POSSIBILITY OF USING MICHI-NO-EKI AS DISASTER SHELTERS: A NATIONWIDE QUESTIONNAIRE RESEARCH AMONG STATION MANAGERS

Kosuke TANAKA¹, Ryusaku MATSUO² and Junko MATSUMOTO³

¹Member of JSCE, Assistant Professor, Dept. of Civil Eng., Tokyo University of Science
(Yamazaki 2641, Noda-shi, Chiba 278-8510, Japan)
E-mail: tanaka.k@rs.tus.ac.jp

²Faculty of Sociology, Toyo University (28-20, Shiroyama 5, Bunkyo-ku, Tokyo 112-8606, Japan)
E-mail: yousakum@gmail.com

³NPO Hito to Michi Kenkyukai (7-1, Sanban-cho, Chiyoda-ku, Tokyo 102-0075, Japan)
E-mail: matsumoto@route-press21st.jp

Michi-no-Eki provide free parking, toilets, and information on specific areas in Japan and play important roles as sales offices for local products. After the Great East Japan Earthquake in 2011, these stations attracted attention as possible disaster shelters. The purpose of this study is to consider their function as disaster shelters and to grasp the current situation of these stations nationwide. We conducted a questionnaire survey among station operators, obtaining responses from 73.2% of the stations. The results showed that there were not enough facilities and systems to counter disaster. On the other hand, the results suggested that although many stations are privately managed, most station operators have intention to serve as disaster shelters. Michi-no-Eki seem to have high utility during both normal times and disasters. However, for the stations to function as disaster shelters, their equipment and the system must be improved.

Key Words : disaster, michi-no-eki, roadside station, questionnaire, station manager

1. INTRODUCTION

Japan is a country at high risk of natural disasters. Public facilities such as schools or public halls are useful as disaster shelters. In recent years, the Michi-no-Eki have attracted attention as possible disaster shelters. Michi-no-Eki refers to Japan’s roadside stations⁴, which are located alongside local roads. The stations provide free parking, toilets, public telephones, and information on the area. Furthermore, they serve as sales offices of local products².

The first time a roadside station was noted as a disaster shelter was during the Mid Niigata Prefecture Earthquake in 2004. Many victims rushed to the stations at the time. Temporary houses were set up in the parking lots and they served as information dissemination hubs. In addition, it was reported that the stations greatly contributed to supporting the victims and providing activities for recovery, even during the Great East Japan Earthquake in 2011.

The stations have large parking lots that are useful bases of activity. Furthermore, they are located along the main road, which is advantageous in terms of access from other areas in emergency situations. In addition, 1,040 stations (as of June 2013) are scattered across the country. They can serve as effective disaster shelters in various types of natural disasters, the time and place of occurrence of which, could not be predetermined.

On the other hand, the following problems were reported for the stations during the Great East Japan Earthquake. At the time, many victims of the disaster swamped the stations. However, the water supply was hampered by the earthquake, and consequently, there was no water flow to the toilets. Staff at the station had to remove waste from the toilets with gloved hands. While this was not their duty, they did the job in good faith⁶.

Various studies have been conducted to improve the disaster prevention function of roadside stations. Yoshida et al.⁴ conducted a questionnaire survey targeting the stations in six prefectures in the Tohoku area (Japan’s northeastern region) to report on the activities and issues at the time of the Great East Japan Earthquake.

Hamamoto et al.⁵, ⁶ conducted a disaster-related
questionnaire survey targeting roadside stations in Yamaguchi Prefecture. They pointed out the need to develop hardware, such as private power generation facilities and emergency toilets, and highlighted the need for preliminary agreements with local governments.

Tanaka and Kawasaki\(^7\) conducted a survey on roadside stations in Fukushima Prefecture, pointing out the importance of maintaining facilities and disaster shelter education for staff.

If many people gather at the station when a disaster occurs and there are not enough facilities, confusion could occur. However, previous research has not clarified the whole situation, because only certain regions were targeted.

Therefore, in this research, we conducted a questionnaire survey targeting the station managers of roadside stations nationwide. As such, a questionnaire survey on disaster shelter facilities and intended use for disaster shelter was performed. Based on the results, we examine Michi-no-Eki as a disaster shelter in this paper.

The disaster shelter assumed in this paper is not an evacuation site for escaping from the danger when a disaster occurs or is likely to occur. It is a facility for staying for as long as necessary or for temporarily accommodating inhabitants who cannot return home due to a disaster.

The case of the Mid Niigata Prefecture Earthquake in 2004 is an example. Temporary houses were set up in the parking lots and they served as information dissemination hubs. In addition, the stations contributed to supporting the victims and providing activities for recovery.

The shelter standards aim to satisfy all of the following conditions\(^5\):

- a) The facility must be of the appropriate scale and appropriate for staying victims.
- b) The facility should be able to promptly accept victims and distribute daily life-related materials.
- c) It is in a place where the expected impact of a disaster is relatively small.

| Question | Answer format | Reference |
|----------|---------------|-----------|
| Preparation of facilities for use in a disaster | Single answer to each item | Table 2 |
| Positioning in disaster management plan | Multiple choice items and free description | Fig. 1 |
| Preparation of disaster prevention manuals | Single answer and free description | Fig. 2 |
| Experience in responding to a disaster | Single answer and free description | Fig. 3 |
| Intention of acceptance at the time of disaster | Single answer and free description | Fig. 4 |
| Responses to possible services during a disaster | Multiple choice items and free description | Fig. 5 |
| Opinions on improving Michi-no-Eki as disaster shelters | Free description | |

d) It is in a place where access by vehicles is relatively easy.

Some roadside stations are not necessarily located in places where the impact of disasters is small. However, because roadside stations are basically located along main roads and have a certain scale, the roadside stations can become disaster shelters from the aspect of access and scale.

In this paper, a roadside station as a disaster shelter is considered from the aspect of facilities and administration system.

2. OVERVIEW OF THE SURVEY

We conducted the survey from August to October 2012. We sent questionnaires to 987 roadside stations nationwide (number as of August 2012), receiving responses from 727 stations (73.7%). Five stations that did not write the station name were excluded from the aggregation, meaning that ultimately, the responses of 722 stations (73.2%) were analyzed. Table 1 shows the summary of the questionnaire.

(1) Disaster shelter facilities

The following question addressed disaster shelter facilities: “Does your station have any disaster shelter facilities? Please fill in the appropriate situation for all disaster shelter facilities.” Table 2 provides the results.

(2) Disaster shelter administration system

Regarding positioning or inclusion in a disaster shelter administration plan, we asked the following question (see Fig. 1 for the response options): “Is there a disaster management position in your station; for example, is your station included in a regional disaster shelter plan or designated as an evacuation center in the area?”

In addition, we asked: “Was there a manual at the time of the disaster?” Figure 2 provides the results.

Regarding the experience of using disaster shelter facilities, our questions provided two options for responses, namely, “yes” or “no.” “Have you used disaster shelter facilities? Please circle the option indicating your answer. If you have utilized them, please describe the situation at the time.”

In addition, we asked questions pertaining to collaboration with other stations. “Have you ever been provided with information, equipment, and human resources, amongst others, by other stations when your station was hit by a disaster such as an earthquake, typhoon, heavy rain, and so on?” We provided two options for the responses, namely, “yes” or “no,” and asked for specific details through free description. Figure 3 provides the results.
We asked the following question to confirm the intention of accepting disaster victims. “When disasters occur during business hours, it is expected that road users and neighboring local residents in addition to customers at your station will arrive as victims of the disaster. Do you accept these people at your roadside station? Please circle the corresponding number. (Assume no damage to your station).” The results are provided in Fig.4.

Next, we asked what types of services were considered possible (see the results in Fig.5 for the options): “What type of services can be offered to the victims? Please circle all applicable items (multiple answers possible).”

Finally, we asked respondents’ opinions on improving disaster shelter activities at the Michi-no-Eki through free description.

3. RESULTS AND DISCUSSION

In this chapter, first we show the current status of the facilities and the system of roadside stations as disaster shelters. After that, the results of the intention survey are shown and discussed.

(1) Disaster shelter facilities

Table 1 provides the results of the survey on the available disaster shelter facilities at stations. The rate of preparation of automated external defibrillator is 64.8%, and only this figure exceeds 50%. The second highest is 40.6% preparedness as a disaster information station. The rate of stations with a reserve power source is also only 16.6%.

(3) Intention of station operator

We asked the following question to confirm the intention of accepting disaster victims. “When disasters occur during business hours, it is expected that road users and neighboring local residents in addition to customers at your station will arrive as victims of the disaster. Do you accept these people at your roadside station? Please circle the corresponding number. (Assume no damage to your station).” The results are provided in Fig.4.

Next, we asked what types of services were considered possible (see the results in Fig.5 for the options): “What type of services can be offered to the victims? Please circle all applicable items (multiple answers possible).”

(4) Others

Finally, we asked respondents’ opinions on improving disaster shelter activities at the Michi-no-Eki through free description.

As for toilets, 14.7% of the stations have at least one of the following facilities: earthquake-resistant toilet (9.8%), earthquake-resistant reservoir (6.0%), emergency sewage tank (2.9%), assembled toilet (2.6%), or manhole toilet (2.4%).

These results indicate that the preparation of facilities is currently far from adequate in relation to the use of all the roadside stations as disaster shelters.

In the open-ended question, insufficient improvement of the facility was reported as an issue of concern: “Disaster shelter functions are not being provided, and no satisfactory assistance is provided,” “Even though providing a reserve power source is urgent, it is impossible to provide this equipment using our own funds without government support,” and “It is a great burden to provide the function as a disaster shelter, because it is privately managed.”

In fact, roadside stations have public characteristics, but many stations commission management personnel from the private sector. Of the operators, 15.7% were from the municipality, 31.1% from semi-public corporations, 8.9% from foundation corporations, and 44.3% from private sector companies.
Thus, government support is indispensable for preparing facilities.

(2) Disaster shelter administration system

In addition to the abovementioned facility improvements, the system needs to be improved as well. The results for roadside stations’ positioning or inclusion in the disaster shelter administration plan are provided in Fig. 1.

In Fig. 1, 20.5% of the stations were positioned as a disaster prevention administration center and 6.5% had a usage agreement or memorandum of understanding at the time of a disaster.

Here, in the open-ended question, it is suggested that a sufficient system is not organized; for example, “The authority and responsibilities of the station manager when a disaster occurs have not been decided,” or “There is no arrangement with the administration, so it is difficult to accept victims.”

Nevertheless, 56.1% of the stations responded that they could play a role even if they had no arrangement with the administration. Due to this intention of doing what they can do, roadside stations could be potential disaster shelters.

Next, the rate at which disaster prevention manuals are prepared is shown in Fig. 2. Operation manuals for disaster prevention have been prepared at 7.9% of the stations, 23.8% have been considering preparing manuals, but 64.3% have no manuals and no plan to prepare operation manuals. This result indicates that emergency management at the time of a disaster will depend on each station.

The free-description responses indicate similar problems; for example, “A private company commissioned operation from the administration, and is an amateur in terms of disaster prevention,” and “In our station, the station manager is a man, and about 20 women work part time. If a disaster occurs, we will be unable to respond.”

Furthermore, Fig. 3 shows that 6% of the respondents answered “Yes” regarding having used their own stations in a disaster. Despite the fact that the disaster shelter function of roadside stations is now gaining more attention, practical experience remains limited.

These results mean that almost all the stations are lacking both in experience and a manual against a disaster.

On the other hand, at the time of a disaster, the roadside stations in the disaster area interchange people and items between other stations. Here, 7.1% of the stations have had such experience. There was also a report that two stations located about 800 km apart cooperated. Their own network of Michi-no-Eki could be effective for supporting each other during a disaster.

As stated above, since the stations are not necessarily installed/operated as disaster shelters, there is a concern that there are not enough facilities and systems to handle a disaster.

(3) Intention of station operator

In this section, the intentions of station operators are shown and we consider the possibility of roadside stations being used as disaster shelters.

The results of the responses pertaining to the intention to accept victims during a disaster are shown in Fig. 4.

About 95.4% of station operators responded that they would accept all people or accept as many as possible.
In total, 24 stations (3.5%) answered that they would not accept victims of the disaster. Of the 24 stations, 10 face a problem in terms of location; for example, “because the station is located between a mountain and the sea, it will easily collapse in heavy rain.” Furthermore, 6 of the 24 stations face equipment problems; for example, “it is impossible physically, because it is a narrow roadside station.”

These results indicate that most station operators have the intention to contribute.

Furthermore, the free description expresses the station operators’ high intention to use their facilities to serve as disaster shelters. Other free descriptions are as follows: “It is desirable to be a disaster shelter as a public facility.” “In the event of a disaster, I would like to accept all people as far as possible and to offer goods as much as possible.” “I am sorry that our station cannot serve as a disaster shelter, because it is not located in an area safe from disaster.” “I think we can do something, even though the station will have difficulties serving as a disaster shelter, because of its location.”

The services they will be able to offer are shown in Fig. 5.

The percentage of stations that will be able to provide a toilet is 94.6%, and 66.1% will be able to provide water. Note that the question is based on the premise of no damage to the station, despite the fact that it will likely be severely damaged. We must consider the possibility that the station will not always be able to provide these services because of the lack of preparation of facilities.

(4) Discussion

In the preceding section, Table 2 shows that preparation of toilets against a disaster is not adequate, while 94.6% of respondents said that they thought they could offer toilets for use by victims. The lack of preparation of facilities at stations of some prefectures was pointed out(4)-7), and this paper showed that almost all the stations in Japan were lacking preparation of facilities. Furthermore, this paper revealed that most of station operators had the intention to accept disaster victims.

Once a natural disaster occurs, general facilities do not necessarily function. For example, one station, Jobon-no-Sato, accepted many victims during the Great East Japan Earthquake. According to Ota(3), the water supply stopped, and staff had to remove waste from the toilets with gloved hands. Without adequate preparation we can assume that some stations will fall into similar situation in the future. Improvement by the public sector is required to avoid the situation.

4. CONCLUSION

The possibility that Michi-no-Eki will be utilized as disaster shelters has gained increasing attention since the Mid Niigata earthquake in 2004 and the Great East Japan Earthquake in 2011. Stations are located alongside main roads throughout Japan, and usually have large parking lots. Therefore, they have the potential of serving as disaster shelters against natural disasters that might occur at unknown times and places. It is important to grasp the current situation if stations nationwide are to be used. We conducted a questionnaire survey targeting station operators.

As a result, we clarified that the facilities for disasters, such as emergency power supplies and disaster toilets, are not adequately prepared. In addition, it was suggested that it is difficult for maintenance to be carried out through the station’s own funds; thus, government support is essential.

Furthermore, more than 70% of the stations have no partnership with the administration at the time of disaster, and 64.3% have not prepared disaster response manuals.

Some roadside stations are undergoing facility maintenance as emergency bases. However, most do not have enough facilities.

On the other hand, as 95.6% of station managers indicated their intention to accept disaster victims, they will do so in good faith even if the facilities and system are inadequate.

Though roadside stations attract attention as disaster shelters, people may swarm to stations and cause confusion, regardless of whether the station is functioning sufficiently at the time of disaster.

Improvement by the public sector is required; it should not depend only on their good faith.

In future research, it will be necessary to consider the usage and preparation at the time of disaster based on the circumstances of each area and each station.

REFERENCES

1) Michi-no-Eki Official Website. https://www.michi-no-eki.jp/about/english (Accessed October 1, 2017)
2) Murakami, K. H. and Oyabu, T.: An analysis of how roadside stations, “Michi-no-eki”, function to promote local revitalization: A case study in a rural area in Japan, Journal of Global Tourism Research, Vol. 1, No. 1, pp. 47-54, 2016.
3) Ota, M.: Road Station at That Time, UN World Conference on Disaster Risk Reduction, http://www.route-press21st.jp/kokuren2015/04e.pdf (Accessed October 1, 2017)
4) Yoshida, S., Matsuda, A. and Kasama, S.: A study on the enhancement of disaster readiness at “Michi-no-eki” roadside rest areas, Public Works Research Institute Result Report 2014, No. 30, 2014.
5) Hamamoto, S., Kumano, M., Hiraoka, T. and Sawamura, S.: A study about the improvement of disaster protection function of “Michinoeki” in Yamaguchi Prefecture: About the relevance of hazard map and the attitude survey of station
master and manager, Proceedings of the Annual Research Meeting Chugoku Chapter, Vol. 37, pp. 593-596, 2014.

6) Hamamoto, S., Kumano, M., Hiraoka, T. and Sawamura, S.: A study about the improvement of disaster protection function of “Michinoeki” in Yamaguchi Prefecture: About the attitude survey of the person in charge of local authority and future trends of each “Michinoeki”, Proceedings of the Annual Research Meeting Chugoku Chapter, Vol. 37, pp. 597-600, 2014.

7) Tanaka, Y. and Kawasaki, K.: Current state and future issues of the development of roadside stations as disaster prevention function, Report of the City Planning Institute of Japan, Vol. 14, pp. 236-241, 2016.

8) Ministry of Education, Culture, Sports, Science and Technology “Emergency Evacuation Site” and “Evacuation Shelter”, http://www.mext.go.jp/b_menu/shingi/chousa/shisetsu/013/007/shiryo/__icsFiles/afieldfile/2013/12/26/1342793_1.pdf (Accessed September 12, 2019)

9) Ministry of Land, Infrastructure, Transportation and Tourism, About Michi-no-Eki, https://www5.cao.go.jp/keizai-shimon/kaigi/special/local_economy/04/haifu_04_1.pdf (Accessed April 5, 2019)

(Received June 15, 2018)