Public Participation Approach for the Rural Community Black Spot Improvement, Experiences from Thailand

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Abstract: This study aims to propose the approach for public participation to improve the black spot in rural community. The approach explains how to involve public in the community black spot improvement program. The proposed procedures including 1) Team members set up, 2) Team member’s knowledge Acquisition, 3) Community Black Spot Improvement, 4) Monitoring and evaluation, 5) Activities to promote knowledge sharing and lesson learn, and 6) Connecting to responsible organizations, Case examples of 5 selected rural villages in Mahasarakham Province, Thailand, are employed to demonstrate the procedure and the successful of the program. The proposed approach would be very useful and practical for the rural community to sustainably improve the black spot in their own community by themselves.

Key Words: Public participation, Black spot improvement, Rural community, Road safety

1. INTRODUCTION

The problem of traffic accident in Thailand becomes a critical situation once it compares with other countries with high national income. As the traffic accident report (Royal Thai Police, 2010), the accident fatality rate of Thailand during 1999-2009 is an average 19.9 fatalities per 100,000 populations while WHO reports that countries with high national income have an average 10.0 fatalities per 100,000 populations (WHO, 2010). Once considering in term of economic loss from the study report of Thailand Department of Highways, it reveals that the cost of economic loss from traffic accident is 232,855 Million baht in 2007 or approximately 2.81% of GDP.

To diminish this critical problem, the Thailand government, as a member state of The United Nations, announced that the period of years 2011-2020 being the Decade of Action for Road Safety among member states of UN to accomplish the goal of decreasing the accident death rate appropriate with each country at the end of this decade. For Thailand, the target is to decrease the accident fatality rate of Thailand being a half of the existing rate or lower than 10.0 fatalities per 100,000 populations. To accomplish the target, the Thailand government
determined the eight implementing programs. One of implementing program is the improvement of all black spot in Thailand within determined period that should be mainly carried on by the experiences and resources available governmental organizations, including Department of Highways and Department of Rural Roads.

However, once it considers the accident situation in regional province. For example, the accidents occurred in Mahasarakham province is displayed by road type in Figure 1. It notices that over a half of fatality accidents occurred on the other road networks, including urban and rural roads, rather than the highway road network, as same as the situations in other areas of Thailand. In other words, there are many accidents or black spots on rural road network in the community. The improvement of the rural roads mainly takes a responsibility by the Department of Rural Roads and the Local Administration Organization of Thailand.

However, the problem is that a lot of black spots on the rural roads belonging to sub-district administration organizations have not been improved for a whole due to the constraints of budget and human resources of those local organizations. In subsequently, this study proposes the approach for community to improve the black spot for short term to lessen the accident on their own community roads.

![Figure 1 Accident fatality rate in Mahasarakham province by road type](image)

2. LITERATURE REVIEW

From the previous many researches and project studies, they conducted widely on the issues of identifying and analyzing the recorded black spots (Tanaboriboon, 2003; Kowtanapanich et al., 2006) as well as the potential black spots (Fukuda et al., 2005; Karnchanasantisuk, 2007) by public participation. But, after the process of identification and analyzing the accident causes at black spot, there is a lack of research and study that further process to improve those identified black spot by public participation. Even there was a project study that further improved the identified black spots but the improvement, including a treatment plan, a budget as well as an action, performed by the government organization (Kulreap, 2004). This study consequently attempted to propose the approach for the community to improve their black spots by themselves.

3. PUBLIC PARTICIPATION APPROACH FOR BLACK SPOT IMPROVEMENT

The proposed approach to improve the black spot in rural community by public participation
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is displayed as a following Figure 2. The procedures according to the proposed approach include followings:

Figure 2 Public participation approach for community black spot improvement

3.1 Team members set up

3.1.1 Search Research Team Members
The team leader, usually the village leader, or the local administrative organization, holds the first meeting to identify the local research team members. It is very important to select the right team member to ensure the success of the program. The team member should have an active role in community development. When possible, the stakeholder analysis should be performed. After the team members are set up, the second meeting should be arranged to explain the research objectives, procedures and possible outcome.

3.1.2 Preliminary Field Survey
The research team members conduct the initial field survey to make a base line for the research activities.

3.2 Team member’s knowledge Acquirement

3.2.1 Training

Team leaders set a 1-day training program for team members. The program should include all necessary knowledge to team leaders including the active role of public in black spot improvement, how to set the meeting to identify, analyze and improve the community black spot.

3.2.2 Site Visiting

Team leaders select the good prototype village for their black spot improvement. The site visiting should be arranged for the team and community members to learn for the good practice. This program would encourage the team members to discuss and exchange their knowledge and experience for black spot improvement during site visiting and continue the brain storm after back to their own village.

3.3 Community Black Spot Improvement

The team members organize the community meeting in each target village to identify the black spot, analyze, make a plan for the black spot treatment solutions and take an action to improve the black spot.

3.3.1 Black spot identification

Team leaders firstly develop the large-size community map. The developed map should include the road network and community landmarks such as temple, school, village leader’s office, pond and community member’s house, etc. It is important that developed map must be very understandable for community members. It can be tested by asking a community member to identify the important location, such as main intersection in the community. Then, to develop the black spot map, the community meeting should be arranged to ask the community members to identify where, when, how the accident occurred/nearly occur based on their experiences for the last 3 years. The accident location may be identified on the community map by the color sticky label. The severity of accident may be classified by the shade of color of sticky label.

3.3.2 Black spot analysis (Social walk and transaction mapping)

After the black spot are identified on map, the team members organize the community meeting. Initially, the community members walk socially through the community to examine the existing condition of the black spot, simultaneously to record and draw concerning issues on the map. Afterward, the community members analyze cooperatively the occurred accidents at the black spot. The accident characteristics including accident cause, involved vehicle, accident severity, and collision pattern, are analyzed by the community members, the community members lastly will select the critical black spot for the priority improvement.
3.3.3 Black spot Improvement plan

After the critical black spot is analyzed and selected for the priority improvement, the community members continue to determine jointly the plan for short-term and long-term black spot improvements. The plan should include the black spot solution, the improvement process, as well as the budget. The plan for short-term improvement would be determined under constrains of budget and capability of community, such as clearing roadside bush or installing the traffic sign, etc. For the long-term improvement plan, the community may require the supports from governmental organizations, such as repairing or constructing geometric of the road that required the high budget and engineering knowledge.

3.3.4 Community action

The community improves the black spot under the time and budget constrains by self reliance and local wisdom constrains.

3.4 Monitoring and evaluation

3.4.1 Monitoring accident statistics

The community holds the community meeting to evaluate the black spot improvement by using the accident records monitored by community.

3.4.2 Periodically maintenance plan
For continuous maintenance, the maintenance plan is programmed every several months.

3.4.3 Monitoring new black spot location
The community usually holds the community meeting to monitor the new black spot location for sustainable and continuous improvement.

3.5 Activities to promote knowledge sharing and lesson learn

The community summarizes all the lessons learn from the improvement being lessons to other villages for black spot improvement.

3.6 Connecting to responsible organizations

The community organizes the stakeholder meeting for corporation among local administration, road authorities, and communities to integrate road improvement plans with road authorities for long-term black spot improvement.
4. CASE STUDY OF FIVE RURAL VILLAGES

To demonstrate and prove the proposed approach, this study conducted a case study of prototype rural communities in regional province, Mahasarakham province. The villages in the neighborhood of Mahasarakham University which has a high growth rate of population causing high traffic accident were the target group. The five prototype rural villages were selected based on the following criteria; 1) The rural village is affected by the growth of Mahasarakham University, 2) The rural village is accident prone with no improvement plans both from the local administrative level and community level and, 3) The rural village with the responsible authority for the road is still questionable.

4.1 Characteristics of five selected rural villages

The selected five rural villages include; 1) Donna Village Mo.7, Khamrang Sub-district, 2) Khamrang Village Mo.15, Khamrang Sub-district, 3) Makok Village Mo.5, Khamrang Sub-district, 4) Thakhonyang Village Mo.1, Thakhonyang Sub-district, and 5) Thakhonyang Village Mo.11, Thakhonyang Sub-district of Kantharawichai District, Mahasarakham province. The locations of selected five villages neighboring to Mahasarakham University are presented as Figure 3. The geographic layouts of selected five villages are shown in Figure 4. And, the household information of selected five villages is presented in Table 1.
Table 1 Household information of five selected rural villages

<table>
<thead>
<tr>
<th>Village</th>
<th>No. of Population</th>
<th>No. of Household</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Donna Mo.7</td>
<td>643</td>
<td>217</td>
<td>Mostly farmers</td>
</tr>
<tr>
<td>2) Khamrang Mo.15</td>
<td>366</td>
<td>80</td>
<td>Mostly farmers</td>
</tr>
<tr>
<td>3) Makok Mo.5</td>
<td>-</td>
<td>-</td>
<td>Mostly farmers</td>
</tr>
<tr>
<td>4) Thakhonyang Mo.1</td>
<td>1,153</td>
<td>420</td>
<td>Mostly farmers</td>
</tr>
<tr>
<td>5) Thakhonyang Mo.11</td>
<td>355</td>
<td>98</td>
<td>Mostly farmers</td>
</tr>
</tbody>
</table>

4.2 Black Spot Identification by Community

The activity of black spot identification and resulted black spot map by community are demonstrated in Figure 5. The results of black spot identification in selected villages are summarized in according to road geometric characteristic as shown in Table 2. It found that the identified black spots are mostly at intersections, at horizontal curve, and at the road section in the villages.
Table 2 Summarized results of black spot identification by community

<table>
<thead>
<tr>
<th>Village</th>
<th>Sharp Curve</th>
<th>3-leg Intersection</th>
<th>4-leg Intersection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Donna Mo.7</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>2) Khamrang Mo.15</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3) Makok Mo.5</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>4) Thakhonyang Mo.1 and 11</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

4.3 Black Spot Analysis by Community

The activity analyzing accident characteristic by community is presented in Figure 6. The results of accident analysis, i.e. accident characteristics including accident cause, involved vehicle, accident severity and collision pattern, are summarized in Table 3. It found that main accident causes in rural villages were obstruction of sight distance at intersections and curve, no installation of warming sign, insufficient illumination during night time as well as the human behaviors, including, drunk and drive and high speed. The types of crashed vehicle were mainly motorcycle, passenger car and, truck. It is very observable that the accidents occurred in community caused many fatalities and severe injured. The collision patterns were mostly 90° angle crashes and obstructor crashes.
### Table 3 Summarized results of black spot analysis by community

<table>
<thead>
<tr>
<th>Village</th>
<th>Accident Characteristic</th>
<th>Crashed Vehicle</th>
<th>Accident Severity</th>
<th>Collision Pattern</th>
</tr>
</thead>
</table>
| 1) Donna Mo.7    | - Obstructed sight distance  
- No warming sign  
- Insufficient illumination  
- Drunk drive | - Motorcycle  
- Passenger car  
- Truck | - Severe injured | - 90° angle crashes  
- Obstructer crash  
- Out of road at curve |
| 2) Khamrang Mo.15| - Obstructed sight distance  
- High speed | - Motorcycle  
- Pickup truck  
- Truck | - Fatality  
- Severe injured  
- Slight injured | - Mostly 90° angle crashes  
- Obstructer crash  
- Out of road at curve |
| 3) Makok Mo.5    | - Obstructed sight distance  
- No warming sign  
- Insufficient illumination  
- Drunk drive  
- High speed | - Motorcycle  
- Passenger car  
- Pickup truck  
- Truck | - Fatality  
- Severe injured | - 90° angle crashes  
- Obstructer crash  
- Out of road at curve |
| 4) Thakhonyang Mo.1 and 11 | - Obstructed sight distance  
- No warming sign | - Motorcycle  
- Passenger car  
- Truck | - Severe injured | - 90° angle crashes  
- Obstructer crash |

### 4.4 Black Spot Improvement Plan

The plans of black spot improvement by community are summarized in Table 4.

Table 4 Summarized plans of black spot improvement

<table>
<thead>
<tr>
<th>Village</th>
<th>Plan for improvement</th>
</tr>
</thead>
</table>
| 1) Donna Mo.7    | - Clear obstructers such as roadside bushes  
- Install warning traffic sign at intersection and curve  
- Install guard rail  
- Install light |
| 2) Khamrang Mo.15| - Clear obstructers such as roadside bushes  
- Install warning traffic sign at intersection and curve  
- Install road hump  
- Install light |
| 3) Makok Mo.5    | - Install warning traffic sign  
- Install entrance gate to reduce vehicle’s speed  
- Install light  
- Construct drainage  
- Construct concrete pavement |
| 4) Thakhonyang Mo.1 and 11 | - Install warning traffic sign at intersection  
- Install road hump  
- Install light  
- Widening road shoulder |
4.5 Community Action

The community performs the short-term black spot improvement emphasizing on self reliance and local wisdom under the time and budget constrains. The activity of black spot improvement by community is displayed in Figure 7. The black spots were improved by clearing the bushes to provide intersections and curves visibility and installing guide posts made from painted bamboo along sharp curves as shown in Figure 8 and 9. The black spot at sharp curve was warmed to drivers by installing reused warning signs before sharp curve as presented in Figure 10. The black spots at roadsides were improved by installing the painted bamboo barriers for sites visibility, use of used CD and reflective sticker to provide nighttime visibility as shown in Figure 11. The Figure 12 shows the black spot improvement by installing the pavement marking and the road bump to reduce the speed of traffic entering the community and intersection.

Figure 7 Black spot improvement by community

Figure 8 Before-after improvements by clearing bushed and installing guide posts
Remarks: at Donna Village, Kantharawichai District, Mahasarakham Province
Figure 9 Before-after improvements by clearing bushed and installing guide posts

Remarks: at Makok Village, Kantharawichai District, Mahasarakham Province
Figure 10 Before-after improvements by installing reused warning signs before sharp curve

Remarks: at Khamrang Village, Kantharawichai District, Mahasarakham Province
Figure 11 After improvement by installing painted bamboo barriers with used CD for nighttime visibility
5. RESULTS AND DISCUSSIONS

The study results create significant changes both in terms of physical and social behavior. The physical changes refer to the safety improvement of black spot location from community action. The social behavior changes extend to the knowledge gain of research team members who can develop their own skill to identify and analyze the black spot. They also enable to lead other communities as well.

6. CONCLUSIONS AND RECOMMENDATIONS

In conclusions, the success or summary of this study is not only aim to show the practice of proposed approach of community improved the black spots in their five villages but also can encourage the community to participate in improving their own safety problems. Several procedures including community study, problem analysis by community, creating problems ownership feeling, integrating of local wisdom and technical knowledge to seek for improvement solutions, enable community action. This leads to community self-reliance development, safety cultural development from the smallest social element but make significant changes and effective dissemination, and sustainable road safety.

The commendations are listed as follows.

- Since some of improved features at pilot black spots are not appropriate and standardized such as installing the sign at wrong place, the further study should therefore develop the practical guideline for short-term black spot improvement which the rural community can easily understand and practically effort.
- The evaluation by recording annually the traffic accident

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