



EXPERIMENTAL STUDY ON DISASTER RESPONSE TO FOREIGN TOURISTS USING THE INTERPRETER SOFTWARE

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Abstract

As a result of the campaign conducted by the government of Japan to invite foreign tourists to Japan in order to become a tourism-oriented country, the number of foreign tourists visiting Japan in 2018 was 31.91 million, surpassing the 28.69 million in 2017, a record high for seven consecutive years. The number has been steadily moving toward the target of 40 million people in 2020. On the other hand, Japan is a natural disaster-prone country. Natural disasters have occurred in various parts of Japan in recent years, including the 2011 Great East Japan earthquake, and most recently the 2018 Northern Osaka earthquake and the 2018 Hokkaido Northern Iburi earthquake. In preparation for the 2020 Olympic and Paralympic Tokyo Games, Japan is required to create an environment where foreign tourists can travel with peace of mind. Thus, Japan is strongly urged to establish a system that can provide appropriate disaster information in order to guide foreign tourists promptly and appropriately in the event of a disaster. Therefore, in this study, we propose an experiment that can grasp the information needs of foreign tourists at the time of a disaster and verify the validity of providing information by tourist facilities staff according to the information needs.

In this study, experiments were conducted on Chinese people, who are the most popular tourists in Japan. This study is also characterized by conducting experiments using interpreter software (SmaLingual Pro). Using this software, conversations between tourist facilities staff and Chinese tourists becomes possible and correct disaster responses for foreign tourists based on appropriate information transmission can be clarified. The disaster response experiment using simultaneous interpretation app was conducted as a method for organizing the conditions and contents of disaster information that tourist facilities should provide to foreign tourists during a disaster. In the case of providing disaster information to foreign tourists, it is important to focus on four conditions: an easy-to-understand description of what happened, how it will progress, and what action to take. It is necessary, furthermore, to consider differences in culture, disaster experience, and legal systems of the country that tourists came from, instead of literally translating disaster information issued by public institutions such as Japan Meteorological Agency. If such an experiment is conducted, it will be possible to prepare a disaster response manual which can be actually used for foreign tourists.

The interpretation software makes it easier to perform the above experiment. In addition, the application of the interpretation software will make it possible, for even relatively small tourist facilities that do not employ staff who can speak foreign languages, to respond to foreign tourist in disasters. It is important that the interpreter software is used during normal times, so that it can be used in an emergency.

Keywords: disaster response experiment; foreign tourists; interpretation software; disaster information; tourism crisis management



1. Introduction

Japan has strategically invited foreign tourists to become a tourism-oriented nation, and as a result, the number of foreign tourists visiting Japan has been increasing for seven consecutive years, and has been firmly moving toward the target of 40 million for 2020. On the other hand, Japan is a natural disaster-prone country, and many foreign tourists have encountered natural disasters such as the 2018 Northern Osaka earthquake in June 2018 and the 2018 Hokkaido Eastern-Iburi earthquake in September 2018 [1-4]. At the time of these disasters, many foreign tourists tried to use the internet to gather information, but could not easily obtain the necessary information. Whereas, it has been reported that one of the useful information collecting means for foreign tourists was information from "employee at accommodation". However, small-to-medium-sized tourist facilities in Japan have few employees who can speak foreign languages.

The definitions of terms such as magnitude and seismic intensity differ between Japan and other countries. In addition, actions to be taken in the event of an earthquake and legal systems for evacuation of victims vary from country to country. In the first place, rather than spending time in evacuation centers, foreign tourists enjoy the following itinerary and want to return home as scheduled. It is important provide disaster information on (1) what is happening, (2) how it will progress, and (3) actions to be taken in (4) plain language. In addition, it is necessary to provide disaster information that encourages foreign tourists to take action, taking into account differences in culture, disaster experiences, and legal systems.

The purpose of this study is to verify that employees of hotels and tourist facilities can provide appropriate assistance to foreign tourists using an interpretation app in the event of a disaster. In this paper, basic experiments on disaster response will be introduced, and issues to be considered in providing disaster information to foreign tourists will be discussed based on the results.

2. Necessary conditions for disaster information

Mr. Kunio Yanagida, non-fiction writer, in his book "Unexpected Trap: Nuclear Power Plants," pointed out that it is important to provide disaster information (1) what is happening, (2) how it will progress, and (3) actions to be taken in (4) plain language [5]. It seems that this idea is being adopted in recent disaster information released by the Japan Meteorological Agency. However, there are some events that are not well understood what is happening even by experts. There is a fact, furthermore, that even many Japanese people do not fully understand disaster information, because it uses esoteric technical terms.

Municipalities issue evacuation information to encourage residents to take evacuation actions when a disaster is predicted to occur or to prevent further damage from spreading in Japan. However, in a situation of urgency, it is indispensable to issue evacuation information based on (1) to (4) above, with the presence of highly skilled disaster prevention personnel. Therefore, Suzuki [6] developed a function to register the standard text corresponding to (1) to (4) in advance in the evacuation information issuing function of the municipal disaster information system, and fill in the blanks of the standard text when issuing the evacuation information. The statement of evacuation information is created, and is sent to citizens by e-mail by the system. The disaster information system having this function has already been actually used in a plurality of municipalities for disaster response.

Catastrophic disasters occur almost every year in Japan, and Japanese people listen to and read their reports and commentary on media such as television and the Internet many times. Therefore, many Japanese are somewhat accustomed to disaster information. In recent years, SNS has become widespread, and there are many applications that provide disaster information in real time. Training of citizens who were qualified as local disaster management leader is also conducted nationwide, and the number of such citizens is increasing every year. Evacuation based on the My Timeline following the approach of the typhoon has begun at the local level [7]. However, it is clear from the low evacuation rate in recent heavy rain disasters that only a few people understand the disaster until they take the correct action even in disaster-prone country like Japan.



On the other hand, it is impossible, for foreign tourists visiting Japan from countries that do not experience specific natural disasters, such as countries where tropical cyclones and typhoons do not hit, countries where earthquakes rarely occur, and countries where active volcanoes do not exist, to imagine how to act in response to a disaster encountered in a travel. Therefore, when providing disaster information to foreign tourists, it is necessary to follow the above (1) to (4) and use different explanations and expressions from those provided to Japanese people so that they can take appropriate actions.

3. Features of the interpreter app used in this study

As mentioned above, foreign tourists will not be able to understand the meaning of push-type disaster information provided by TV or SNS. Whereas, many Japanese are not good at speaking foreign languages. For many Japanese living in a society where only Japanese people live, foreign languages are a subject studied at school, but there are few opportunities to actually talk and discuss using foreign languages. So, many Japanese are not good at communicating with foreign tourists.

At small to medium-sized hotels and leisure facilities, there are few staff members who can speak foreign languages. It has been reported that one of the useful information collection means for foreign tourists at the time of the recent disasters such as the 2018 Northern Osaka earthquake in June 2018 and the 2018 Hokkaido Eastern-Iburi earthquake in September 2018 was information from "employee at the hotel"[1,3,4]. One of the reasons is that foreign tourists can ask the employees what they don't know repeatedly over and over. It is almost impossible for the employees to explain the information perfectly according to the above conditions (1) to (4) at once so that anyone can understand. Also, because the level of understanding varies depending on the recipient of the information, it may be necessary for foreign tourists to ask the employee many times in order to finally understand how to act.

Small and medium-sized tourist facilities have a shortage of employees and a small number of employees who can speak a foreign language, making it difficult to respond individually to foreign tourists. Foreign languages are also different for foreign tourists, so Chinese, Korean, English, Thai, Vietnamese, Indonesian, etc. are needed. Therefore, the author came up with the idea of using an interpreter app, that has been developed in recent years and is spreading rapidly, in disaster response of tourist facilities. The translation engines available for the interpreter app are developed by Google, Microsoft, NICT in Japan and so on.

As described above, in order for tourist facility employees to provide disaster information to multiple and multinational tourists simultaneously and to answer tourist questions individually, an interpreter app that can translate between one-to-many and Japanese-to-multiple languages. Needless to say, such an application can be used for tourist information and facility explanations during normal times. In this research, "SmaLingual Pro", which has been jointly developed by the author and Smart Culture Gateway Co., Ltd., was selected as the interpreter app with such functions [8]. This application is a paid service that provides

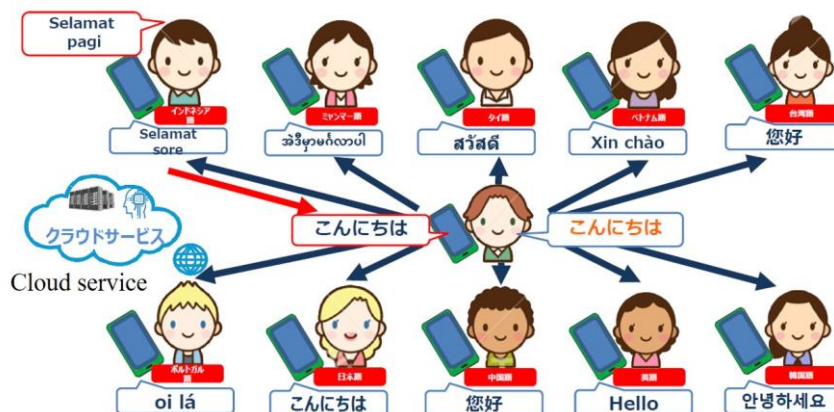


Figure 1 – Schematic diagram to show features of the interpreter app (Brochure for SmaLingual Pro)



simultaneous multilingual interpretation using a multilingual translation engine developed by National Institute of Information and Communications Technology; NICT in Japan. The application can be downloaded from the Apple Store or Google Play, and with simple settings, you can talk with multiple people in multiple languages with the same convenience as a regular smartphone conversation.

4. Fundamental disaster response experiments

4.1 Examination on differences in disaster experience, lifestyle, culture and legal system

4.1.1 Participants in the experiment

Taking Chinese and Taiwanese and Hong Kong people as the most common foreign tourists to Japan, foreign tourists whose native language is Chinese account for about 50% of the total. Therefore, we first planned a fundamental experiment for Chinese. China ranks first in the world in the number of earthquakes of magnitude 6 or more. Massive damage has also occurred, exceeding 200,000 people. However, since active fault zones are located in limited areas, while China's land area is about one-quarter of the world's, most of Chinese have not experienced earthquakes. In addition, it is known that the actions taken during an earthquake are different between the two countries, such as Japanese people hiding under the table, while Chinese people run outdoors. In addition, whether or not they have received disaster management education, the content of the education that they receive should also differ depending on the region. Therefore, in conducting a fundamental disaster response experiment for Chinese people, it is necessary to select multiple people who grew up in China from different origins and in different disaster environments as participants.

Therefore, we picked up 11 Chinese students of University of Yamanashi from hometowns shown in Fig.1 as candidate students to participate in the experiment. As shown in Table 1, only five students have experienced the earthquake, six students have learned what to do during the earthquake from their parents and four students have participated in the earthquake disaster drill. Therefore, as shown in the table, five of A, B, F, H and I selected from these 11 people were to participate in the fundamental experiment as Chinese tourists. In this selection, consideration was given to the dispersal of participants, and both students with and without disaster experience, as well as students with and without disaster education were included.

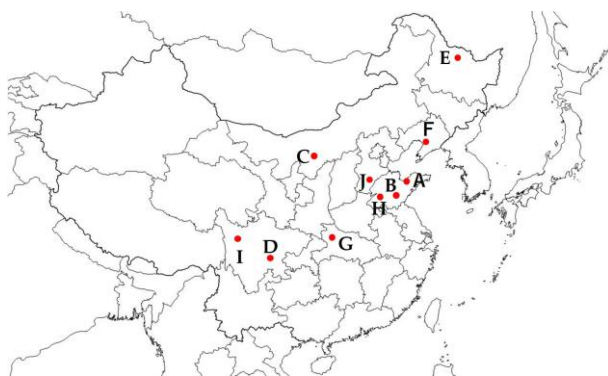


Fig.1 – Map showing hometowns of Chinese students

Table 1 – Classification of Chinese students

Chinese Student	Earthquake experience	Education form parents	Earthquake response drill
A			1
B			1
C			
D	1	1	
E		1	
F	1	1	
G		1	
H			1
I	1	1	
J	1	1	1
total	4	6	4

4.1.2 Scenario of the experiment

It was designed as an experiment for Chinese tourists who are not group tourists with a tour conductor. Therefore, the experiment was conducted under the condition that the participants of the experiment came to Japan with friends and stayed at the hotel where the experiment was conducted. The experiment dealt with



Fig.2 – Photographs of fundamental earthquake response experiment

the response immediately after the occurrence of a large earthquake, and set up three scenes: (1) a tourist jumps out of a hotel, (2) a friend in the room is injured, and (3) the lifeline stops. At the same time, the tourists asked the Japanese hotel staff questions, and the tourists had a conversation using SmaLingual Pro. The first author played the role of Japanese hotel staff, five Chinese students became tourists, and the second author taught Chinese students how to use the interpreter app and recorded the experiment. Fig.2 shows the implementation status of the disaster response experiment. The experimental results were analyzed using the data recorded in the interpreter app as a conversation log.

4.1.3 Results of the experiment

In the scene (1), when the hotel staff told the tourists not to rush out, the conversation shown in Table 2 took place. Here, the difference between the legal systems of the new seismic resistant design method in Japan and the seismic resistant class designated for each building in China became apparent. Many people in Japan know that buildings to which the new 1981 seismic resistant design method is applied are safe buildings that do not collapse. In China, on the other hand, it seems that it is common to express the degree of safety of a building by its seismic resistant class. There are still many brick buildings in China, and every time a large-scale earthquake occurs, such buildings collapsed and many people died under the rubble. Therefore, the Chinese rush out of the building with the earthquake. However, in Japan, where there are many earthquake-resistant buildings, the first thing to do is to hide under the table. The Chinese, who questioned the explanation of the hotel staff not to go outside, tried to confirm the safety of the building by checking the seismic resistant class of the hotel they stay, but the hotel staff gave a meaningless explanation to the Chinese that the was built after 1981. In addition, hotel staff added that the hotel was not rated for seismic ratings, which exasperated tourists.

Table 2 – Example of conversation in scene (1)

Speaker	dialogue	Native Language
Tourist	Why can't we get out of the building?	我们为什么不去户外呢。
Staff	Outside is more dangerous. The window glass of the building may break and fall.	外のほうが危険です。建物の窓ガラスが割れ、落下する可能性があります。
Staff	It is safest to be in this building.	建物の中にいるのが一番安全なのですよ。
Tourist	Will this hotel collapse?	这个酒店不会倒塌吗。
Staff	The hotel was built after 1981 according to new seismic standards.	このホテルは 1981 年以降に建てられましたので、新し耐震設計が適用されています。
Tourist	What is the seismic resistant class of this hotel?	这家酒店的抗震等级是多少啊。
Staff	There is no seismic resistant class for this hotel.	耐震等級はありません。



In Japan, there are 10 seismic intensity classes, and the maximum seismic intensity is 7. In China, on the contrary, there are 12 seismic intensity classes, and the maximum seismic intensity is 12. Buildings that have seismic resistance against seismic intensity 9 are designated as seismic class 1 or 2 as special or important buildings, while standard or moderate buildings are set to have low seismic performance. Although not always accurate, Chinese students explain that seismic resistant classes 1, 2, 3, and 4 are considered to be able to withstand seismic intensities of 9, 8, 7, and 6, respectively. Therefore, Chinese tourists tried to make sure that the hotel they stayed in had a seismic resistant class of 1 and was a safe hotel. In this way, it was found that the same treatment (explanation) as for Japanese tourists was not easily accepted by foreign tourists with different legal systems and customs.

From the experimental results in the scene (2), it became clear that it was necessary for the hotel to have a mechanism to collect information from the local government, such as the status of hospital reception and the impact of earthquake damage on traffic. In the scene (3), Chinese tourists asked about the guarantee of their lives. The hotel staff misunderstood this as financial compensation or confirmation due to delays in checking travel insurance or returning home. However, in China, the word "guarantee or security" seemed to be used to make sure that water and food were prepared at the hotel and that the hotel could lead a safe life.

Five Chinese students asked a total of 27 questions, and the first author answered each question as a hotel staff member. The conversation was repeated several times without responding to one question without completing the conversation. As a result, the correct understanding of foreign tourists was obtained. Since one tourist's question is also a question of another tourist, the answer from the hotel staff using the interpreter app to the question is also transmitted to all tourists, so it is also useful information for other tourists. Therefore, the conversation using the interpreter software was effective for the hotel staff to deal with foreign tourists at a time of disaster.

After the fundamental experiment, the second author asked each participant the impression after the experiment. As a result, a participant told that she was really panicked because the staff did not clearly state the seismic resistant class of the hotel. Another participant told that he could not fully understand the explanation of the hotel staff, because he had never experienced the earthquake. It has become clear that disaster information cannot be transmitted to foreign tourists even if the same explanation can be made using an interpreter app. Table 3 summarizes the five items to be considered when communicating disasters to foreign tourists other than the languages obtained from the fundamental experiment, and summarizes the contents and countermeasures. Even if an interpretation app is used, it is important to explain the event and response method in an easy-to-follow manner, as described in the countermeasures section, along with an explanation of the scientific basis. It was shown that it is essential to devise more than just translation, such as preparing a disaster response manual for foreign tourists and summarizing matters to be considered for each major country.

Table 3 – five items to be considered when communicating disasters to foreign tourists

Classification	Contents to explain	Countermeasure
Disaster Experience	Description of what is happening now	Explain the phenomenon as much as possible using easy-to-understand expression and plain language
Lifestyle and culture	Action taken when an earthquake occurs The meaning and usage of "guarantee"	Tell them about the hotel's actions. Be prepared to explain why you should take action. Do not assume that foreign tourists are learning about Japanese lifestyle and culture.
Legal systems	Seismic standards, evacuation systems	Explain the seismic safety of buildings, assuming that the seismic standards differ from country to country.
Technical terms	Magnitude, Seismic Intensity	Don't use magnitude and seismic intensity jargon alone to describe the magnitude the earthquake or seismic intensity of earthquake ground motions.
Tourism crisis management	Assistance for returning tourists to their countries and communication with the embassy	It is necessary for the hotel to make a tourism crisis management plan and prepare in advance.



4.2 Validation of four conditions required for disaster information

4.1.1 Participants in the experiment

The fundamental experiment is designed as a disaster response exercise carried out by hotel staff and tourists using an interpreter, in order to verify the validity to provide disaster information on (1) what is happening, (2) how it will progress, and (3) actions to be taken in (4) plain language. All of the 11 Chinese students picked up as participants in the experiment had never experienced a volcanic eruption and had little knowledge of volcanic eruptions. Thus, four Chinese students who did not participate in the experiment shown in 4.1.1 were selected as Chinese students participating in this experiment.

4.2.2 Scenario of the experiment

In Japan, the Japan Meteorological Agency is establishing a system to set an alert level for volcanic eruptions, announce the Volcanic Alert Level appropriately according to the volcanic situation, and release evacuation information according to the Volcanic Alert Level. The alert level is an index that categorizes the area that needs alerting and the disaster prevention measures to be taken by disaster prevention agencies and residents in five stages according to the volcanic activity, and announces it. This system is operated at 41 volcanoes out of the 111 active volcanoes in Japan.

Mt. Fuji is the largest active volcano in Japan, and it is said that more than 70 craters erupted in the past, mainly at the foot of the mountain. Therefore, only in the case of Mt. Fuji, the Volcanic Alert Level changes from 1 (remember that it is an active volcano) level 3 (restriction to enter a mountain area), without going to level 2 (restriction to enter 1 km around a crater). In the volcanic disaster management system of Mt. Fuji, different evacuation information will be issued for each area according to the location and situation of the eruption. Before the Meteorological Agency raises the Volcanic Alert Level from Level 1 to Level 3, the Meteorological Agency will publish commentary information on the state of the volcano based on volcanic observation information. However, since the Volcanic Alert Level announcement system was established, no commentary information has ever been released on Mt. Fuji. Therefore, at the municipalities and tourist facilities at the foot of Mt. Fuji, the actual situation when the commentary information was announced has not yet been determined.

The scenario of the fundamental experiment is that the hotel staff will transmit three types of information announced by the Japan Meteorological Agency shown in Table 4 to Chinese tourists who are planning to climb Mt. Fuji the next day. In the experiment, the Q & A session between hotel staff and foreign tourists starting from this announcement will be recorded as a disaster response at the hotel. At this time, the conversation will be compared between the case where the message announced by the Meteorological

Table 3 – Provision of information in the experiment using direct translation and ingenious explanation

Type of information	Direct translation	Ingenious explanation
Commentary information 1	The Japan Meteorological Agency has released commentary on the situation of the volcano. It seems that the number of deep low-frequency earthquakes observed has increased. There is a possibility that magma activity has slightly increased under Mt. Fuji. Please note the volcano information of Mt. Fuji.	an earthquake was observed deep under Mt. Fuji. This indicates that magma activity is becoming active. Although Mt. Fuji has not erupted yet, even volcanologists do not know at this time about whether Mt. Fuji will erupt or not, and when, where and how the eruption will occur. So, we recommend that you refrain from climbing Mt. Fuji tomorrow.
Commentary information 2	The Japan Meteorological Agency released commentary information on the situation of the volcano, which indicates that the number of volcanic earthquakes is increasing rapidly.	According to the Japan Meteorological Agency, the number of observations of small earthquakes caused by volcanic activity seems to be increasing. Mt. Fuji doesn't seem to erupt right now, but I think it's better to refrain from climbing just in case.
Issuance of Volcanic Alert Level 3	Noticeable earthquakes have occurred and the expansion of the mountain volume is observed at the foot of Mt. Fuji. The Japan Meteorological Agency raised the Volcanic Alert Level to 3. Mountain climbing on Mt. Fuji is regulated.	Several signs of the possibility of an eruption were observed on Mt. Fuji, and the Japan Meteorological Agency announced that the possibility of an eruption was high. Mountain climbing on Mt. Fuji has been already prohibited. Nobody knows at this time about whether Mt. Fuji will erupt or not, and when, where and how the eruption will occur. For safety, as a tourist facility, we ask all customers to stay away from the foot of Mt. Fuji.



Agency is transmitted directly to foreign tourists as a translation of the interpreter app and the case where the message is converted and transmitted so that it can satisfy the aforementioned four conditions regarding disaster information. As a result, a confirmation will be made as to whether or not the foreign tourist is finally satisfied.

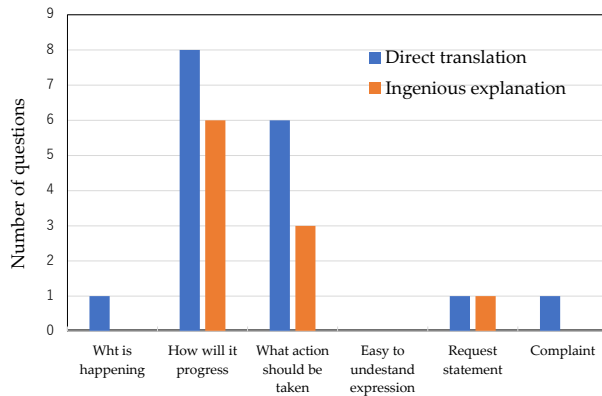
The results of the fundamental experiment are summarized below in the case where the message announced by the Meteorological Agency is transmitted directly to foreign tourists as a translation of the interpreter app. The questions from tourists when transmitting the commentary information 1 began with "What is the commentary information?" and moved on to what is happening and how it will progress, such as "What is dangerous here?", "Is the ash falling?", and moved further on to actions to be taken such as "Can I climb Mt. Fuji?", "What should I do if Mt. Fuji erupts?" and "Should I wear a mask?". In the final stage of the conversation, they may be frustrated with anxiety such as "I am running out of accommodation", "When am I able to return?", "Is transportation ready?" and "Is the accommodation refundable?"

When the hotel staff transmits the commentary information 2 to the tourists, the questions from tourists focused on what is happening and how it will progress, such as "Is there an earthquake tonight?", "Is the eruption intense?", "Will this hotel collapse due to a volcanic earthquake?", "Does the hotel prepare a place for us to evacuate?". In addition, when the hotel staff answered "Climbing Mt. Fuji is not restricted now." to the question from a tourist "Can we climb Mt. Fuji?", the tourists asked "I want to climb Mt. Fuji, but what happens if an eruption occurs during the climb?" and "How many evacuation sites are there before the summit of Mt. Fuji?". The hotel staff told to these questions, "I'm not a volcano expert so I don't know." and "It's better to refrain from climbing Mt. Fuji. The tourists asked the hotel staff for support "I want to return home today."

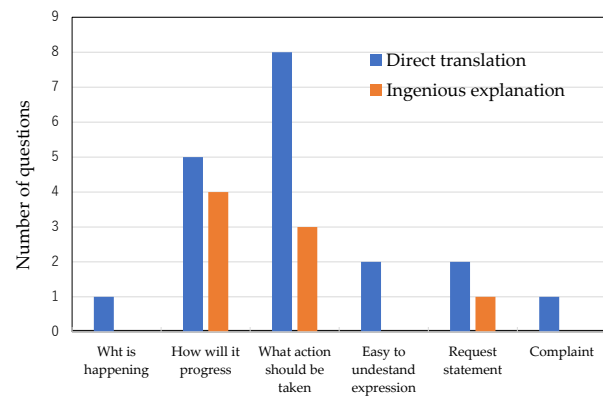
On the contrary, in the case where the hotel staff converted the information announced by the Japan Meteorological Agency into an ingenious explanation created in accordance with the aforementioned four conditions, and then translated it with an interpreter app and transmitted it to tourists, at any stage of information transmission shown in Table 3, it was found that the content of questions from tourists tended to concentrate on how the disaster progresses and what actions should be taken. Fig.3(a) shows the contents of questions from tourists on the horizontal axis and the number of questions on the vertical axis when the commentary information 1 was announced. The questions from the tourists on the horizontal axis show what is happening now, how it will progress, what actions should be taken, and easy-to-understand expression (tourists did not understand the content because information was given using difficult explanation using jargon or academic terms), as well as requests for support and response, and complaint to the hotel staff because they were dissatisfied and angry with the response of the hotel staff. Similarly, Fig.3(b) shows the same comparison result when the commentary information 2 is announced, and Fig.3(c) shows the same comparison result when the Volcanic Alert Level 3 is announced.

As shown in these figures, it is common in the two cases of direct translation and ingenious explanation, the number of questions from tourists on questions on how will it progress and what actions should be taken is overwhelmingly large. Thus, it is clear that foreign tourists are seeking information on these two points. Ingenious explanation with easy-to-understand expression overwhelmingly reduce the number of questions until the tourist is satisfied, for a direct translation. However, in the direct translation of the JMA's announcement, what is happening was not communicated to the tourist, and the explanation of the meaning of the term was requested, unexpected request was made, and finally the tourists complained and ended in protest. In this way, it was shown that for foreign tourists, responding only to disasters using an interpreter or an interpreter app is not enough, and it is necessary to provide disaster information using an ingenious explanation instead of a direct translation.

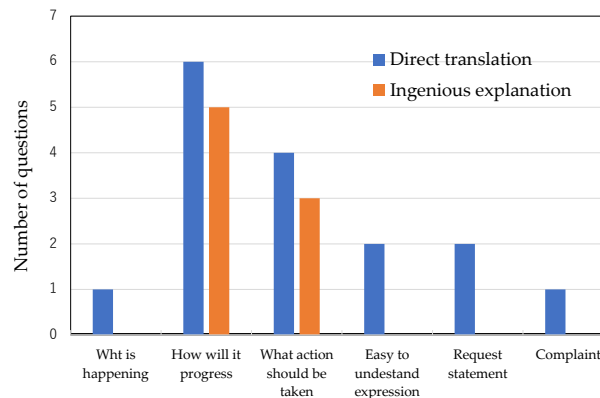
Disaster response using the interpreter app was shown to be effective because it enabled the fundamental disaster response experiments described above. But questions about what is happening and how will it progress can often only be answered by experts. Therefore, it is necessary for the Meteorological Agency and local governments to use ingenious explanation and transmit information in a more devised manner, such as adding explanations to ordinary messages. In addition, in order for tourists to understand the



(a) Commentary Information 1



(b) Commentary information 2



(c) Volcanic Alert Level 3

Fig.3 – Result of analyses for the fundamental experiment

actions to be taken, tourist facilities need to prepare a tourism crisis management plan that specifies concretely responses to foreign tourists in response to announcements by the Japan Meteorological Agency regarding volcanic conditions. Based on this plan, the hotel will prepare a disaster response manual that compiles messages to guide foreign tourists, educate employees through training, and provide information in Japanese. Once prepared, the interpreter app will function even more effectively for disaster response at tourist facilities.

The first author, who played a role of the hotel staff in this study, is familiar with seismic engineering, volcanology and disaster management, and is also somewhat familiar with the administrative disaster management system and tourism crisis management. In response to questions from tourists, therefore, the author was able to answer without error based on the policies of the Volcano Disaster Measures Council of Mt. Fuji. In the case of ingenious and devised explanations, when the explanation information is announced by the meteorological Agency of Japan, the hotel staff instructed the tourists to refrain from climbing Mt. Fuji and to return to their home country as much as possible, based on the tourism crisis management manual prepared by the hotel. However, actual hotels do not have sufficient disaster management systems for the eruption of Mt. Fuji, and it is highly likely that employees will give incorrect answers to questions from tourists. This has actually been confirmed at a tourist facility at the northern foot of Mt. Fuji through demonstrations involving actual hotel staff [9].



5. Conclusions

In this study, the authors conducted fundamental experiments on the provision of disaster information by a hotel staff to foreign tourists under an environment where a hotel staff and foreign tourists can talk together using the interpreter app. The results of this research are summarized as follows:

- 1) When providing disaster information to foreign tourists, not only direct translation of the language, but also ingenious explanation is necessary from the perspective of tourism crisis management, keeping in mind that there are differences in the legal system, including disaster experience, lifestyle and culture, and jargon in foreign countries.
- 2) Information requested by foreign tourists will focus on how the disaster will progress and what actions should be taken in the future.
- 3) When disaster information was provided on (1) what is happening, (2) how the disaster will progress, and (3) actions to be taken in (4) plain language, the number of questions from tourists reduced, and the intention of the hotel was communicated to tourists at an early stage.
- 4) The hotel staff is not a disaster expert, but tourists ask questions about disaster phenomena and how the disaster will progress. Hotel staff are also asked by tourists to explain disaster responses taken by the hotel. Therefore, it is necessary for the hotel to prepare a disaster response manual with a fixed form of disaster information to be provided, and to regularly conduct employee training. In addition, it is essential to have a system that can share disaster information closely with local governments.
- 5) The interpretation app makes it easier to perform the above experiment. In addition, the application of the interpretation app will make it possible, for even relatively small tourist facilities that do not employ staff who can speak foreign languages, to respond to foreign tourists in disasters. It is important that the interpreter software is used during normal times, so that it can be used in an emergency.

6. References

- [1] Survey Research Center (2016): Survey on evacuation behavior of foreign tourists visiting Japan during the Kumamoto earthquake. <https://www.surece.co.jp/research/1782/> (accessed on 27 January 2020).
- [2] Survey Research Center (2018): Survey on evacuation behavior of foreign tourists visiting Japan during the Osaka Northern Earthquake. <https://www.surece.co.jp/research/2441/> (accessed on 27 January 2020).
- [3] Survey Research Center (2018): Survey on evacuation behavior of foreign tourists visiting Japan during the 2018 Hokkaido Northern Iwate earthquake. <https://www.surece.co.jp/research2491/> (accessed on 27 January 2020).
- [4] Survey Research Center (2019): Survey on evacuation behavior of foreign tourists visiting Japan during the 2019 off Yamagata Prefecture earthquake. <https://www.surece.co.jp/research2968/> (accessed on 27 January 2020).
- [5] Yanagida K (2011): *Unexpected Trap: Nuclear Power Plants*. Bungeishunju Ltd.
- [6] Suzuki T, Tsuda T (2012): Development of a standard text registration function for a disaster response management system and its verification. *Journal of JSCE (Safety and Security)*, **68**(2), I_82-I_87.
- [7] Suzuki T, Watanabe T, Okuyama S (2019): Facilitating risk communication for wide-area evacuation during large-scale floods. *International Journal of Environmental Research and Public Health. Special Issue " Demonstrated Community Disaster Resilience"*, Vol.16, 2466;doi:10.3390/ijerph16142466.
- [8] Smart Culture Gateway Co, Ltd.(2019): Brochure for SmaLingual Pro.
- [9] Suzuki T (2020): An experimental study on the provision of information to foreign tourists using the interpreter application during disasters in tourist facilities, *9th WIT International Conference on Sustainable Tourism 2020, Madrid*.