The Karen villagers’ knowledge development in road construction: a case study of Panoki –Kopadoh (PNK) route

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Abstract. The Karen, of Panoki village agreed to upgrade the unpaved PNK route to a bamboo reinforced concrete road which used money from the donation. At the beginning of the road construction project, 2010, there were many problems concerned with construction technique and accidents. Civil Engineering Department, Engineering Faculty, King Mongkut’s Institute of Technology Ladkrabang (KMITL) was invited to be a road construction consultant of Panoki-Kopadoh (PNK) route during 2012 to 2017. As the villages of Panoki in Tak province and Kopadoh in Chiang Mai province are in Thailand’s northern remote mountainous areas connected by a 16.5 km unpaved narrow track of Panoki-Kopadoh (PNK) route. In fact, the majority of volunteer villagers understand only the Karen language, lack the basic construction skills, and show no regard for personal safety and hygiene. The consulting team thus provided a training program prior to construction and assisted with technical advice since the onset of the project. As an achievement of the project depends on people participation, this research is to examine the pre- and post-training local workers’ knowledge development and attitudes toward the academic services provided by KMITL through direct observations, a Likert-scale-based questionnaire, and in-depth interviews. The findings reveal that the participating villagers have learned to construct a bamboo reinforced concrete road and are intent on applying the knowledge to similar projects in the future. They exhibit the higher level of knowledge development following the training and also hold a positive attitude toward KMITL’s academic services.

1 Introduction

The 16.5-km Panoki-Kopadoh route is an unpaved narrow track that connects Thailand’s mountainous village of Panoki in Tak province with another mountainous village of Kopadho in Chiang Mai. However, in the rainy season (May-October), the unpaved local route of high plastics fine grained soil becomes very difficult for motorized vehicles to travel on. Therefore, the villagers are required to travel the distance of 53 km (almost 5 hours) through Tak’s Tha Songyang district to Omkoi district of Chiang Mai, Thailand. To shorten a travel time, a bamboo reinforced concrete road has thus been laid over the existing unpaved Panoki-Kopadoh (PNK) route where the construction of the PNK route is underway, whose elevations are in a range of 200-1300 meters above mean sea level. Approximately, 14 km of the PNK route has been completed as at the end of April 2017. Apart from the reduced travel time, other benefits gained are, for example, increased trade of local agriculture products, greater access to formal education, and transportation of patients in emergency. King Mongkut’s Institute of Technology Ladkrabang (KMITL)’s Civil Engineering Department was invited to take part in the project as academic services provider and construction consultant. The construction began in December 2011 and could be carried out only 2 km annually during the dry season (i.e. 4 months). During the rainy season (May – October), the construction is halted due to the area’s high elevations and thus the difficulty to transport equipment and machinery to the site. In addition, the shortage of labor has delayed the project completion. Since the local villagers are of Papa Kayour hill tribe descent, they understand only the Karen language, posing the communication challenge between the consulting team and local workers who also lack the basic construction knowledge and skills. To overcome the challenges, a 3-day practical training session was arranged during the early stage of the PNK project. The training covered the topics of ground assessment, concrete and construction materials, road construction techniques and personal safety and hygiene. Techniques of communication, signs for construction and interpreters, use for Thai and Karen. The aim of this research is to investigate the villagers’ knowledge development in road construction.
development and attitudes toward the training and academic services provided by KMITL. KMITL’s academic service provided a long term consulting for the Karen villagers, then their knowledge development was observed for 5 years. The knowledge development of the Karen villagers were qualitatively described. The representative persons of KMITL comprised of the lecturers, staffs and students with the total number of 20 people. Since the construction has been started in Tak’s Panoki village of Tha Songyang district of Tak province, the representative samples were the local residents of Panoki. The collection of data by was carried out from March to May 2013 through observations and deep interviews with the villagers with help from Thai fluent Karen interpreters.

2 Literature Review

PNK route is the concrete road which used a bamboo as a wire mesh. Because it is a natural inexpensive material that can be sought locally. There are many bamboo reinforced concrete roads in use today and their advantages and disadvantages have been widely studied. In Thailand, bamboo reinforced concrete was used as a good alternative construction material for road [1]. To solve above-mentioned problems of the PNK project, the Voluntary Protection Program (VPP) was reviewed and has been adopted for the PNK project [2]. The VPP has been established to promote minimum safe practices in construction as well as personal health and hygiene. Since the PNK route is a charitable project, the volunteer local workers receive no daily wage. The communication at the construction site relies on simple drawings and signs to overcome the language barrier and guarantee the Karen workers’ correct understanding. Due to the constraints of communication language and time, a preliminary survey was undertaken to measure the post-training attitudes and skill development of the villagers using a Likert-scale based questionnaire and in-depth interviews. The Likert scale is a 5-point scale with “Strongly Agree” on the left end and “Strongly Disagree” on the opposite end. In the middle is “Neither Agree nor Disagree”. In general, the scores on attitudinal items on a Likert scale are relatively reliable predictors of respondents’ attitudes. For measuring the knowledge development of the Karen workers, the works of Swamy and Arends et al were considered. Swamy (2007) reported that questionnaires employed to evaluate respondents’ attitudes toward an issue, product or service usually contain several biased questions that result in inflated responses [3]. Arends et al (1998) thus suggested that, in addition to the Likert scale, behavioral observations are an effective mean to determine the success of training [4].

3 Study Method

Prior to the construction, the 3-day practical-based training activities were provided. Table 1 presents the training activities and their respective objectives. The main activities entail site investigation, concrete work, safety and hygiene, service and maintenance, and public relations. The training purposes are to create a correct understanding and prevent human errors in the construction. The volunteers from the temple and KMITL’s engineering students and academics, totaling 20 persons, were training instructors, and there were about 120 local Karen villagers participating in the training. The participants were equally divided into five small groups, each of which was assigned to attend two classes (i.e. main activities) on the first day, then another two classes on the second day, and the remaining class on the last day. The third day was also reserved for the post-training assessment of the participants’ basic construction skills. Every participating village was required to learn about the five main activities to complete the training. The content and workshop were simplified to enable ease of understanding. The success of a road construction project depends in large part on the careful investigation and selection of proper construction site and construction materials. The aim of site investigation is to determine the quality of the sub-grade natural ground of the route. Construction materials must be inspected to assure that they are suitable and satisfy the standards for road construction.

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<tr>
<th>No.</th>
<th>Activity</th>
<th>Objective</th>
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<tbody>
<tr>
<td>1</td>
<td>Site investigation</td>
<td>To assess the sub-grade natural ground, sand and gravel pits, slope failure, slope protection.</td>
</tr>
<tr>
<td>2</td>
<td>Concrete work and construction technique</td>
<td>To prepare the construction materials, concrete mixing, curing and testing.</td>
</tr>
<tr>
<td>3</td>
<td>Safety and hygiene</td>
<td>To understand and adopt traffic control, safety wares, e.g. mask, earplugs, helmet, safety boots.</td>
</tr>
<tr>
<td>4</td>
<td>Service &amp; maintenance</td>
<td>To learn about refreshment provision, transportation of construction materials, maintenance of equipment and tools, service during work.</td>
</tr>
<tr>
<td>5</td>
<td>Public relations</td>
<td>To build a rapport with concerned individuals and organizations.</td>
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At the construction site, the drawings and signposts were improvised and emphasize quick and correct understanding of the local workers and other villagers. For instance, Fig 1 shows the sign of communication for construction which 1a is an “under construction” sign along the main road to warn motorists of danger and exercise caution. For 1B is a sign to remind the workers to perform the compaction of the sub-grade natural ground and inspection of the hill’s slope stability. At the packing area, a drawing instructing of 1C sign reminds the local workers to bag 30-35 kg of aggregate with about five shovelfuls. Safety and hygiene signs show as 1D. Trainees studied and practiced the mix design of
the compressive strength of a standard cylindrical concrete sample is 210 ksc with the density of 2,400 kg/cc. The required slump value of concrete shows in the range of 8 to 12 cm. For 1 cubic meter of concrete, the proportion of water, cement, coarse aggregate and fine aggregate presents as 143 kg, 257 kg, 1,240 kg and 752 kg, respectively.

The success deeds and accumulating good karma. A handful of civil servants, traders and students. Most of village people have no formal education and work as farmers. It was discovered during interviews that the village heads, medical service personnel and government officers are also regarded as villagers’ opinion leaders. The villagers’ belief in the fruits of good karma from good deeds has led them to offer manual labor to the construction project, anticipating no financial reward.

The villagers’ post-training knowledge development was measured through direct observations and in-depth interviews to determine their attitudes. The measurements covered their understanding of the work process, application of knowledge, and leadership, all of which were rated “strongly agree” by the villagers. Fig. 3 to Fig.5 show more than 79% of the respondents gave a “strongly agree” rating with regards to their knowledge development and self-improvement after the training. By comparison, prior to the training, their attitudes were mostly either “undecided” or “disagree” on the Likert scale. The in-depth interviews revealed that most villagers gave a “strongly agree” rating for the 3-day training because of its hands-on nature whereby the villagers were encouraged to perform actual work. The hands-on training method was adopted to guarantee a correct theoretical and practical understanding of road construction. The villagers were very resourceful in locating the sources of raw materials and water. The villagers’ post-training attitudes with regard to participation and overall satisfaction toward KMITL’s.

However, prior to the training, the majority of villagers rated “undecided” and “disagree”, the finding which was attributable to mutual distrust as the consulting team was perceived as strangers and the language barrier. It was discovered that local Karen villagers exhibit more trust in people of Karen lineage than in those of different descent. The training and collaboration in the PNK project helped bridge an understanding between the KMITL team and local villagers. The in-depth interviews revealed that those who volunteered in the PNK project hold a belief that, according to Buddhist canons, they were doing good deeds and accumulating good karma. A handful of

4.2 Villagers’ Knowledge Development

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4 Result and Discussion

4.1 Description of the Sample

The population of Thailand’s northern village of Panoki is around 300, constituting 80 households. The village has one day care center but no electricity and tap water. A total of 120 villagers were randomly sampled, equally split between male and female. The largest age group was 20-30 years old, accounting for 43% of the total. The interviews revealed that a majority of villagers did not seek employment in major cities outside their community because of the language barrier and parental responsibility. As shown in Fig.2, around 20% of the sample villagers are able to communicate in Thai, 11% of whom fluently and 9% somewhat fluently, whereas

## Table 1

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<td>1</td>
<td>Safety Awareness</td>
<td>To understand and adopt traffic safety and hygiene, service and maintenance, and public relations.</td>
</tr>
<tr>
<td>2</td>
<td>Concrete work</td>
<td>To learn about refreshment and understanding of the local workers and other villagers.</td>
</tr>
<tr>
<td>3</td>
<td>Training</td>
<td>To build a rapport with organizations.</td>
</tr>
<tr>
<td>4</td>
<td>Public relations</td>
<td>To understand and adopt traffic relations. The training purposes are to create a correct understanding between the KMITL team and local villagers.</td>
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The villagers however were unable to contribute manual labor since they have to seek employment in other larger towns for economic reason. This minority group was found to give either an “undecided” or “disagree” rating to the project. Some of those who were against the project viewed the road would ruin the community’s existing good cultures and replace them with materialism and indebtedness. The construction project was faced with insufficient funding, barring the hiring of skilled construction labor to complete the project. Thus, active participation and labor contribution from local villagers are crucial to the success of the project. This can only be realized through a good public relations campaign where word-of-mouth has been used to persuade the local residents to contribute to the project. The technical training and field practices given by KMITL for 5 years to the Karen trainees, brought their knowledge and community development. Concrete technology, road construction technique, management and safety and hygiene can be applied in their daily lives. Although, there was no budget for fiscal year 2017 to support PNK project.

![Fig.3 Pre- and Post-training Attitudes of Villagers For Understanding of Work Process](image)

![Fig.4 Pre- and Post-training Attitudes of Villagers For Knowledge and Experiences](image)

![Fig.5 Pre- and Post-training Attitudes of Villagers For Leadership and Self-Esteem](image)

5 Summary

In the construction of the PNK route, the 3-day training was one solution to overcome the obstacles, i.e. lack of skills, distrust and language barrier, and also crucial to the success of the project. According to the qualitative research findings, KMITL has been favored by the people of Panoki village to provide the training and support for the project. In addition, this research has revealed the following interesting facts with regard to the local residents of Panoki village:

1. After a good rapport was established, the villagers were more open to share information about their life and livelihoods. They have also formed a positive attitude toward the academic services of KMITL and expressed their intention to seek consultation from the university in the future.

2. The villagers have shown improvement in their work skills and exercised greater care of personal health and hygiene, especially their knowledge development on a construction of bamboo reinforced concrete road.

3. With the future completion of this road, more economic development and thus materialism will find ways to their doorsteps, a phenomenon that would undesirably alter their life and livelihoods. Moreover, it is apparent that the cultivation of corn plants is increasing with the advance of the road. The more the corn cultivation areas, the severer the deforestation in the area. To preserve their cultures and ways of life as well as conserve the natural resources, future quantitative research has been planned for the village, e.g. quality of the PNK concrete road, road safety and maintenance.

4. The observation data on behaviors and attitudes of the villagers could be used in redesigning the academic curricula to better suit the cultures and requirements of Karen children and youths.

The authors would like to express deep gratitude to Mr. Pawadee, Head of Panoki Village, and to students from Hui Nokkok School for their translation, without whom a good understanding and close rapport between the consulting team and local workers would not have established.

References


