholder	.049	Cambodia	.039
support	.027	problem	.047	house	.037
country	.027	best	.038	area	.036
conduct	.025	time	.037	compensation	.031

Source: Prepared by the author.

The MPWT and consultants explained the alternatives analysis and ESCS using a participatory approach during the second stage. Local people were still interested in the social impact and compensation. The remarks of the MPWT, consultants, and local people were reproduced below. The characteristic words have been underlined.

MPWT: We will decide the best alternative method to cross the Mekong river. So, we will examine the impacts...on each alternative method of crossing the river.

Consultant: More detailed study on the project impact will be analyzed. We want to share [results] with all the stakeholders to see who will be affected. The stakeholder meeting will be held two more times...to select the best solution to cross the river.

Local person: So social impact, I mean it affects the residence of the people. What is the compensation? How to compensate the people?

The MPWT and consultants explained the results of the ESCS during the third stage. A ferry company and local people were interested in compensation. Their remarks were below. The characteristic words have been underlined.

Ferry company: Does JICA or government have any compensation for losing jobs or business career?

Local person: I have some questions on the bridge construction to impact landowners.

Local person: I...request that the bridge...be constructed. On behalf of the Cambodians, I am very happy with the bridge...granted by the Japanese Government.

As stated above an outline of public involvement at three stages was developed by confirming characteristic words and analyzing the use of these words in the minutes. Through the statistical analysis of words identified automatically from the minutes from the meetings, a subjective sampling of words was avoided as much as possible and characteristic words were searched and presented. Next by creating coding rules an analysis was pursued focused on specific subjects.

3.3 Analysis of specific subjects

The appearance ratio of six codings was shown at each stage (Table 5 and Figure 1). According

to the coding rule, environmental issues were suggested by the words traffic, environmental, water, or environment; social issues by land, house, social, accident, relocation, or resettlement; development issues by economic, job, development, work, economy, market, or investment; impact by only the word impact; compensation by compensation or compensate; and alternatives analysis by alternative, criteria, or option. These words were selected from among the top 150 words.

Table 5. Appearance ratio of codings (Significant at *$p < .05$, **$p < .01$)

	Environmental issues	Social issues	Development issues	Impact	Compensation	Alternative	Number of paragraphs
1st stage	18 (24.3%)	17 (23.0%)	25 (33.8%)	15 (20.3%)	11 (14.9%)	2 (2.7%)	74
2nd stage	37 (20.2%)	48 (26.2%)	27 (14.8%)	30 (16.4%)	12 (6.6%)	40 (21.9%)	183
3rd stage	12 (5.3%)	33 (14.5%)	38 (16.7%)	14 (6.1%)	22 (9.7%)	5 (2.2%)	228
Total	67 (13.8%)	98 (20.2%)	90 (18.6%)	59 (12.2%)	45 (9.3%)	47 (9.7%)	485
Chi-square	27.17**	9.12*	13.64**	15.36**	4.39	49.73**	

Source: Prepared by the author.

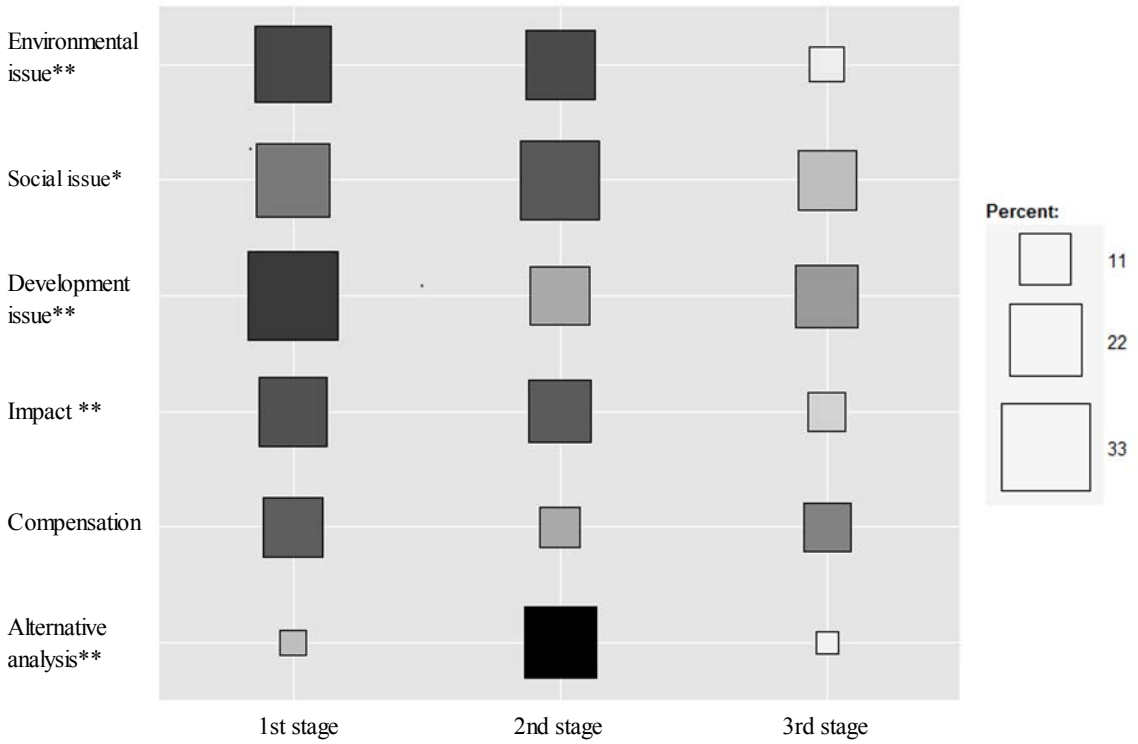

Figure 1. Appearance ratio of codings (Significant at *$p < .05$, **$p < .01$).

Source: Prepared by the author.

When the appearance ratio was higher than those at other stages the value was positive and the color became darker, and when it was lower the value was negative and the color became lighter. The appearance ratio of environmental issues was lower than that of social and development issues, and the specific environmental words were only traffic and water. On the other hand the specific social words were: land, house, accident, and relocation, and the specific development words were: economic, job, work, economy, market, and investment. The social and development interests appeared to be diverse and concrete. The environmental issues could be more limited and general than social and development issues. The appearance ratio of impact decreased as the stages went on. In the case of compensation the appearance ratio was not very different between the three stages, which meant that local people's interests in compensation continued to a certain degree even as the stage went on. Unlike these two codings, the appearance ratio of alternative increased rapidly at the second stage and decreased rapidly at the third stage. The MPWT and consultants explained alternatives, criteria and AHP technique intensively in the second stage, but local people's interests in alternatives appeared limited. Next, for the three codings of impact, compensation, and alternative, the number of paragraphs mentioned by each stakeholder category was counted (Table 6), and specific impact items were identified (Table 7). It could be seen through this that local people spoke frequently about compensation and social impact, and rarely about environmental impacts and alternatives, even though the information about adverse environmental impacts and alternatives was provided.

Table 6. Number of paragraphs mentioned by stakeholder category about three codings

Impact

	Local people	MPWT	Consultant	NGO	University	Commune	Others	Total
1st stage	2	4	1	3	1	1	3	15
2nd stage	10	9	3	0	1	1	6	30
3rd stage	10	4	0	0	0	0	0	14
Total	22	17	4	3	2	2	9	59

Compensation

	Local people	MPWT	Consultant	NGO	Commune	Facilitator	Business	Total
1st stage	5	5	0	1	0	0	0	11
2nd stage	8	2	0	0	0	0	2	12
3rd stage	6	10	2	0	2	2	0	22
Total	19	17	2	1	2	2	2	45

Alternative

	Consultant	MPWT	NGO	Local people	District	Facilitator	Others	Total
1st stage	0	1	1	0	0	0	0	2
2nd stage	17	10	1	1	1	1	9	40
3rd stage	4	1	0	0	0	0	0	5
Total	21	12	2	1	1	1	9	47

Source: Prepared by the author.

Table 7. Specific impact items referred by stakeholder category

1st stage	Local people (residence and livelihood), MPWT (land, house and livelihood), NGO (livelihood, traffic and accident), and business (air, accident, water and HIV/AIDS)
2nd stage	Local people (residence, land, business, job, water resource, fish, sedimentation, involuntary resettlement, local economy, and migration), MPWT (home, land, livelihood, smoke and noise), consultant (water resource, traffic, air, accident and river current), university (job), and others (traffic, cost, noise, smoke and houses)
3rd stage	Local people (economy, land, house, job and livelihood), and MPWT (land, house, job and asset)

Source: Prepared by the author.

The environment impacts were topics of interest at the meetings though the number of times it was brought up was limited. Two groups of villagers expressed concerns about river water pollution and fish cut by ferry propellers on October 7, 2004, and one environmental NGO asked for the environmental criteria for decision making on December 27, 2004. However the project proponents did not continue to discuss these topics. Regarding alternatives, local people did not appear to discuss them even though an alternatives analysis could be a tangible solution to avoid or minimize social impacts, or at least better explain decision-making. Only once during a meeting on October 28, 2004 in the second stage, a local person expressed an opinion about alternatives, saying, “When we have a bridge...[there will be] more cars and motorcycles and the atmosphere...[will be] polluted, however, the bridge is [the] best option.”

NGOs commented twice about alternatives, first stating on May 24, 2004, “The alternatives to avoid the negative impacts should be considered.” In a second comment on December 27, 2004 about criteria, the representative from the NGO insisted that criteria were different depending on the evaluator; for example the consultant engineer criteria and the environmental NGO criteria were different. The MPWT responded to the question of who would decide on the criteria, explaining that priority would be placed on the economic criteria.

4. Discussion

4.1 Reflecting environmental impacts on decision making

The study showed clearly that local people were very interested in social impacts related to involuntary resettlement and compensation, and less interested in environmental impacts, even though adverse environmental impacts were explained to them. This would be of interest to project proponents such as donors and consultants as it suggests that future public engagement efforts should be amended, perhaps to focus more on how the environment underpins social and economic factors. Two groups of villagers expressed concerns about river water pollution and fish cut by ferry propellers and one environmental NGO asked about the environmental criteria that would be used for decision making. But their opinions were not talked about. The project proponents might not have regarded these environmental issues as important or might not have been prepared to discuss them. But it was certainly true that there were stakeholders who were interested in the environment. If the project proponents had dug a bit deeper into the problems of river water quality and fish, their remarks would have provided good opportunities to discuss environmental impacts and reflect on the decision making. A wide range of environmental information and specific opinions and concerns should be collected from environmental NGOs, local people, and other stakeholders in advance and proposals to address these opinions and concerns should be prepared before discussion. Local people appear to have

generally supported the project. Given the inconvenience of having only a ferry service, it is not surprising that the bridge project was very attractive for many of them. Even under those circumstances project proponents should plan a way to reflect environmental impacts on decision making.

4.2 Selecting a good alternative

Local people appeared to show little interest in alternatives to the project. The US Council on Environmental Quality calls the alternatives "the heart of the environmental impact statement (EIS)" (n.d., 15). In this case the MPWT and consultants prepared and explained information on alternatives, criteria, and AHP, including the best option and its rationale on December 27, 2004. Representatives from one environmental NGO asked about criteria, but a consultant did not reply to their questions and instead changed the topic by inviting opinions about factors that participants put a high value on. The consultants provided local people with a briefing session on AHP for deeper comprehension of the process, but local people did not seem to ask any question about options, or a selected option and its reasons. The AHP is a common multi-criteria method using a pair-wise comparison, and is a useful technique that utilizes the experience and values of the evaluators. While EIA practitioners were very familiar with the method, it was probably difficult for local people to understand a pair-wise comparison and calculate scores. Consequently alternatives and criteria prepared by the consultants were not modified and one alternative was selected. The AHP scores of the selected option and the second one were .500 and .235 respectively. The selected option held the first place in 11 out of 13 criteria. The difference was clear at a glance and no opinions appeared to be given. The only concrete environmental criterion was noise and vibration. According to the study result, the impacts of soil and sedimentation, and flora and fauna were bigger than noise and vibration. Those impact items also should have been included in criteria. If the five options of a bridge

route A, a bridge route B, a bridge route C, a ferry improvement, and no action were open to discussion including soil and sedimentation, and flora and fauna, the local people might have discussed alternatives. A judgment of experts is one solution but is not always the best option. Others experts may propose other alternatives and criteria.

What should EIA practitioners do to improve the likelihood of selecting a good alternative? Steinemann (2001) stated that more environmentally sound alternatives could be overlooked before the formal analyses in EIA and inadequate alternatives could undermine the goals of EIA (3). Smith (2007) examined Federal Court of Appeal decisions on challenges to alternatives analyses that were contained in federal agency documented and reported that federal agencies had not included a full, reasonable range of alternatives and had improperly constructed the purpose of, and need for, their projects (126). One proposal is to use related ideas from environmental and social NGOs and other stakeholders to prepare and show a wide range of alternatives and criteria to be analyzed at an early enough stage that alternatives and criteria could be modified. Another is to use an easily understandable comparative analysis technique to display the alternatives and their distinctions simply and objectively so that local people can understand points of discussion and give their opinions. The representative from the environmental NGO who asked a question about criteria provided a good opportunity to reflect on the use of alternatives analysis. Reflecting opinions of stakeholders could improve the quality of the decision, and maintain the credibility and legitimacy of the project. It is not difficult to add new criteria and options, evaluate them and select the best option, and it would be regrettable not to incorporate these comments in the future. The World Bank (1996) explained the comparative assessment of alternatives. “The objective of comparative analysis is to sharply define the merits and demerits of realistic alternatives, thereby providing decision makers and the public with a clear basis for choosing between options. The key challenge...is to show distinctions objectively, and as simply as possible. The adoption of unnecessarily complicated techniques can confuse decision-makers

and exclude the public from effective participation" (8).

Kamijo (2015b) proposed the principal component analysis (PCA) as an alternative assessment technique in comparison to AHP, a weighted summation, a summation without weighting, a score method, and a qualitative analysis in five respects: option discussion; definition of merits and demerits of alternatives; arbitrariness of an evaluator; countermeasures for a high correlation between criteria; and ease of use (38). The PCA is a common statistical technique and transforms a number of correlated variables into a smaller number (two or three in many cases) of principal component (PC), so that alternatives are compared on scatter diagrams with one PC on the X axis and the other PC on the Y axis, and comparison is facilitated. The alternatives analysis, that has a suitable number of credible alternatives and criteria, that the public can genuinely have an influence, and that is all communicated better, needs to be explored in the future.

4.3 Improving the process of public involvement

Public involvement in this bridge project was improved with JICA assistance such as information dissemination, meetings at the project site, and participation of many kinds of stakeholders. The information was translated into the Khmer language; it was provided near the project site and on a website; the eight meetings at three stages were held at the project site addressing more than 1,595 participants in total. NGOs and media also attended, which helped increase transparency and garner support from local people. To summarize the public involvement of this project, the MPWT and consultants explained the project outline and ESCS to local people, who generally supported the project and requested social impact compensation. Although necessary actions for improvement were taken, the discussion was somewhat one-sided and not as active as it might have been. It is possible that local people did not understand the contents of discussions very well—possibly because the messages were

overly technical—-or that the dates of meetings were too late to have a real influence on decision making.

What should EIA practitioners do to improve public involvement? The previous studies showed that constraints on public involvement included a lack of familiarity with EIA; low institutional capacity; a lack of a formal participation culture; a lack of trust; and a lack of openness to rethink a project. Sullivan, Kuo, and Prabhu (1996) examined citizens' understanding of the EIS and found a poor level of understanding. To improve understanding they proposed computer-generated visual simulation, which enables people to see the impacts of proposed projects and makes it easier to understand the EIS. Good quality meeting materials, improved facilitation of discussion, and meetings at an early stage could be the proposed solutions for the above mentioned constraints. EIA practitioners need to prepare meeting materials including alternatives analysis, whose contents are elaborated on and easily understandable. At the same time they need to present a list of issues to facilitate discussion at an early stage. Creighton (2005) says, "The process of consulting with the public often helps to clarify the objectives and requirements of a project or policy. The public can force rethinking of hidden assumptions that might prevent seeing the most effective solution. ...The public often possesses crucial information about existing conditions or about how a decision should be implemented" (18). One benefit of public involvement is that it could provide opportunities for project proponents to notice environmental and social impacts particular to the project area, which is likely to improve the quality of the EIS. Good quality public involvement could rest upon environmental and social awareness of project proponents.

To summarize the above, one realistic approach to improve the process is to identify and meet main stakeholders—a small number of people at convenient locations within their community—communicate with them using techniques such as visual simulations, learn what information they already possess, and understand their responses before the main public consultations, at an early enough stage in the project that the alternatives could be reassessed.

The main public consultation might then provide opportunities for every stakeholder to confirm the contents of the report and for project proponents to collect additional information.

4.4 Novelty, credibility, and validity of quantitative text analysis as an analysis tool

Previous studies on public involvement have generally been qualitative, except for a consultation and public participation index (Mwenda et al. 2012). The minutes from the meetings on public involvement have never been analyzed quantitatively even though they provide valuable information and are readily available. Through the QTA capable of analyzing qualitative data, key words and topics were extracted automatically in a short time and it was easy to understand an outline of meetings with related tables and a figure. This broader understanding enables a detailed analysis focusing on specific codings such as impact, compensation, and alternatives. At the same time it also enables a reader to easily understand and reproduce the results of the analysis. The QTA could be a very efficient and useful tool for obtaining valuable knowledge from existing minutes from meetings attached to EIS, which could be invaluable sources of information for any future analysis of public involvement.

This study dealt with one project, but one benefit of quantitative analysis is the ability to compare different projects to each other, which would then lead to new knowledge. For example, is there a vast difference or similar tendencies between projects or sectors? What are the major factors contributing to any differences? What is the alternatives analysis technique to facilitate discussion? The quantitative text analysis could find answers to those questions and broaden the baseline of public involvement researches.

Conclusion

The study analyzed the minutes from the meetings on one bridge project using the QTA. The QTA highlighted a valid analysis tool for public involvement, and was very useful for understanding a quantitative overview of public involvement and focusing on specific subjects of examination in a short time. Compared with previous qualitative research, this study was able to focus more on concrete topics of how to reflect environmental impacts on decision making and how to select a good alternative through the QTA. At the very least, this study shows that more time could be spent analyzing and discussing the issue. Even improving institutional constraints such as information disclosure, access of information, use of local language, locations of meeting places in communities, and participation of many kinds of stakeholders including NGOs and media, were insufficient for increasing public involvement in decision making. Good and understandable meeting materials, and the facilitation of discussion and meetings at an early stage could be key components to improve public involvement, and such involvement could rest upon the environmental and social awareness of project proponents. In particular this study focused on a discussion about alternatives analysis, which is the heart of the EIS. The discussion about alternatives analysis is required because the significant impacts are decided and the mitigation measures are limited after one option has been selected. Further research is needed to improve public involvement using the QTA, focusing on high- or low-interest items to local people, alternatives analysis, and comparison with projects.

References

Abaza, Hussein, Ron Bisset, and Barry Sadler. 2004. *Environmental Impact Assessment and Strategic Environmental Assessment: Towards an Integrated Approach*. Geneva: UNEP.

André, P., B. Enserink, D. Connor, and P. Croal. 2006. *Public Participation International Best Practice Principles. Special Publication Series No. 4*. Fargo, USA: International Association for Impact Assessment.

Chi, Cheryl S.F., Jianhua Xu and Lan Xue. 2014. "Public Participation in Environmental Impact Assessment for Public Projects: A Case of Non-participation." *Journal of Environmental Planning and Management* 57(9): 1422-40.

Council on Environmental Quality (CEQ). n.d. *Regulations for Implementing the Procedual Provisions of the National Environmental Policy Act. Reprint 40 CFR Parts 1500-1508.* Accessed June 22, 2015.https://ceq.doe.gov/ceq_regulations/Council_on_Environmental_Quality_Regulations. pdf.

Creighton, James L. 2005. *The Public Participation Handbook: Making Better Decisions through Citizen Involvement*. San Francisco: Jossey-Bass.

Doelle, Meinhard and A. John Sinclair. 2006. "Time for a New Approach to Public Participation in EA: Promoting Cooperation and Consensus for Sustainability." *Environmental Impact Assessment Review* 26: 185-205.

Glucker, Anne N., Peter P.J. Driessen, Arend Kolhoff, and Hens A. C. Runhaar. 2013. "Public Participation in Environmental Impact Assessment: Why, Who and How?" *Environmental Impact Assessment Review* 43: 104-11.

Higuchi, Koichi. 2014. *Quantitative Text Analysis for Social Researchers: A Contribution to Content Analysis*. Kyoto: Nakanishiya [in Japanese].

Japan International Cooperation Agency (JICA). 2006. *The Study on the Construction of the Second Mekong Bridge in the Kingdom of Cambodia Final Report*. Tokyo: JICA.

———. 2010. *Guidelines for Environmental and Social Considerations*. Tokyo: JICA.

Kakonge, John O. 1996. "Problems with Public Participation in EIA Process: Examples from Sub-Saharan Africa." *Impact Assessment* 14: 309-20.

Kamijo, Tetsuya. 2015a. "A Verification of the Effectiveness of Alternatives Analysis and Public Involvement on the Quality of JICA Environmental and Social Consideration Reports." JICA Research Institute Working Paper No. 108. Accessed November 1. http://jica-ri.jica.go.jp/publication /workingpaper/index.html.

———. 2015b. "A Verification of Alternative Assessment using Principal Component Analysis based on Case Studies of the Japan International Cooperation Agency." *Journal of Environmental Information Science* 43(5): 31-38.

Kobayashi, Tsubasa, Susumu Ohnuma, and Yasuhiro Mori. 2014. "A Text-mining-based Investigation of Longitudinal Energy Saving Behavior: A Case Study of Asahikawa's Ene-Eco Project." *Papers on Environmental Information Science* 28: 37-42 [in Japanese].

Lawal, Akeem Morounkeji, Stefan Bouzarovski, and Julian Clark. 2013. "Public Participation in EIA: the Case of West African Gas Pipeline and Tank Farm Project in Nigeria." *Impact Assessment and Project Appraisal* 31(3): 226-31.

Momtaz, Salim. 2006. "Public Participation and Community Involvement in Environmental and Social Impact Assessment in Developing Countries." *International Journal of Environmental, Cultural, Economic and Social Sustainability* 2 (4): 89-97.

Mwenda, Angela N., Arnold K. Bregt, Arend Ligtenberg, and Thomas N. Kibutu. 2012. "Trends in Consultation and Public Participation within Environmental Impact Assessment in Kenya." *Impact Assessment and Project Appraisal* 30 (2): 130-35.

Nadeem, Obaidullah and Thomas B. Fischer. 2011. “An Evaluation Framework for Effective Public Participation in EIA in Pakistan.” *Environmental Impact Assessment Review* 31: 36-47.

Natakani, Jun, Seika Akemura, and Yuichi Moriguchi. 2014. “Analysis of Issues in the Advisory Committee on Energy and Natural Resources before and after the Great East Japan Earthquake using Text Mining.” *Papers on Environmental Information Science* 28: 113-18 [in Japanese].

Okello, Nick, Lindsay Beevers, Wim Douven, and Jan Leentvaar. 2009. “The Doing and Un-doing of Public Participation during Environmental Impact Assessment in Kenya.” *Impact Assessment and Project Appraisal* 27(3): 217-26.

Purnama, Dadang. 2003. “Reform of the EIA Process in Indonesia: Improving the Role of Public Involvement.” *Environmental Impact Assessment Review* 23: 415-39.

Rajvanshi, Asha. 2003. “Promoting Public Participation for Integrating Sustainability Issues in Environmental Decision-making: The Indian Experience.” *Journal of Environmental Assessment Policy and Management* 5(3): 295-319.

Roach, Ian. 2013. “Examining Public Understanding of the Environmental Effects of an Energy-from-waste Facility.” *Impact Assessment and Project Appraisal* 31(3): 220-25.

Romesburg, H. C. 1984. *Cluster Analysis for Researchers*. Belmont, CA: Lifetime Learning.

Sinclair, John. and Alan P. Diduck. 2000. “Public Involvement in Environmental Impact Assessment: A Case Study of Hydro Development in Kullu District, Himachal Pradesh, India.” *Impact Assessment and Project Appraisal* 18(1): 63-75.

Smith, Michael D. 2007. “A Review of Recent NEPA Alternatives Analysis Case Law.” *Environmental Impact Assessment Review* 27: 126-44.

Steinemann, Anne. 2001. “Improving Alternatives for Environmental Impact Assessment.” *Environmental Impact Assessment Review* 21: 3-21.

Sullivan, William C., Frances E. Kuo, and Mona Prabhu. 1996. “Assessing the Impact of Environmental Impact Statements on Citizens.” *Environmental Impact Assessment Review* 16: 171-82.

To, Wai Ming and Andy W.L.Chung. 2014. “Public Engagement in Environmental Impact Assessment in Hong Kong SAR, China using Web 2.0: Past, Present and Future.” *Journal of Environmental Assessment Policy and Management* 16 (1): 1450002-1-13.

Wiklund, Hans. 2011. “Why High Participatory Ideals Fail in Practice: A Bottom-up Approach to Public Nonparticipation in EIA.” *Journal of Environmental Assessment Policy and Management* 13(2): 159-78.

World Bank Environment Department. 1993. *Public Involvement in Environmental Assessment: Requirements, Opportunities and Issues*. Environmental Assessnment Sourcebook Update no. 5. Washington, DC: World Bank

———. 1996. *Analysis of Alternatives in Environmental Assessment*. Environmental Assessment Sourcebook Update no. 17. Washington, DC: World Bank.

Abstract (in Japanese)

要約

環境影響評価における住民参加の先行研究は、主に定性的分析に基づくものであった。近年は、計量テキスト分析が発達してきており、社会調査にも適用されているため、本研究では、カンボジア橋梁プロジェクトの議事録に計量テキスト分析を適用し住民参加を調べた。分析の結果、環境影響と代替案分析についての協議は限定的との結論に至った。また、質が良く理解容易な会議資料と協議の円滑化が住民参加を改善する主な要素であり、良い住民参加は事業者の環境社会意識によることも明らかになった。さらに、こうした分析結果は、計量テキスト分析が妥当な住民参加分析手法であることも示した。今後の研究課題としては、地域住民の関心の高い項目と低い項目、代替案分析、プロジェクト比較に焦点を当てた住民参加分析があげられる。

Working Papers from the same research project

"Improving Environmental and Social Considerations of JICA at the Planning Stage"

JICA-RI Working Paper No. 108

A Verification of the Effectiveness of Alternatives Analysis and Public Involvement on the Quality of JICA Environmental and Social Consideration Reports

Tetsuya Kamijo