

# METHODS FOR ENHANCING RESOURCEFULNESS IN FORESEEING DANGEROUS SITUATIONS IN CASE OF ACCIDENTS OF DISASTER

**Kenji Horioka**

**Safety Research Laboratory Chief**

**East Japan Railway Company**



## SUMMARY

We report here our new training method that has recently been introduced in programs for our employees. This method is aimed at enhancing ability to act flexibly and appropriately in a disaster. This method was created based on interviews with operators who have had experience in guiding passengers to safety from the tsunami caused by the Pacific Coast of Tohoku Earthquake in 2011. Subsequently, we carried out the training program using the method that had been produced initially to evaluate the effectiveness of this method in improving participants' resourcefulness. We re-evaluated its effectiveness based on the remarks of participants in this program and further developed this method.

## INTRODUCTION

East Japan Railway Company (JR-East) operators successfully guided their passengers to safety from the tsunami caused by the Pacific Coast of Tohoku Earthquake in 2011. At the time the earthquake occurred, 27 trains were in operation along the Pacific coast (Fig.1). As soon as the tsunami alert was issued, train drivers and conductors evacuated passengers and guided them on foot to nearby tsunami shelters before five of these trains were swept off the tracks.

We will introduce a successful example of how they rescued their passengers from the tsunami.

"The train driver stopped his train at soon, as he felt the huge seismic shock. He decided that they should escape from the train and move to a safer high spot that the tsunami would not reach. He was able to decide so quickly because he had been trained to imagine what he should do or what would happen if a large earthquake occurred."

We also interviewed our employees who had escaped the tsunami and asked how they made their decisions with the little information available. From the interviews, we found that it would be effective to improve the ability to cope with unanticipated problems. Consequently, we have developed a training method to enhance this ability.

## SUMMARY OF OUR TRAINING METHOD

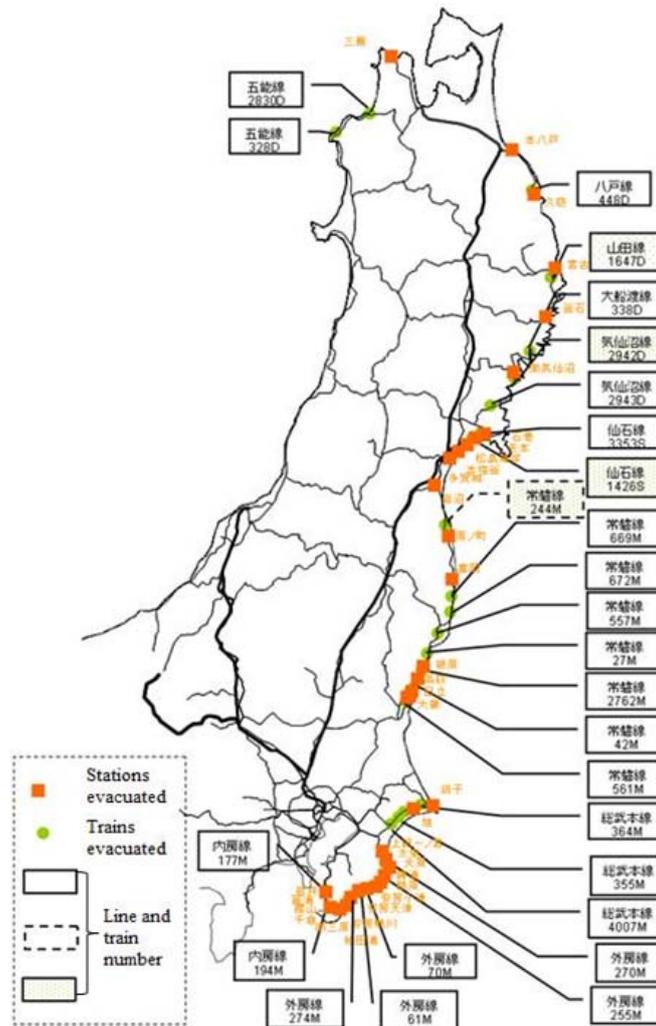
In the training method, the chairperson of a group reads the scenario of an irregular railway event, and then members think about the situation and decide what they should do.

We developed two versions. In one version, the chairperson asks a question such as, "Should you stay on board or evacuate?" Each member chooses "yes" or "no" cards. After all the members make their decision, they simultaneously show which card they chose. Then the chairman asks them how they chose their answer.

In another version, after the chairperson asks the question, each member writes their decision on a blank sheet.

Then, the chairperson leads the members in a discussion, in which they describe their respective decisions and debate among themselves regarding their reasons. This ultimately leads to a discussion of alternatives that must be made in unstable circumstances and the members' ability to act effectively in irregular situations can be enhanced.

We tested the method with six groups (including station staff, train operators, maintenance engineers, and construction supervisors). Through this test, we found that participants were satisfied with the method, especially regarding discussion about irregular circumstances. One comment from a participant was that they found through discussion that there are so many ways to avoid dangerous situations. We believe group discussions helped the participants to think of alternatives and imagine many factors to consider, and notice them to understand that there is no "correct answer".



**Fig.1 Railway network of the East Japan Railway Company and its stations (squares) and trains (circles) from which station staff and train crews guided passengers to the safety from tsunami on March 11, 2011**

Consequently, we found that using the method was the most suitable way to enhance the resourcefulness of employees. We are now introducing this method in our company via intranet and refining the training scenario as well as the instructional manual for the chairperson.

**EVALUATION OF THE TRAINING METHOD**

We evaluated effectiveness of our training method based on data obtained in some institutions.

**Methods**

The training using this program for train operators was carried out for the purpose mentioned above. We used a version of the training in which these participants were required to write their decisions on a blank sheet.

The training program comprised of two stages: 1) The chairperson asks each participant to form an image based on the scenario shown in Fig.2. Then, they were instructed to consider individually and freely what action they would make in that situation and to write their decision on a blank sheet. 2) Participants disclosed their decisions to each other. The chairperson encouraged the participants to discuss the appropriateness of their decisions in various situations.

After the training program, the participants were asked to write their remarks down.

**Result of the questionnaire**

We obtained the following positive remarks about the training program:

- Participants wrote that "I seldom had an opportunity to consider what we would do under disaster conditions. I realized that appropriate actions vary depending on situation."

- Participants considered that readiness for prompt decisions and actions in various and irregular situations was improved by this kind of training.
- Listening to decisions of others helps participants to expand their own image of factors in disaster situations.
- Some participants found it helpful in the training to form an image about disaster conditions using an open-ended scenario with few details for them to decide how to act when they cannot predict consequences.

On the contrary, some negative remarks were also presented by the participants. In addition, when we observed the training, we found some difficulties that the participants encountered in the training program due to differences from most training programs using previously introduced methods.

- The new training method did not show participants correctness or appropriateness of their ideas. Therefore, some participants questioned if their ideas would appropriately fit situations and if it would be all right if they took actions as discussed in the program.
- Using an open-ended scenario confused participants because most of our training programs require participants to follow a fixed procedure described in a manual. Some of the participants could not imagine a situation or condition clearly in the training program. Several groups failed to develop concrete discussion.
- In the training program, participants are required to discuss the relativity of appropriateness of actions and situational factors. However, several participants argued for the validity of their own ideas.
- Development of discussions seemed to depend on the chairperson's skills in facilitating group members to actively express their opinions and ideas in discussion.

### **Discussion and elaboration of the training program method**

It was implied that the training encourages participants to take flexible action depending on the conditions by thinking for themselves of what to do, and listening to and discussing others' ideas. However, considering the negative remarks and problems that we observed in the training, we realized that some of the procedures needed to be elaborated. Here, we show two examples of our elaborations.

1. Compared to the manual we initially made, we have further emphasized that appropriateness of actions would vary according to situation. We added detailed descriptions of the below to the manual:

- Participants should add various situational factors to the vague scenario to assist that the situation be discussed concretely.
- Additional factors should be changed in the progress of discussion.
- In accordance with such change, participants are allowed to change their decisions to make their ideas fit the currently discussed situation.
- The chairperson is expected to encourage the group to not hesitate from changing their decisions.

2. The manual added a provision to encourage the chairperson to expand discussion by adding a Q and A section.

**Imagine how you would be in this situation**

When you are in uniform and walking in the station,  
a great earthquake occurs.  
The roof of the platform breaks down.  
A few passengers are trying to get down on the track  
to escape.

**What would you do in this situation?**

Cues to develop your discussion:

- What would you do if there were no other staff around?
- What would you do if you could not contact your boss?
- What would you do if there were no space to escape on the platform due to crowding?
- What would you do if it were midnight and you could not see the condition of the tracks clearly?

**Fig.2 A scenario sheet used for evaluating effectiveness of the training**

## **EVALUATION OF LASTING EFFECTS OF THE TRAINING**

In order to decide what to do without wasting time and resources in an emergency, it may be useful to prepare as many options for actions in various situations as much as possible. It is desired that staff become more aware of potentially dangerous situations after training. To check the lasting effect of the training program, we asked the participants two months later to recall any idea or opinion that they had discussed in training.

### **Methods**

Thirty-one train operators who had participated in the training 2 months previously receive the scenario sheet they had used in training along with a question sheet. The participants were asked to recall as many ideas or opinions that had come up in the discussion as they could and write them on the question sheet. In addition, the participants answered two questions: One was whether they had increased opportunities to consider for themselves how to act in an emergency. The other question was whether or not participants would recommend employees of other affiliated organizations to take the training program.

### **Results and discussions**

28 of 31 participants recalled ideas and opinions that other members had given in the training, as well as their own ideas. This result indicates that the training program has increased the options that the participants would take in an emergency.

Moreover, 24 of 31 participants answered that they have come to think their actions personally more than before. Further, 23 participants responded that they were able to imagine how to guide passengers to safety in various critical situations. Thus, the training program is likely effective in promoting participants to voluntarily consider appropriate actions.

Finally, 30 participants answered that the training program was recommendable to others. This comment can be interpreted that the participants considered the training program to be effective.

As shown above, it was confirmed that there is a certain level of effectiveness in the training program as a way of improving participants' readiness for action in various situations.

### **CONCLUSION**

A new training method has recently been introduced into the training and workshops in which operators learn safety. The method is also introduced to the operators on the portal site within our company.

This method is still being developed by increasing scenarios tailored to different work situations. Furthermore, we plan to encourage branch offices to take this training program and to create their original scenarios reflecting on their local conditions.