IMPLEMENTATION OF COLLABORATIVE INFRASTRUCTURE MANAGEMENT
- THE CASE OF THE WORKSHOPS IN SHIRETOKO, HOKKAIDO -

Abstract: Four workshops were held for formulating road improvement and utilization methods in the Shiretoko World Natural Heritage area (including the national highway between Shari and Utoro). Participants in these workshops consisted of local residents, scholars and road administrators, and employed a method called “collaborative infrastructure management.” Through the workshops, a "basic plan" was framed which summarized how future road improvements should be carried out, and how roads themselves should be utilized. The method of collaborative infrastructure management identifies and arouses discussion of specific needs and problems, and allows the creation of long-range solutions. Opinion map/Resource map used in the workshops were useful for the Externalization and Combination process of the SECI model which is model concept for knowledge management, and video clips of driving conditions were effective in the Socialization process.

Key Words: collaborative infrastructure management, workshop

1. INTRODUCTION

As a part of collaborative infrastructure management in Hokkaido, workshops were organized for the Shiretoko World Natural Heritage area (extending between Shari and Utoro on National Highway 334). In the workshops, local residents acting as representative road users, scholars and road administrators sat at a conference table and discussed a range of road-related issues including road-based resources and problems, as well as the functions of roads
and efficiencies requiring enhancement. At the end, they agreed on a “basic plan” which summarizes how future road improvements should be carried out as well as how roads themselves should be utilized.

2. FORMULATION OF THE BASIC PLAN AND THE ROLE OF WORKSHOPS IN COLLABORATIVE INFRASTRUCTURE MANAGEMENT

The nucleus of the collaborative infrastructure management method is collaborative activities carried out between road administrators and users, or in other words, the general public and the relevant public and private road-administering organizations. Yet, conventional activities so far have tended to appear as partial ad hoc public relations activities rather than being directly linked to the genuine core operations of road administrators.

Collaborative infrastructure management in Hokkaido, under which the Shiretoko workshops were held, has been highly rated for the way in which it allowed a basic plan for future road improvement and utilization principles to be formulated through collaborative exchange with local road users. The formulation process of this basic plan dealt with (1) functions of the route, (2) efficiencies required of the route, (3) problem mapping, (4) resource mapping, (5) improvement/utilization menu creation, and (6) target schedule arrangement. Figure 1 shows the formulation process. This method differed from the existing public involvement (PI) in that it detected and allowed discussion of specific needs and problems about local roads with local people through workshop-style communication. In addition, long-range solutions were sought and attained through a collaborative process. This therefore required discussions that would value region-wide strategies rather than focused designs on individual sections for improvement. Discussions about road improvement and utilization methods, their implementation schedules and joint-responsibilities continued until a final agreement was reached.

We consider that the activities in the Shiretoko workshops demonstrated a new collaborative management model.

![Figure 1 Formulation of the basic plan in the workshops](image-url)
3. KNOWLEDGE BUILDING THROUGH WORKSHOP-STYLE COMMUNICATION

3.1 Road users’ experience-based knowledge and its management

Local people are empirically aware of mobility problems they experience in their daily economic activities and casual movements. When drawing up road-project improvement and utilization plans, their experience-based knowledge should be taken into consideration as much as possible to allow the structure of these problems to be more accurately understood. Also, in order for an optimum plan to be realized, it is important for the related stakeholders to come to a mutual agreement through negotiation, concession and acceptance.

A special feature of the Shiretoko workshops was that they were held over several occasions, during which dual perspectives were viewed: the personal view of individual road users and also the long-term view in terms of regional management. As workshops went on over time, differing views were shared and digested by all of the participants culminating in an overall collective knowledge about road usage and desired improvement methods.

The success of workshops was determined by the following evaluation criteria items: (1) non-retrogressing progression of discussion and control of discussion rate (irreversibility), (2) successful examination of plan feasibility (identification of restrictive conditions), (3) knowledge support for participants in on-going discussions (knowledge enhancement), (4) specific and general discussion about 5W1H-type questions (discussion depth control), and (5) final agreement (settling of a planning proposal based on collective knowledge).

Collaborative infrastructure management in which a limited number of workshops are organized and participated in by a selected group of people can be identified as the SECI model or the knowledge management model (Figure 2). Knowledge in the SECI model is roughly classified into “tacit knowledge” and “explicit knowledge”. People empirically and physically obtain tacit knowledge, which is unavailable in a language-based form. In collaborative infrastructure management, intuitive sense and driving know-how obtained through experience fit into this category. Explicit knowledge is an articulated and codified version of tacit knowledge which is therefore shareable. Opinions from road users and roadside stakeholders are modeled into some form. In the SECI model, the following four modes take place alternatively. If each is viewed from the perspective of collaborative infrastructure management they can be interpreted as:
1) Socialization: Tacit knowledge is derived from tacit knowledge. This experience-based knowledge can be shared with those without experience. Road users have similar internal knowledge among them from their common experience using a particular road.

2) Externalization: Explicit knowledge is created based on tacit knowledge. In this process, personal tacit knowledge is articulated into explicit concepts by means of words and diagrams. In the Shiretoko workshops, road administrators’ knowledge was also converted into tacit knowledge in the form of a preliminarily drawn problem map and a local resource map. Participants’ experience-based problems and ideas were codified into language and converted to exchangeable tacit knowledge.

3) Combination: In this process, explicit knowledge is combined to create new explicit knowledge in which solutions are formulated to address the changes experienced by each represented group in the workshop from a proposed road project. Studies examining overall problems for participants as well as proposals for consensus-gaining possible solutions are carried out.

4) Internalization: Explicit knowledge is transformed to tacit knowledge. Explicit knowledge agreed to by all is integrated to ordinary physical activities to be carried out practically. It is assimilated in individual activities and practices such as surveys on road-based social experiments and other regional activities.

The Shiretoko workshops correspond to the above mentioned “externalization” and “combination” processes which were held several times. The goal of the workshops was to eventually reach an agreement on a plan associated with a road project. Therefore, in managing discussions, communication tools become important to support the whole process from raising mutual recognition about the route’s necessary functions and efficiencies for meeting regional strategies to reaching an agreement on concrete design proposals. The function of communication tools in a group discussion is discussed in the next section.

3.2 Workshop management
The total number of participants in the Shiretoko workshops was 12-13 (including one woman), and the group consisted of seven local representatives, two scholars and three to four road administrators. The role of these three groups is depicted below:

a) Local representative road users: Those who had a keen awareness of local road infrastructure problems from daily use and were capable of discussing issues on local strategies were selected. Because their knowledge was based mostly on practical experience, they were regarded as the main group for practically judging the significance of the basic plan.

b) Road administrators: Administrative staff members who had extensive knowledge of the target road section and were able to judge issues raised in the workshops to a fair degree participated. A member of the department in charge of the institutional design of collaborative infrastructure management also became a member of these Shiretoko workshops. The role of the administrative organ was to be a main body that holds knowledge about feasible road policies and indicates a rough range within which the resulting basic plan would eventually be agreed on.
c) Scholars:
A local scholar took the role of discussion coordinator while the other scholar, who had broad road planning and city planning expertise, was invited from outside of Hokkaido as an advisor. The scholars directed each discussion integrating the diverse knowledge of each representative group together from a third-party viewpoint. They acted as the main body to activate “externalization” and “combination” of knowledge in the SECI model.

The workshops were held four times in total. The discussion process is depicted in Figure 1, and tasks in each workshop are broadly grouped into (1) opinion collection phase, (2) recognition sharing phase, (3) examination phase, and (4) decision-making phase. As Figure 3 shows, the functions and efficiencies which were required of the road as well as devices for improvement and utilization were discussed taking regional strategies into account to reach a mutually agreeable basic plan.

![Diagram of the examination process in the workshops](image)

For the participants to be able to share ideas about specific needs and problems smoothly in collaborative workshops, the scheduling of the workshops has to be carefully arranged so that the participants can build up mutual knowledge through proper information provision and cooperative tasks. In this regard, communication tools to facilitate “externalization” and “combination” of knowledge in the SECI model played a significant role. This is the subject of the next section.

### 4. PERFORMANCE AND EVALUATION OF COMMUNICATION TOOLS

#### 4.1 Opinion map/Resource map
Communication tools were used to facilitate the “externalization” and “combination” of the SECI model introduced in the previous section. In the preparation and initial stages of the Shiretoko workshops, a preliminary hearing session was offered to the participants in which tacit knowledge was “externalized” as explicit knowledge by means of texts and diagrams. As a concrete measure, road structures the road administrators knew and problems identified when a group of experts tried driving at the location several times were plotted on an “opinion map”.
map”. The region also contains a number of local resources accessible along the target route. These are rooted in the natural features of the region, and are utilized to enhance the numbers of visitors. Such resources were depicted on a “resource map”.

The effective use of these maps in a workshop enables problems and resources on the chosen route to be “externalized” to a bird-eye’s viewpoint, “combined” as a total structure and “socialized” among all the participants. Through these processes, decision-making in sorting out and prioritizing issues can be done smoothly when drafting the plan. In the Shiretoko workshops, “socialization” of knowledge was attempted using these “opinion map” and “resource map” in the discussions, where new ideas were added if necessary. Diverse knowledge surfaced in the Shiretoko workshops through repeated occurrence of “externalization” and “combination” of knowledge (knowledge enhancement). At first, a macro-scale map (1/200,000) and both an “opinion map” (Figure 4) and a “resource map” (Figure 5) of a scale of 1/25,000 were completed. In the second Shiretoko workshop, the study target was limited to a problem area (Oshin-Koshin Falls parking area) and the use of a 1/1,000 map (Figure 6) assisted a discussion (irreversibility and depth control of discussion).

Figure 4  Opinion map (1/25,000)

Figure 5  Resource map (1/25,000)
4.2 Driving video clip
As a special communication tool, the use of “driving images recorded with a camcorder” (Figure 7) is recommended. In this method, driving images taken from a driver’s viewpoint were projected in the workshops to let all the participants experience virtual driving. The method worked well to recall tacit knowledge of an individual participant and to collect their opinions (Figure 8). Both the “problem map” and the “resource map” underscored “externalization” and “combination” in the SECI model while the virtual “simultaneous driving experience” aroused tacit knowledge of an individual participant and invigorated opinion exchange with others and discussions for improvement. In this sense, the method can be regarded as a tool assisting the process of “socialization”. In the Shiretoko workshops, simultaneous projection of both summer and winter driving images helped create smooth discussions, in examining planning proposals about road efficiencies for road sections where environments differ drastically by season. However, as screening time easily becomes problematic in workshop management, the use of video images needs to be flexible according to discussion circumstances.

Communication tools are devices to support the creation of a “planning proposal” agreeable to all the participants in a series of workshops which are held only a limited number of times. Communication tools for smooth discussion are important in a sense to heighten the satisfaction of participants. Elements resulting in unsatisfactory outcomes include personal...
inability of a road user in explaining his/her experience or sharing information with others, failure in finding solutions and incapability of judging whether a recommended solution is worth considering or not. The capacity for effectively managing workshop discussion is always required when handling tools.

However, what essentially cultivated communication between the hosting body and the participants were sincere replies about technical issues, effects and the costs necessary to realize various proposed ideas. The development of a trusting relationship leads to the foundation of communication, which is the basic requirement of collaborative workshops.

5. CONCLUSION

These Shiretoko workshops were organized to be collaborative infrastructure management workshops. The workshops started with the chief aim of identifying problems in terms of institutional designing. Yet, as the time went on, the workshop’s activities became more realistic as things first considered as mere possibilities actually came to being carried out in the workshop environment. Besides the outstanding qualifications of the participants, their special zeal for improvement helped change the initial mission and advance the collaborative workshop.

After the final workshop, problems identified will be reviewed and collaborative infrastructure management in Hokkaido will enter a more practical 2nd stage. We express our deep gratitude to all the participants, and at the same time consider it urgent that a usable collaborative decision-making system be constructed.

REFERENCES