

Master Thesis

# Clarifying Information Seeking and Evacuation Behavior of Foreign Visitors to Japan

Department of Transdisciplinary Science and Engineering  
School of Environment and Society  
Tokyo Institute of Technology

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Submitted By  
RUNZE HE

Research Supervisor  
Prof. Shinya HANAOKA  
Lecturer Sunkyung CHOI

## Abstract

As we all know, before the COVID-19, foreign visitors to Japan were likely to increase year after year. Given that Japan is prone to earthquakes, many surveys show that it is extremely difficult for foreigners to seek information and evacuate with appropriate behaviors during previous disasters in Japan. In addition, given the government's ongoing focus on security and safety issues in the tourism industry, it is necessary to understand foreign visitors' behaviors during disasters. To assist foreign visitors in Japan, the Japan Tourism Agency has developed an application called Safety Tips, which can notify disaster information in 14 languages.

The purpose of this study is to better understand the information-seeking and evacuation behavior of foreign visitors to Japan, as well as to explore their behavior patterns when a disaster occurs. This study also looked at how foreign visitors perceive Safety Tips and how their personal backgrounds influence their attitudes about them. The primary data for this study was an internet-based web survey that included demographic questions, personal experiences, and knowledge, also respondents' information seeking and evacuation behaviors in the Tokyo Metropolitan Earthquake scenarios, and finally their perception of Safety Tips.

First, this study examined the usage experience of all respondents and discovered that Safety Tips is more popular and well-known in Indonesia, China, and Thailand than in the U.K. and Korea. Safety Tips are not used by more than 70% of individuals who know about them or have heard about them before. We also figure out the differences among different nationalities and their different attitude based on their experience of usage. Secondly, this study used Structural Equation Modeling to investigate how personal attributes influence people's attitudes about safety tips. As a result of the findings, we can determine that 'disaster knowledge' could have a positive impact on respondents' attitudes toward Safety Tips. What is more, this study also compared the differences between information-seeking and evacuation behaviors and showed that evacuation behaviors should be utilized more often than information-seeking actions. Evacuation behaviors have also been prioritized over information-seeking activities. Furthermore, non-face-to-face information-seeking activities should be utilized more frequently than face-to-face information-seeking behaviors. In the top three activities, following evacuation advice behaviors should be used more than self-evacuation behaviors. Finally, this study attempts to apply the findings of the study to provide Safety Tips with some acceptable recommendations for future development.

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# Chapter 1

## Results and Discussion

### 1.1 Results for Objective 1

#### 1.1.1 First Task

For Q15, do the respondents know about SafetyTips before, the result is shown in Figure ??.

we can find that around 50% of the respondents from the UK and Korea do not know Safety Tips before, around 80% of the respondents from China and Thailand know or at least heard Safety Tips before, while around 90% of the respondents from Indonesia know or at least heard Safety Tips before.

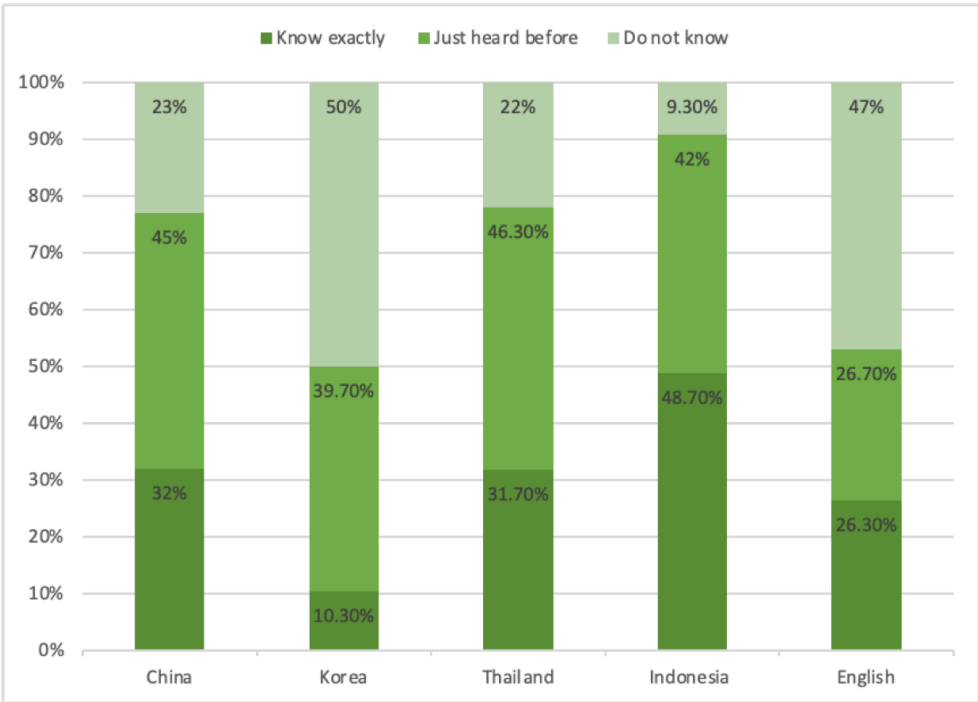


Figure 1.1: Survey result of Q15(Do you know Safety Tips or not ?)

For Q16, did the respondents use SafetyTips before, the result shows in Figure ??, we can find that more than 50% of the respondents from China(66.2%), Korea(72%), and Thailand(55.1%) did not use Safety Tips before, while more than 50% of respondents from Indonesia(65.8%) and the UK(54.7%) have used Safety Tips before. Among all countries, respondents from Indonesia have the highest usage rate of Safety Tips at 65.8%. Koreans had the lowest, at 28%.

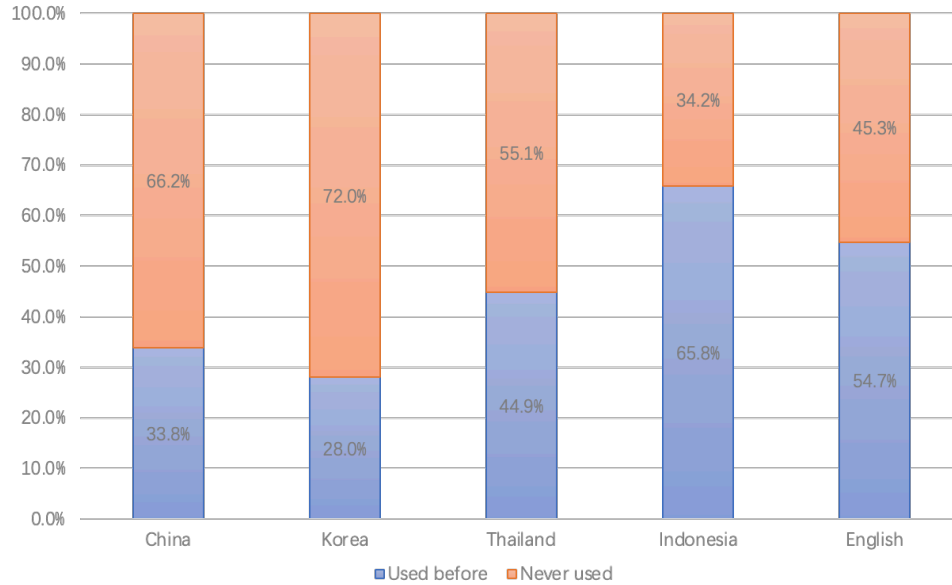


Figure 1.2: Survey result of Q16(Do you use Safety Tips before or not ?)

For Q17\_1, Will the respondents trust Safety Tips more than information from their country, the result shows in Figure ?. we can find that over 90% of respondents from Thailand(91.1%) and Indonesia(91.7%) said they trusted information from Safety Tips more than from their own countries, and more than 80% of respondents from China(80.3%) feel that the information on Safety Tips could be trusted more than their own countries, while respondents from the UK(78%) and Korea(77.3%) have a relatively low level of trust in Safety Tips compared to the other three countries, but still around 70%.

For Q17\_2, Will the respondents use Safety Tips before searching information from their country, the result shows in Figure ?. we can find that over 90% of respondents from Thailand(90.7%) and Indonesia(94.1%) said they use Safety Tips to search information before their own country's, and more than 80% of respondents from China(88%), the UK(82.3%) and Korea(82.3%) will use Safety Tips to find information before their own country.

For Q17\_3, do the respondents think Safety Tips could be useful during the evacuation, the result is shown in Figure ?. we can find that over 90% of respondents from Thailand(95.4%), China(95.7%), and Indonesia(96.6%) think Safety Tips could be useful during the evacuation, and more than 80% of respondents from the UK(87%) and Korea(84.9%) think Safety Tips could be useful during evacuation.

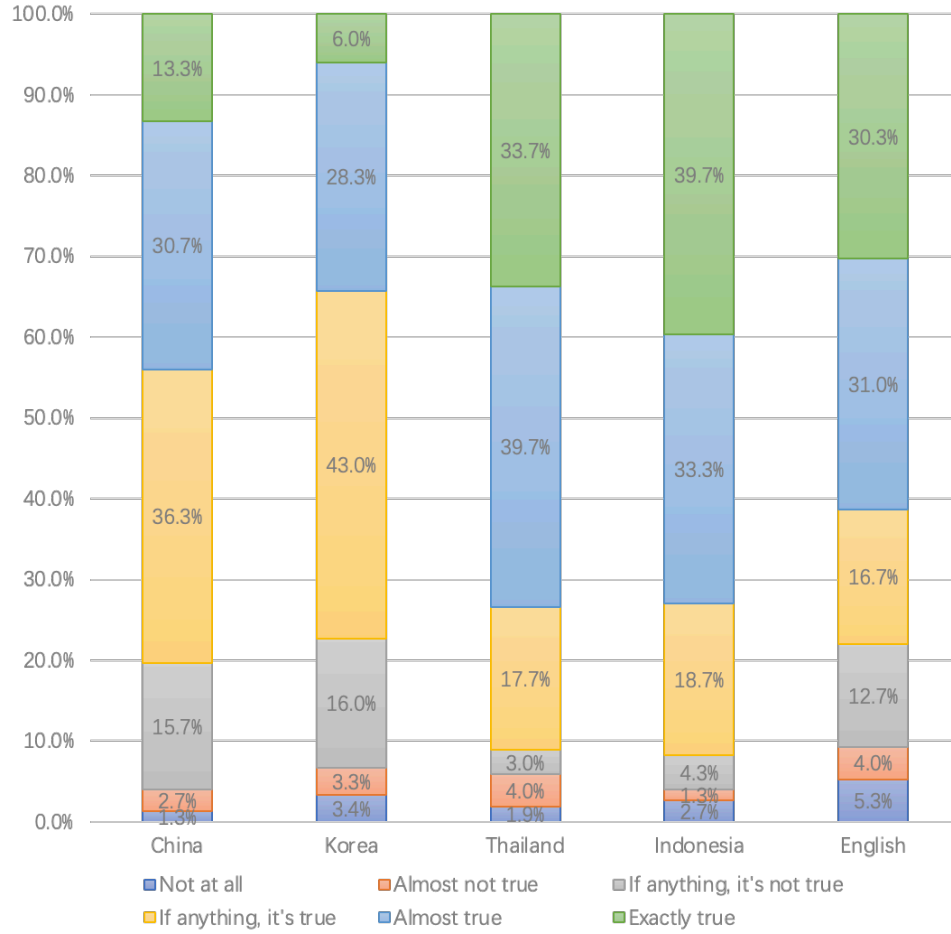


Figure 1.3: Survey result of Q17.1(Will you trust Safety Tips more than information from your own country ?)

For Q17.4, will the respondents use Safety Tips in the future, the result shows in Figure ??, we can find that over 90% of respondents from Thailand(93.3%), China(95.3%), and Indonesia(95.3%) think they will use Safety Tips in the future, and more than 80% of respondents from the UK(87%) and Korea(84.9%) think they will use Safety Tips in the future.

From the above results, we can conclude that from the usage experience, Safety Tips could be more popular and well-known in Indonesia(90%), China(77%), and Thailand(79%) rather than in the UK(53%) and Korea(50%). Also, among those respondents that know Safety Tips or heard them before, their usage rate is lower than 70%. China(33.8%), Korea(28%), Thailand(44.9%), Indonesia(65.8%) and the UK(54.7%). Then from the attitude toward Safety Tips, we can conclude that over 77% of the respondents say that they trust Safety Tips more than information from their own countries, over 82% of the respondents say that they will use Safety Tips to search information before from their own countries, and over 84% of the respondents say that they believe Safety Tips could be useful during evacuation and will use Safety Tips in the future.



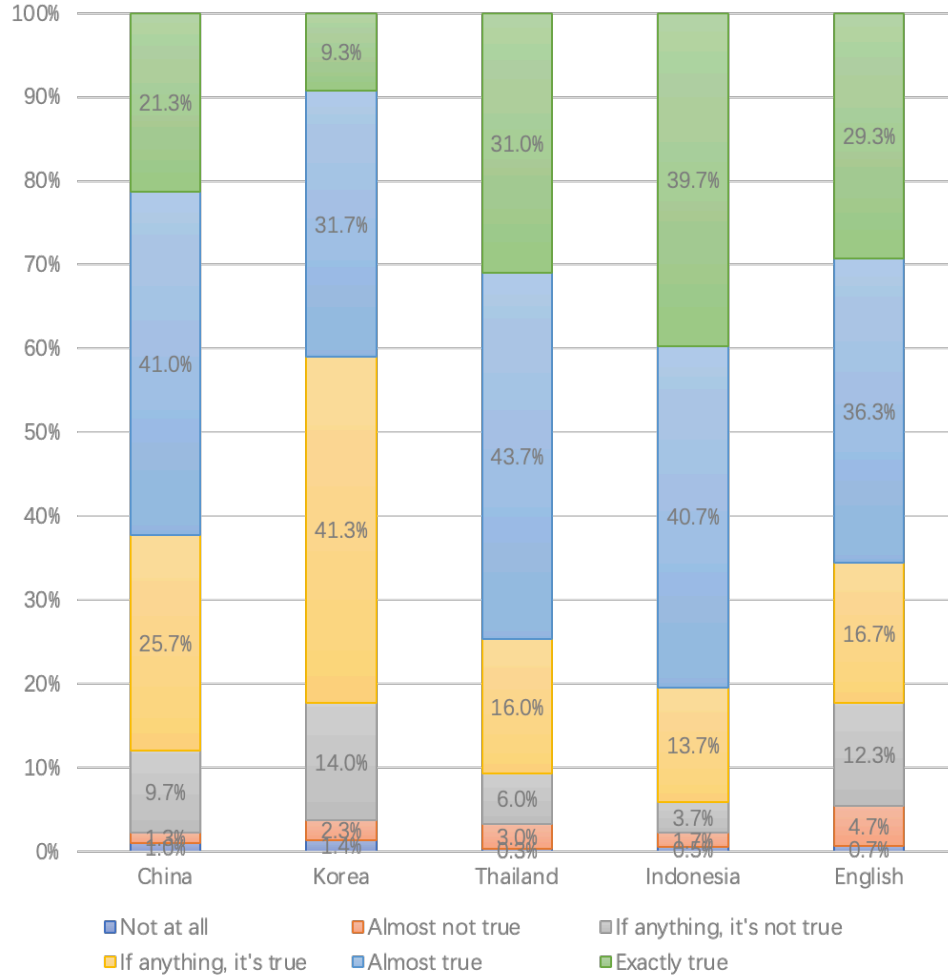


Figure 1.4: Survey result of Q17\_2(Will you use Safety Tips before searching information from your own country ?)

### 1.1.2 Second Task

In the second task, we aim to find whether the two factors of respondents' past awareness and whether they used it before had an impact on their attitudes toward Safety Tips. After dividing all respondents into 5 groups, we can find the differences between groups.

For Q17\_1, Will the respondents trust Safety Tips more than information from their country, the result shows in Figure ???. we can find that respondents who know exactly and used Safety Tips before have shown the highest trust toward Safety Tips, as more than 75% of the respondents said they trust the information on Safety Tips rather than from their own countries. Respondents who know exactly but never used Safety Tips before and respondents who heard Safety Tips before but never used Safety Tips before are more likely to trust the information on Safety Tips. Respondents who heard and used Safety Tips before and respondents who do not know and never used this application before have shown a relatively negative attitude toward Safety Tips.

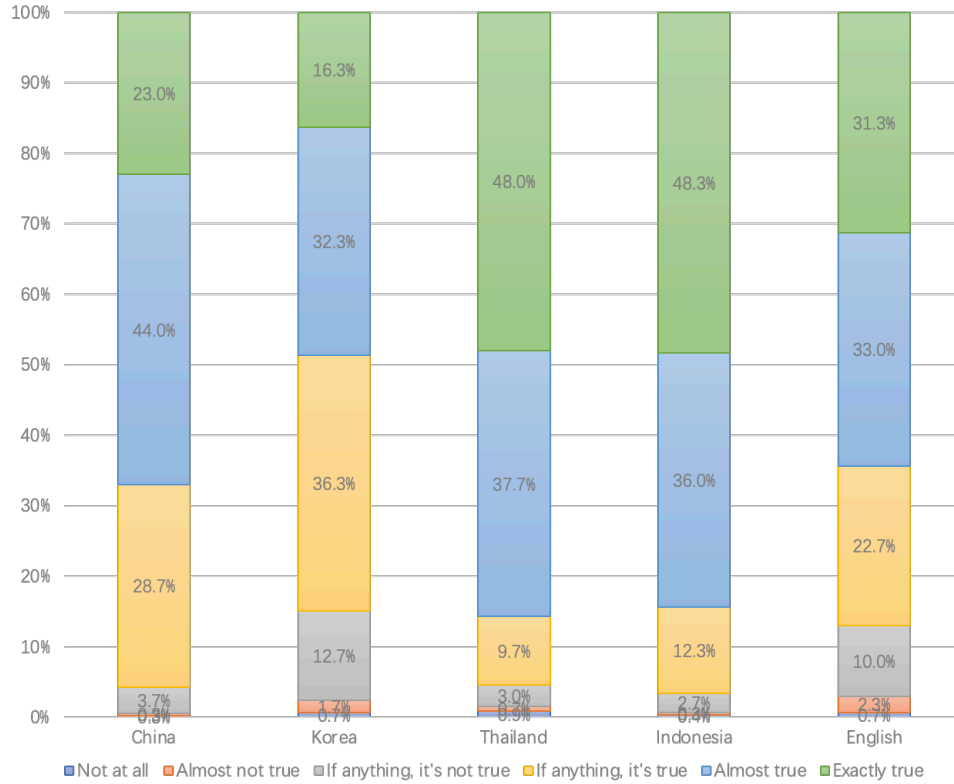


Figure 1.5: Survey result of Q17\_3(Do you think Safety Tips could be useful during evacuation ?)

For Q17\_2, Will the respondents use Safety Tips before searching information from their country, the result shows in Figure ???. we can find that the respondents who know exactly and used Safety Tips before have shown the highest usage possibility on Safety Tips, as more than 80% of the respondents said Safety Tips have a higher priority of usage rather than from their own countries. Respondents that know exactly but never used Safety Tips before and respondents who heard Safety Tips before but never used Safety Tips before have shown similar attitudes on the priority of using Safety Tips. Respondents who do not know and never used before and respondents who heard Safety Tips before and used Safety Tips before have shown a little bit lower usage priority.

For Q17\_3, do the respondents think Safety Tips could be useful during the evacuation, the result is shown in Figure ???. we can find that respondents that know exactly and used Safety Tips before and respondents who heard Safety Tips before but never used Safety Tips before could be more likely to believe Safety Tips could be useful during evacuation. Respondents that do not know and never used before, respondents who heard and used Safety Tips before, respondents who know exactly but never used Safety Tips before could be more likely to show lower usefulness of Safety Tips.

For Q17\_4, will the respondents use Safety Tips in the future, the result shows in Figure ???. we can find that respondents that know exactly and used Safety Tips before and respondents who heard but never used Safety Tips before have shown higher usage

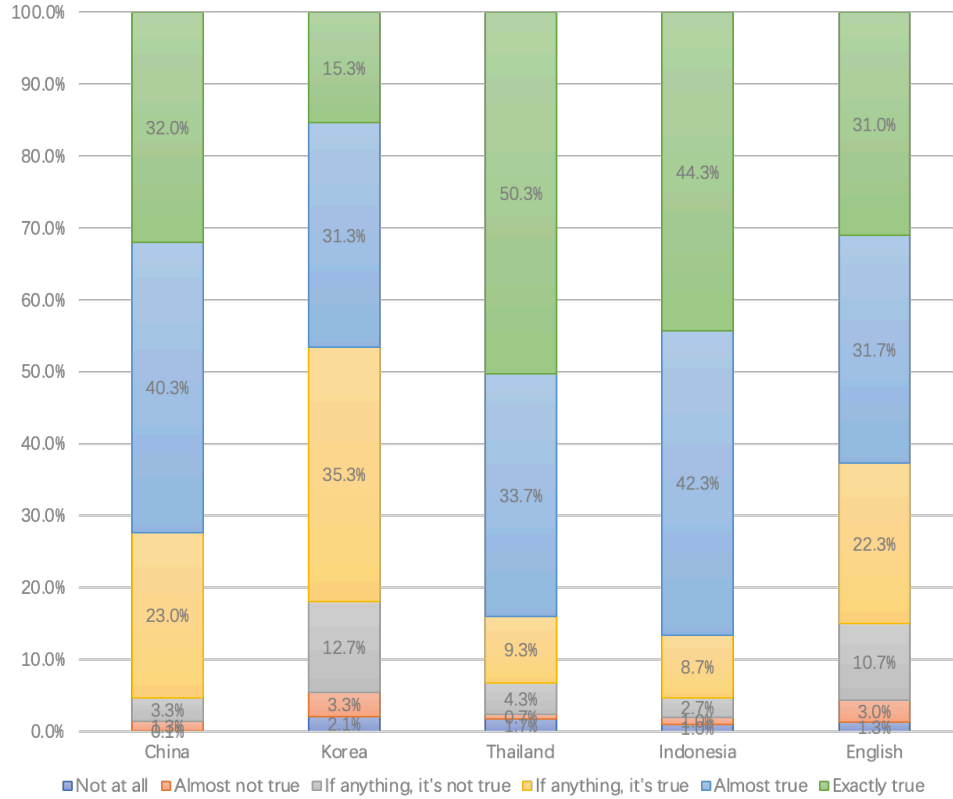


Figure 1.6: Survey result of Q17.4(Will you use Safety Tips in the future ?)

possibly Safety Tips in the future. Respondents that do not know and never used before, respondents who heard and used Safety Tips before, respondents who know exactly but never used Safety Tips before have shown relatively lower usage possibility.

From the above results, we can conclude that respondents that know exactly and used Safety Tips before could show higher trust and higher priority of use on Safety Tips, also they are more likely to believe Safety Tips can be useful during the evacuation, and they will use it in the future. And, respondents that heard but never used Safety Tips before have shown better attitudes on Safety Tips rather than respondents who do not know and never used Safety Tips before, respondents who heard and used Safety Tips before, respondents who know exactly but never used it Safety Tips before.

The results of the grouping indicate that 80% of those who clearly know Safety Tips have actually used Safety Tips before. For those who had only heard of Safety Tips, only 22% of the respondents had used Safety Tips before. Comparing the two sets of data, it is clear that the usage rate has decreased significantly. This shows that people who have a more detailed awareness of Safety Tips are more likely to use this application, so if we want to increase the usage of Safety Tips, it would be helpful to increase foreign visitors' awareness of this application.

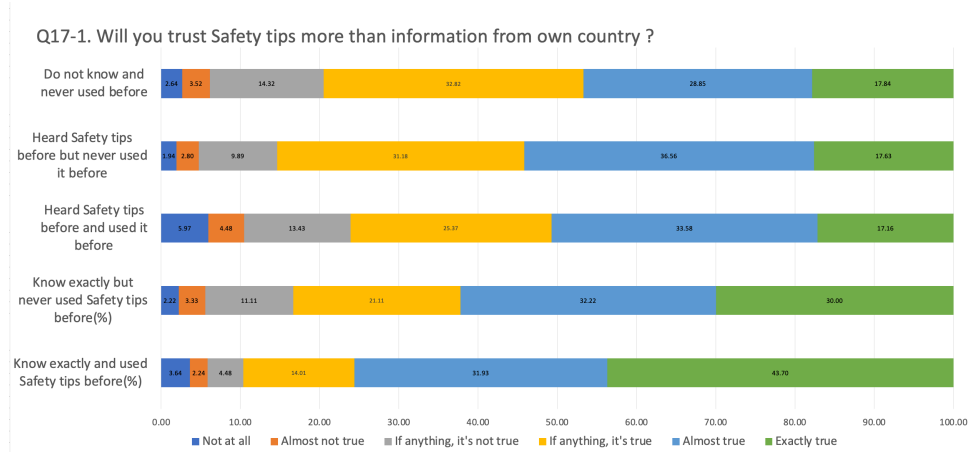


Figure 1.7: 5 groups of respondents' survey result of Q17\_1(Will you trust Safety Tips more than information from your own country ?)

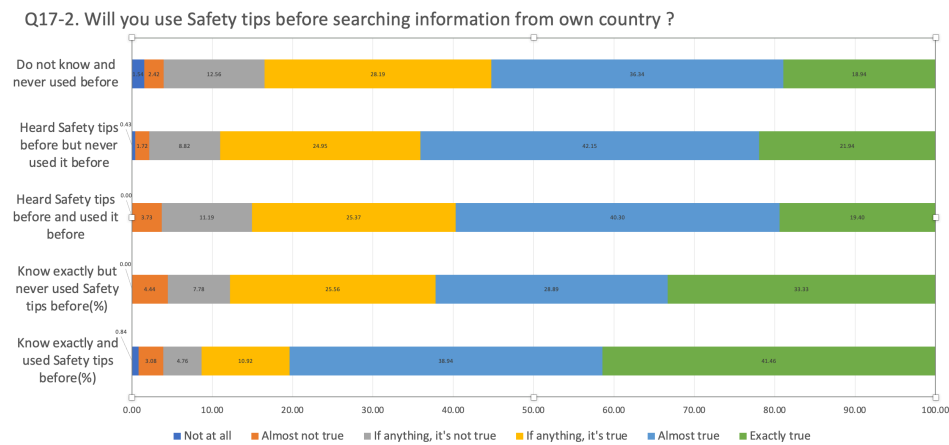


Figure 1.8: 5 groups of respondents' survey result of Q17\_2(Will you use Safety Tips before searching information from your own country ?)

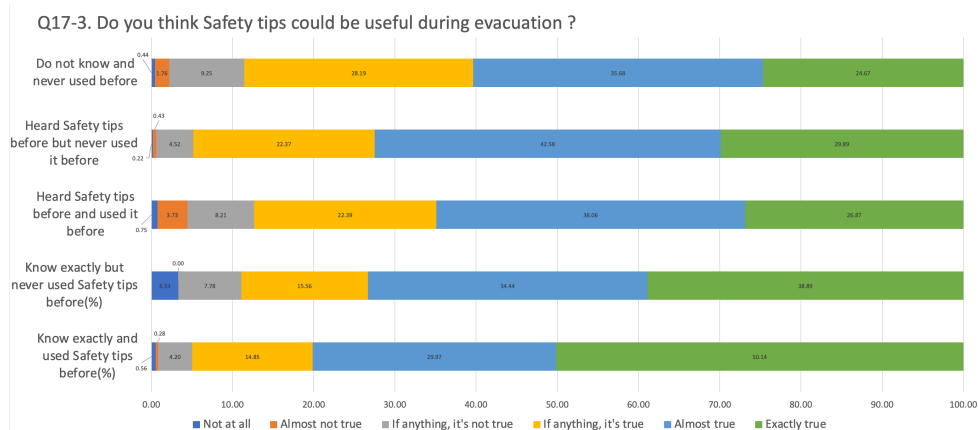


Figure 1.9: 5 groups of respondents' survey result of Q17\_3(Do you think Safety Tips could be useful during evacuation ?)

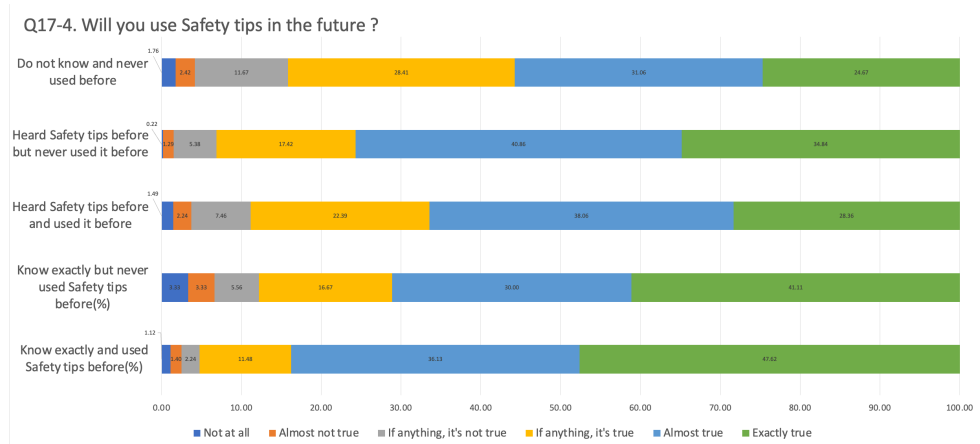


Figure 1.10: 5 groups of respondents' survey result of Q17\_4(Will you use Safety Tips in the future ?)

## 1.2 Results for Objective 2

Table ?? shows the results of the statistical description with the maximum value, minimum value, mean, and standard deviation for each variable.

Table 1.1: Statistical Description (N=491)

Variable	Min value	Max value	Mean	Standard Deviation
Country	2	6	4.32	1.30
gender	1	2	1.48	0.50
age	2	7	4.37	1.26
Visit_country	1	10	4.39	2.61
Visit_Japan	1	11	4.99	2.92
Japanese_Level	1	4	2.59	0.77
Q1	1	6	4.94	1.02
Q2	1	6	4.95	1.01
Q3	1	6	5.08	0.99
Q4	1	6	4.55	1.03
Q5	1	6	3.83	1.41
Q6_1_earthquake	0	12	4.95	3.74
Q6_2_tsunami	0	12	4.53	3.33
Q6_3_typhoon	0	12	4.6	3.43
Q6_4_fire	0	12	5.01	4.06
Q7_1_earthquake	0	4	1.66	1.60
Q7_2_tsunami	0	4	0.80	1.27
Q7_3_typhoon	0	4	0.72	1.29
Q7_4_fire	0	4	1.48	1.61
Q8_experience_earthquake	1	8	3.15	1.87
Q9	1	6	4.88	0.97
Q10	1	6	5.01	0.95
Q15_Safetytips	2	3	2.73	0.45
Q16_Safetytips_use	1	1	1	0
Q17_Safetytips_trust_1	1	6	4.8	1.31
Q17_Safetytips_trust_2	1	6	4.95	1.08
Q17_Safetytips_trust_3	1	6	5.10	1.01
Q17_Safetytips_trust_4	1	6	5.11	1.02

For some group-based data, the frequency descriptions of these variables are shown in the following. ??–?? is the frequency description of Item 1, including Country, Gender, Age, number of visited countries, number of visited Japan, Japanese Level. Table ?? is the frequency description of Item 3, that is the severity of the earthquake experience.

For the scale questions in the questionnaire, we conducted a one-sample t-test, and the results of the study can indicate whether people have clear attitudes in their responses to these questions. For question Q17 about the attitude toward Safety Tips, the answers to the scale questions were divided into 6 dimensions, so we set 3.5 as the test value. Table ??

Table 1.2: Frequency Description of Country (N=491)

Category	Number	Rate
China	78	15.90%
South Korea	42	8.60%
Thailand	105	21.40%
Indonesia	179	36.50%
the UK	87	17.70%

Table 1.3: Frequency Description of Gender (N=491)

Category	Number	Rate
Male	253	51.50%
Female	238	48.50%

shows the results of the one-sample t-test. For Q17\_1 to Q17\_4, the mean values of 491 respondents are  $4.80 \pm 1.31$ ;  $4.95 \pm 1.08$ ;  $5.10 \pm 1.01$ ;  $5.11 \pm 1.02$ ; All of the p values are less than 0.01, mean all are statistically significant at  $p < 0.001$  level. Compared to the test value of 3.5, indicating that all have significant differences in the attitude toward Safety Tips, and all mean values are higher than the test value of 3.5, implying that respondents show positive attitudes to all of the questions towards Safety Tips.

### 1.2.1 Model 1

We constructed the SEM model 1 shown in Figure ?? based on the previous hypotheses in Chapter 4.2 to explore the relationship between the latent variables of 'Training Experience', 'Consciousness', 'Knowledge', and 'Attitudes toward Safety Tips'. The five manifest variables of 'Consciousness' (the responses of Q1-Q5), the two manifest variables of 'Knowledge' (the responses of Q9-Q10), and the four manifest variables of 'Attitudes toward Safety Tips' (the responses of Q17\_1-Q17\_4) are all continuum selections, so it is necessary to test the score reliability coefficient. When multiple questions are asked about a characteristic and the sum of the responses (scale scores) is used as the characteristic scale, the reliability coefficient that assesses whether each questionnaire item (variable) measures the same concept or object as a whole (internal consistency) is called Cronbach's alpha. Cronbach's alpha is calculated by the following formula.

$$\alpha = \frac{m}{m-1} \left( 1 - \frac{\sum_{i=1}^m \sigma_i^2}{\sigma_x^2} \right) \quad (1.1)$$

$m$  means the number of items in the question;  $\sigma_i^2$  means the variance of each question item;  $\sigma_x^2$  means the variance of the total scale score for each question item. Cronbach's alpha has a value between 0 and 1, and the closer the value is to 1, the more reliable it

Table 1.4: Frequency Description of Age (N=491)

Category	Number	Rate
Age 16-19	13	2.60%
Age 20-29	136	27.70%
Age 30-39	126	25.70%
Age 40-49	113	23%
Age 50-59	77	15.70%
Age 60-69	26	5.30%
Age over 70	0	0%

Table 1.5: Frequency Description of number of visited country (N=491)

Category	Number	Rate
0 time	0	0%
1 time	73	14.90%
2 times	63	12.80%
3 to 4 times	152	31%
5 to 6 times	95	19.30%
7 to 9 times	99	20.20%
Over 10 times	9	1.80%

is. The evaluation of Cronbach's alpha, as shown in Figure ??, was suggested by George and Mallery [19]. Cronbach's alpha of 0.9 indicates excellent internal consistency, 0.8 indicates good, 0.7 indicates acceptable, 0.6 indicates poor, and 0.5 unacceptable. The results of the alpha reliability coefficient test are shown in Table ??, the Cronbach's alpha values of Q1-Q5 is 0.869, for Q9-Q10 is 0.927, and for Q7\_1-Q17\_4 is 0.871. The total Cronbach's alpha value for all the above variables is 0.935. We can find that the Cronbach's alpha value of any one of them is satisfying the evaluation criteria.

The result of Regression Weights for Model 1 shows in Table ?? and the result of Standard Regression Weights for Model 1 is shown in Table ??. From the result, we can find that 'Consciousness', 'Knowledge', 'Earthquake experience', 'Japanese level' could show significant relationships with respondents' attitude on Safety Tips. While, 'Age', 'Gender', 'Visit Japan', 'Visit country' don't show significant relationships with respondents' attitudes toward Safety Tips. Currently, 'training experience' also doesn't have a significant relationship with respondents' attitude on Safety Tips. Because 'training experience' is a potential variable in our original hypothesis, I'd like to go deeper into the relationship with some improvements. We can get a better estimate of the true correlation by disattenuated the variables, according to D. Streiner [34]. Two things happen when we add extra variables. First, the model's ability to account for more variance grows. Each new variable, on the other hand, enhances the error variance. As a result, the previous model will struggle to accommodate the additional data, which is a consequence of adding more variables to the model. We can see that Q6 1/2/3/4 and Q7 1/2/3/4 both have a significant relationship with 'Training Experience' based on the results of Table ?? Regression Weights. However, the estimated value of Q7 1/2/3/4 is much lower than the estimated value of



Table 1.6: Frequency Description of number of visited Japan (N=491)

Category	Number	Rate
0 time	0	0%
1 time	47	9.60%
2 times	65	13.20%
3 to 4 times	147	29.90%
5 to 6 times	85	17.30%
7 to 9 times	81	16.50%
Over 10 times	66	13.40%

Table 1.7: Frequency Description of Japanese Level (N=491)

Category	Number	Rate
Cannot understand	25	5.10%
Basic	214	43.60%
Intermediate	190	38.70%
Up level	62	12.60%

Q6 1/2/3/4, as seen in Table ?? Standardized Regression Weights. This means that Q6 is better than Q7 at expressing the latent variable 'Training Experience'. The two manifest variables are similar in structure: Q6 is for the experience of a given event, and the total score is used as data, whereas Q7 is for the number of times. Because the similarity of the two variables causes a significant amount of inaccuracy in the expression of the latent variable, we'll delete Q7 and keep only Q6 as the manifest variable to express 'Training experience' as a way to improve the model. Furthermore, we believe there may have a correlation relationship between 'Training Experience', 'Consciousness', and 'Knowledge'. Therefore adding the correlation between these three latent variables is another way to improve the model. Finally, since the result shows that 'Age', 'Gender', 'Visit Japan', and 'Visit Country' have no significant relationship with 'Attitude toward Safety Tips', deleting these four variables could be also a way to improve the model. Based on the above three improvement ideas shown on the left side of Figure ??, we construct Model 2 shown on the right side of Figure ??.

### 1.2.2 Model 2

The result of Regression Weights for Model 2 shows in Table ?. From the result, we can find that 'Consciousness', 'Knowledge', 'Earthquake experience', 'Training Experience', and 'Japanese level' could all show significant relationships with respondents' attitude toward Safety Tips. Then, the result of Standard Regression Weights for Model 1 shows in Table ?. From the result, we can find that 'Consciousness', 'Earthquake experience', 'Training Experience', and 'Japanese level' could be negatively related to respondents' attitudes towards Safety Tips, as the estimated values are negative numbers. While 'Knowledge' could be positively related to respondents' attitudes towards Safety Tips, as the

Table 1.8: Frequency Description of severity of the earthquake experienced (N=491)

Category	Number	Rate
MMI intensity 5 or less / intensity 3 or less	110	22.40%
MMI intensity 6 / intensity 4	90	18.30%
MMI intensity 7 / intensity 5 weak	119	24.20%
MMI intensity 8 / intensity 5 strong	80	16.30%
MMI intensity 9 / intensity 6 weak	30	6.10%
MMI intensity 10 / intensity 6 strong	18	3.70%
MMI intensity 11 to 12 / intensity 7	30	6.10%
no earthquake experience	14	2.90%

Table 1.9: Result of one-sample t-test (N=491)

	Mean	Test Value	t	p
Q17Safetytips_trust_1	4.80±1.31	3.5	29.96	0.00
Q17Safetytips_trust_2	4.95±1.08	3.5	29.96	0.00
Q17Safetytips_trust_3	5.10±1.01	3.5	35.18	0.00
Q17Safetytips_trust_4	5.11±1.02	3.5	34.81	0.00

estimated value is 3.068. From the Regression Weights, we can find that the p-value of Q5 and Consciousness is 0.034, which means Q5 is not significant enough to express Consciousness, so to improve the model, Model 3 will delete Q5, only use Q1 to Q4 to express latent variable 'Consciousness'. The result of the correlation relationship between 'Consciousness', 'Knowledge', 'Training Experience' was shown in Table ?? and Table ?. The result confirmed that 'Consciousness', 'Knowledge', 'Training Experience' could be all positively correlated with each other. Among them, 'Consciousness' and 'Knowledge' show the highest correlation.

### 1.2.3 Model 3

Based on the feedback from Model 2, we constructed Model 3 shown in Figure ?. The result of Regression Weights for Model 3 is shown in Table ?. From the result, we can find that 'Consciousness', 'Knowledge', 'Earthquake experience', 'Training Experience', and 'Japanese level' could still all show significant relationships with respondents' attitudes toward Safety Tips. Then, the result of Standard Regression Weights for Model 3 shows in Table ?. From the result, we can find that 'Consciousness', 'Earthquake experience', 'Training Experience', and 'Japanese level' could be still negatively related to respondents' attitudes towards Safety Tips, as the estimated values are negative numbers. While 'Knowledge' could be positively related to respondents' attitudes towards Safety Tips, as the estimated value is 3.109.

Table 1.10: Result of Independent Sample T-test Analysis (N=491)

Gender	Sample amount	Mean	t	p
Male	253	4.92±0.99	-1.82	0.07
Female	253	5.07±0.90	-1.82	0.07

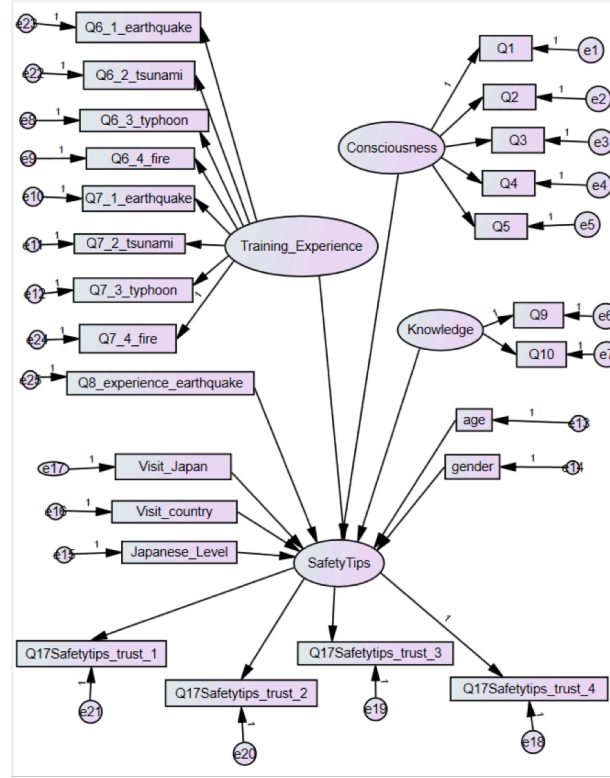


Figure 1.11: SEM model 1

### 1.2.4 Interpretation

The following sections will explain how to interpret the aforesaid results. For all those who have a higher consciousness about the disaster, it means they have a higher disaster imagination, sense, and are more likely to feel anxiety about the disaster, and they are more likely to come into contact with people, so they would prefer a more direct way to evacuate rather than seeking information, which makes their attitude toward safety Tips could be negative. In terms of earthquake experience and training, I believe that respondents with more earthquake or disaster training experience should be more knowledgeable with earthquake evacuation ways, therefore their attitude toward safety suggestions may be negative as well. Then, in terms of Japanese ability, I believe that if the respondents have high Japanese abilities, there will be numerous local options to gather information rather than utilizing Safety Tips, as it is an application in a foreign language. For example, like myself, I am a foreigner who knows Japanese. In the event of a disaster, because I can understand Japanese, there are many ways that I can gather information and find evacuation sites, and I can communicate with Japanese people. So I don't need to use

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Figure 1.12: Evaluation of score reliability coefficient test

Table 1.11: Result of score reliability coefficient test

	Cronbach's alpha value	Objects
Q1 to Q5	0.869	20
Q9 and Q10	0.927	15
Q17	0.871	4
All	0.935	39

any foreign language application. After all, the direct message from the disaster area is undoubtedly the quickest and most accurate. As a result, there may be a negative attitude toward safety Tips. Finally, for those who have a broad understanding of disasters, gathering information could be an important part of the evacuation process. They may use an application like Safety Tips to seek information, and then do their evacuation.

### 1.2.5 Model Evaluation

RMSEA is a common evaluation value for SEM, McDonald & Ho [27] verified RMSEA should be less than 0.08. Takahiro HOSHINO [40] summarized a broader range of evaluation value, it mentioned that if  $RMSEA \leq 0.05$  means 'close fit'; if  $RMSEA \leq 0.08$  means 'fair fit'; if  $RMSEA \leq 0.10$  means 'moderate fit'; if  $RMSEA$  over 0.10 means the model is not good [9, 7, 33].

Comparative fit index (CFI): Bentler [6] verified that a CFI value close to 1 indicates a very good fit. The model fit result of Model 1 is shown in Table ??, and the model fit result of Model 2 is shown in Table ?. Compared with Model 1, the result of Model 2 is improved a bit and can reach the evaluation value of SEM.

The model fit result of Model 1 is shown in Table ??, the model fit result of Model 2 is shown in Table ??, and the model fit result of Model 3 is shown in Table ?. Compared with Model 1 and Model 2, the result of Model 3 is improved a bit and can reach the evaluation value of SEM.

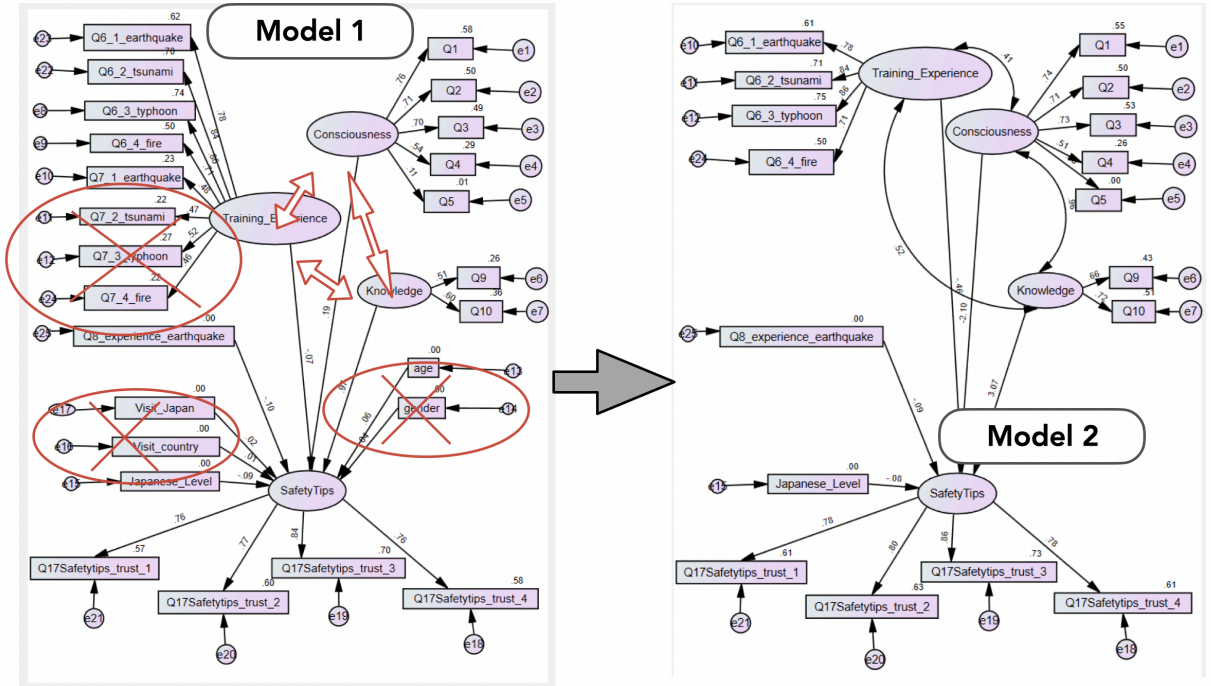


Figure 1.13: Left side: the diagram contains the improvement points made based on Model 1, Right side: Model 2

## 1.3 Results for Objective 3

### 1.3.1 Selected Score and Selected Rate

The result of the Selected score and the Selected rate is shown in ??-??. From the result, we can find that there are some differences between foreign visitors and Japanese in scenarios 1 and 3, which could show that when the internet and telephone are available, people tend to have various behaviors. By checking the Selected Rate, we can find that evacuation behaviors are more used than information-seeking behaviors. And among the evacuation behaviors, 'Moving according to evacuation guidance' could be used most. This indicates that, regardless of the order factor, 'Moving according to evacuation guidance' is the most favored option. In addition, people are more likely to heed evacuation instructions if they are in the area of such recommendations. As a result, if Safety Tips can provide evacuation instructions, it will attract more people. Furthermore, if it can synchronize the user's location information, more people will use Safety Tips. By checking the Selected Score, we can find that evacuation behaviors always happen before information-seeking behaviors. And among the evacuation behaviors, 'Observe the surroundings' could have happened first. This is compounded by the fact that many people's first instinct in the event of a disaster is to observe others. Not only might they receive some evacuation suggestions, but keeping the same pace as others will make people feel more at ease psychologically.

Some lower used information-seeking behaviors during a disaster are 'Gather Information by calling out to Japanese people nearby', 'Contact staff at tourist Information centers

Table 1.12: Regression Weights of Model 1

Regression Weights			Estimate	p
Safety Tips	←	Age	0.036	0.007
Safety Tips	←	Gender	0.065	0.053
Safety Tips	←	Training Experience	-0.075	0.003
Safety Tips	←	Consciousness	0.194	***
Safety Tips	←	Knowledge	1.448	***
Safety Tips	←	Visit Country	0.002	0.803
Safety Tips	←	Japanese Level	-0.095	***
Safety Tips	←	Visit Japan	0.006	0.377
Safety Tips	←	Q8_experience_earthquake	-0.225	***
Q1	←	Consciousness	1.000	
Q2	←	Consciousness	0.790	***
Q3	←	Consciousness	0.868	***
Q4	←	Consciousness	0.677	***
Q5	←	Consciousness	0.158	***
Q6.1_earthquake	←	Training Experience	3.677	***
Q6.2_tsunami	←	Training Experience	3.341	***
Q6.3_typhoon	←	Training Experience	3.576	***
Q6.4_fire	←	Training Experience	3.672	***
Q7.1_earthquake	←	Training Experience	0.949	***
Q7.2_tsunami	←	Training Experience	0.614	***
Q7.3_typhoon	←	Training Experience	0.725	***
Q7.4_fire	←	Training Experience	1.000	
Q9	←	Knowledge	1.000	
Q10	←	Knowledge	1.028	***
Q17 SafetyTips_trust_1	←	Safety Tips	1.118	***
Q17 SafetyTips_trust_2	←	Safety Tips	1.000	
Q17 SafetyTips_trust_3	←	Safety Tips	1.012	***
Q17 SafetyTips_trust_4	←	Safety Tips	1.000	

to collect Information', 'Contact public transport staff to collect Information'. As a result, in the case of Internet&Phone available, people do not choose to acquire information through methods that require verbal conversation, and instead prefer to obtain it on their own. On the other hand, because people can only obtain information through the verbal conversation when the Internet and phone are unavailable, their method of obtaining information depends on the scenario they are in. When people are in a tourist area, they usually ask Japanese people around them for information, and not many people choose the other three options of contacting staff at different spots. However, when people are moving by transportation, people still ask Japanese people around them for information, while contacting staff from public transportation is also a popular option. The lowest used evacuation behavior during a disaster is 'Stay at your current location'. This is understandable after all, few people will just stay put and do nothing in the face of a disaster.

Table 1.13: Standardized Regression Weights of Model 1

Standardized Regression Weights			Estimate
Safety Tips	←	Age	0.057
Safety Tips	←	Gender	0.040
Safety Tips	←	Training Experience	−0.067
Safety Tips	←	Consciousness	0.191
Safety Tips	←	Knowledge	0.967
Safety Tips	←	Visit Country	0.005
Safety Tips	←	Japanese Level	−0.094
Safety Tips	←	Visit Japan	0.018
Safety Tips	←	Q8_experience_earthquake	−0.102
Q1	←	Consciousness	0.760
Q2	←	Consciousness	0.706
Q3	←	Consciousness	0.703
Q4	←	Consciousness	0.540
Q5	←	Consciousness	0.112
Q6.1_earthquake	←	Training Experience	0.785
Q6.2_tsunami	←	Training Experience	0.838
Q6.3_typhoon	←	Training Experience	0.862
Q6.4_fire	←	Training Experience	0.706
Q7.1_earthquake	←	Training Experience	0.484
Q7.2_tsunami	←	Training Experience	0.473
Q7.3_typhoon	←	Training Experience	0.521
Q7.4_fire	←	Training Experience	0.465
Q9	←	Knowledge	0.512
Q10	←	Knowledge	0.600
Q17 SafetyTips_trust_1	←	Safety Tips	0.757
Q17 SafetyTips_trust_2	←	Safety Tips	0.773
Q17 SafetyTips_trust_3	←	Safety Tips	0.829
Q17 SafetyTips_trust_4	←	Safety Tips	0.760

It is important to note here that this result does not mean that everyone will necessarily do something to leave the place where it happened, but that people’s priority evacuation behavior is less likely to be to stay where they are. People will, in most situations, choose to remain where they are after gathering information and following evacuation instructions. This section does not cover such circumstances.

### 1.3.2 Sankey Diagram

Figure ?? depicts the Sankey Diagram for foreign visitors in scenarios 1 to 4, whereas Figure ?? depicts the Sankey Diagram for Japanese visitors in scenarios 1 to 4. Figure ?? shows a summary of the Sankey Diagram data, with blue denoting the action with the highest value. We can learn from the data that No-face-to-face information seeking is

Table 1.14: Regression Weights of Model 2

Regression Weights			Estimate	p
Safety Tips	←	Training Experience	−0.146	***
Safety Tips	←	Consciousness	−2.321	***
Safety Tips	←	Knowledge	3.820	***
Safety Tips	←	Japanese Level	−0.091	***
Safety Tips	←	Q8_experience_earthquake	−0.212	***
Q1	←	Consciousness	1.000	
Q2	←	Consciousness	0.812	***
Q3	←	Consciousness	0.915	***
Q4	←	Consciousness	0.647	***
Q5	←	Consciousness	0.086	0.034
Q6.1_earthquake	←	Training Experience	0.990	***
Q6.2_tsunami	←	Training Experience	0.907	***
Q6.3_typhoon	←	Training Experience	0.969	***
Q6.4_fire	←	Training Experience	1.000	***
Q9	←	Knowledge	1.000	
Q10	←	Knowledge	0.959	***
Q17 SafetyTips_trust_1	←	Safety Tips	1.120	***
Q17 SafetyTips_trust_2	←	Safety Tips	1.000	
Q17 SafetyTips_trust_3	←	Safety Tips	1.010	***
Q17 SafetyTips_trust_4	←	Safety Tips	1.000	

more common than face-to-face information seeking. In the top three actions, following evacuation guidance behaviors is more common than self-evacuation behaviors. On the other hand, when the internet and telephone are available, Japanese prefer to take No-face-to-face information-seeking behaviors, while foreign visitors prefer to take following evacuation guidance behavior first, then trend to take No-face-to-face information-seeking behaviors. When the internet and phone are unavailable, both Japanese and foreign visitors show similar behavior. Both Japanese and foreigners prefer to take following evacuation guidance behaviors first. However, there are some differences in the behaviors that followed. Self-evacuation behaviors are preferred by the Japanese, while foreigners prefer face-to-face information-seeking behaviors before self-evacuation behaviors.

We can more clearly see the differences between foreign visitors and Japanese when we attribute specific actions to behavior patterns. The most common actions among Japanese in scenarios 1 and 3 are all No-face-to-face information seeking, but the most common behaviors among foreign tourists are following evacuation guidance behaviors, followed by No-face-to-face information seeking. Two things can be explained from this result. First and foremost, Safety Tips is a platform for providing No-face-to-face information-seeking services to foreign visitors, who are more prone to seek non-face-to-face information. Second, since foreign visitors will first follow the evacuation guidance, it is possible to cooperate with hotels, information centers, and other organizations that are capable of providing evacuation guidance. If they can remind foreign visitors that the Safety Tips



Table 1.15: Standardized Regression Weights of Model 2

Standardized Regression Weights			Estimate
Safety Tips	←	Training Experience	−0.455
Safety Tips	←	Consciousness	−2.102
Safety Tips	←	Knowledge	3.068
Safety Tips	←	Japanese Level	−0.084
Safety Tips	←	Q8_experience_earthquake	−0.090
Q1	←	Consciousness	0.745
Q2	←	Consciousness	0.710
Q3	←	Consciousness	0.726
Q4	←	Consciousness	0.506
Q5	←	Consciousness	0.060
Q6_1_earthquake	←	Training Experience	0.781
Q6_2_tsunami	←	Training Experience	0.841
Q6_3_typhoon	←	Training Experience	0.863
Q6_4_fire	←	Training Experience	0.710
Q9	←	Knowledge	0.657
Q10	←	Knowledge	0.717
Q17 SafetyTips_trust_1	←	Safety Tips	0.781
Q17 SafetyTips_trust_2	←	Safety Tips	0.796
Q17 SafetyTips_trust_3	←	Safety Tips	0.855
Q17 SafetyTips_trust_4	←	Safety Tips	0.781

Table 1.16: Covariances between 'Consciousness', 'Knowledge', 'Training Experience'

Covariances			Estimate	p
Training Experience	↔	Knowledge	0.962	***
Consciousness	↔	Knowledge	0.518	***
Training Experience	↔	Consciousness	0.856	***

application is a platform that can offer them the information they require during the evacuation guidance, the use of Safety Tips will rise, and it will be able to better assist foreign visitors.

Table 1.17: Correlations between 'Consciousness', 'Knowledge', 'Training Experience'

Correlations			Estimate
Training Experience	$\longleftrightarrow$	Knowledge	0.519
Consciousness	$\longleftrightarrow$	Knowledge	0.960
Training Experience	$\longleftrightarrow$	Consciousness	0.409

Table 1.18: Regression Weights of Model 3

Regression Weights			Estimate	p
Safety Tips	$\leftarrow$	Training Experience	-0.163	***
Safety Tips	$\leftarrow$	Consciousness	-2.665	***
Safety Tips	$\leftarrow$	Knowledge	4.347	***
Safety Tips	$\leftarrow$	Japanese Level	-0.101	***
Safety Tips	$\leftarrow$	Q8_experience_earthquake	-0.238	***
Q1	$\leftarrow$	Consciousness	1.000	
Q2	$\leftarrow$	Consciousness	0.813	***
Q3	$\leftarrow$	Consciousness	0.917	***
Q4	$\leftarrow$	Consciousness	0.644	***
Q6_1_earthquake	$\leftarrow$	Training Experience	1.000	***
Q6_2_tsunami	$\leftarrow$	Training Experience	0.916	***
Q6_3_typhoon	$\leftarrow$	Training Experience	0.978	***
Q6_4_fire	$\leftarrow$	Training Experience	1.010	***
Q9	$\leftarrow$	Knowledge	1.000	
Q10	$\leftarrow$	Knowledge	0.961	***
Q17 SafetyTips_trust_1	$\leftarrow$	Safety Tips	1.000	***
Q17 SafetyTips_trust_2	$\leftarrow$	Safety Tips	0.902	
Q17 SafetyTips_trust_3	$\leftarrow$	Safety Tips	0.898	***
Q17 SafetyTips_trust_4	$\leftarrow$	Safety Tips	0.879	

Table 1.19: Standardized Regression Weights of Model 3

Standardized Regression Weights			Estimate
Safety Tips	←	Training Experience	−0.449
Safety Tips	←	Consciousness	−2.146
Safety Tips	←	Knowledge	3.109
Safety Tips	←	Japanese Level	−0.083
Safety Tips	←	Q8_experience_earthquake	−0.091
Q1	←	Consciousness	0.743
Q2	←	Consciousness	0.711
Q3	←	Consciousness	0.727
Q4	←	Consciousness	0.502
Q6_1_earthquake	←	Training Experience	0.781
Q6_2_tsunami	←	Training Experience	0.841
Q6_3_typhoon	←	Training Experience	0.863
Q6_4_fire	←	Training Experience	0.711
Q9	←	Knowledge	0.656
Q10	←	Knowledge	0.718
Q17 SafetyTips_trust_1	←	Safety Tips	0.782
Q17 SafetyTips_trust_2	←	Safety Tips	0.801
Q17 SafetyTips_trust_3	←	Safety Tips	0.854
Q17 SafetyTips_trust_4	←	Safety Tips	0.775

Table 1.20: Model Fit of Model 1

RMSEA = 0.118 CFI = 0.634
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Table 1.21: Model Fit of Model 2

RMSEA = 0.087 CFI = 0.883
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Table 1.22: Model Fit of Model 3

RMSEA = 0.084 CFI = 0.905
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Table 1.23: Result of Selected score and Selected rate in Scenario 1(No.: number of selection, FV: Foreign Vistors, J: Japanese)

No.	Description	Selected Rate (%)			Selected Score		
		All	FV	J	All	FV	J
1	Collect Information on the official websites of Japanese government agencies	31.6	30.2	38.7	2.9	2.9	3.0
2	Collect Information with the disaster prevention app on your smartphone	27.9	25.4	40.7	2.9	2.8	3.2
3	Collect Information on news sites and disaster prevention portal sites	26.8	23.4	43.7	2.8	2.7	3.2
4	Collect Information on SNS (Twitter, Facebook, LINE, etc.)	19.9	18.2	28.7	2.8	2.7	3.0
5	Call the embassy of your country to collect Information	25.2	30.3	N/A	2.7	2.7	N/A
6	Collect Information from TV and radio	24.9	20.9	44.7	3.0	2.8	3.4
7	Check maps and digital signage to collect Information	14.4	15.0	11.7	2.8	2.8	2.9
8	Gather Information by calling out to Japanese people nearby	18.7	19.0	17.3	2.7	2.8	2.3
9	Contact staff at tourist Information centers to collect Information	16.0	18.3	4.3	2.9	2.9	2.3
10	Contact the hotel staff to collect Information	15.8	17.0	10.0	2.8	2.8	2.8
11	Contact public transport staff to collect Information	13.9	13.7	14.7	2.5	2.6	2.4
12	Stay at your current location	16.6	17.5	12.0	3.4	3.4	3.5
13	Secure necessary supplies (food, drink, etc.)	32.9	33.0	32.3	3.0	3.1	2.8
14	Move to an open space such as a nearby park	39.7	41.8	29.0	3.3	3.3	3.0
15	Move according to evacuation guidance	53.7	54.9	47.7	3.4	3.5	3.2
16	Move to the evacuation center on your own	26.8	27.1	25.0	3.1	3.1	3.0
17	Move in sync with the movements of people around you	28.3	29.2	24.0	2.8	2.9	2.6
18	Observe the surroundings because you don't know what to do	45.2	44.7	48.0	3.6	3.6	3.4

Table 1.24: Result of Selected score and Selected rate in Scenario 2(No.: number of selection, FV: Foreign Vistors, J: Japanese)

No.	Description	Selected Rate (%)			Selected Score		
		All	FV	J	All	FV	J
8	Gather Information by calling out to Japanese people nearby	41.1	40.5	44.0	2.8	2.8	2.9
9	Contact staff at tourist Information centers to collect Information	33.8	36.8	18.7	2.7	2.7	2.4
10	Contact the hotel staff to collect Information	33.0	34.3	26.7	2.9	2.8	3.0
11	Contact public transport staff to collect Information	29.8	29.3	32.7	2.7	2.6	2.8
12	Stay at your current location	23.9	24.7	20.0	3.0	3.0	3.0
13	Secure necessary supplies (food, drink, etc.)	44.5	44.4	45.0	2.9	2.9	3.0
14	Move to an open space such as a nearby park	52.5	54.5	44.7	3.2	3.2	3.1
15	Move according to evacuation guidance	66.6	65.9	70.0	3.4	3.4	3.5
16	Move to the evacuation center on your own	39.3	37.9	46.3	2.9	2.9	2.7
17	Move in sync with the movements of people around you	46.5	47.3	42.7	2.9	3.0	2.8
18	Observe the surroundings because you don't know what to do	61.6	60.7	66.0	3.6	3.5	3.8

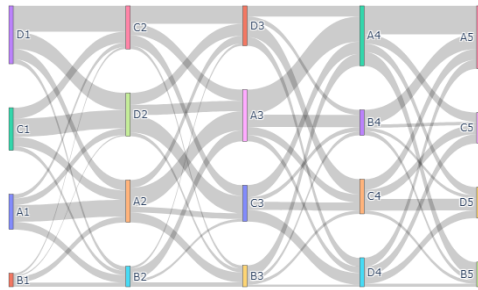
Table 1.25: Result of Selected score and Selected rate in Scenario 3(No.: number of selection, FV: Foreign Vistors, J: Japanese)

No.	Description	Selected Rate (%)			Selected Score		
		All	FV	J	All	FV	J
1	Collect Information on the official websites of Japanese government agencies	29.1	28.6	31.1	3.0	3.0	3.0
2	Collect Information with the disaster prevention app on your smartphone	29.4	27.1	41.0	3.0	2.9	3.2
3	Collect Information on news sites and disaster prevention portal sites	27.6	24.5	43.0	2.8	2.7	3.2
4	Collect Information on SNS (Twitter, Facebook, LINE, etc.)	24.6	22.7	34.3	2.8	2.7	3.0
5	Call the embassy of your country to collect Information	24.2	29.0	N/A	2.9	2.9	N/A
6	Collect Information from TV and radio	22.4	19.3	37.7	2.9	2.8	3.0
7	Check maps and digital signage to collect Information	15.7	16.2	13.3	2.9	2.9	2.9
8	Gather Information by calling out to Japanese people nearby	20.7	21.1	18.3	2.7	2.7	2.7
9	Contact staff at tourist Information centers to collect Information	16.8	18.8	7.0	2.7	2.7	2.7
10	Contact the hotel staff to collect Information	15.4	17.1	7.0	2.8	2.8	2.9
11	Contact public transport staff to collect Information	23.9	22.6	30.7	3.0	3.0	3.1
12	Stay at your current location	13.7	14.3	10.3	3.6	3.7	2.9
13	Secure necessary supplies (food, drink, etc.)	27.8	28.3	25.3	3.0	3.0	2.9
14	Move to an open space such as a nearby park	34.6	37.6	19.3	3.2	3.2	2.9
15	Move according to evacuation guidance	50.7	50.9	50.0	3.4	3.4	3.2
16	Move to the evacuation center on your own	26.6	27.9	20.3	2.9	2.9	2.8
17	Move in sync with the movements of people around you	32.4	33.6	26.7	2.9	2.9	2.8
18	Observe the surroundings because you don't know what to do	41.1	40.8	42.7	3.7	3.7	3.5

Table 1.26: Result of Selected score and Selected rate in Scenario 4(No.: number of selection, FV: Foreign Vistors, J: Japanese)

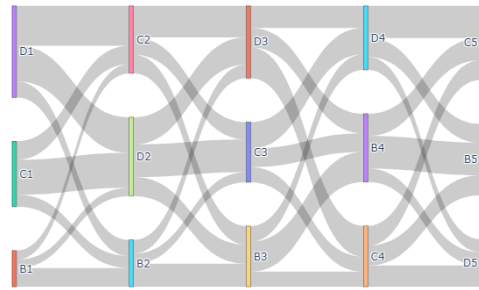
No.	Description	Selected Rate (%)			Selected Score		
		All	FV	J	All	FV	J
8	Gather Information by calling out to Japanese people nearby	42.3	43.4	37.0	2.8	2.8	2.8
9	Contact staff at tourist Information centers to collect Information	29.2	32.1	14.7	2.7	2.7	2.7
10	Contact the hotel staff to collect Information	27.2	29.5	15.7	2.9	2.9	2.8
11	Contact public transport staff to collect Information	40.9	39.4	48.3	3.1	3.0	3.4
12	Stay at your current location	24.3	24.8	21.7	3.1	3.2	3.0
13	Secure necessary supplies (food, drink, etc.)	39.1	39.2	38.3	2.8	2.9	2.8
14	Move to an open space such as a nearby park	49.8	52.2	37.7	3.0	3.0	2.6
15	Move according to evacuation guidance	67.7	66.2	75.0	3.5	3.4	3.6
16	Move to the evacuation center on your own	41.1	40.9	42.0	2.8	2.8	2.5
17	Move in sync with the movements of people around you	50.6	50.9	49.0	2.9	3.0	2.8
18	Observe the surroundings because you don't know what to do	59.2	57.5	67.7	3.5	3.5	3.6

Scenario 1



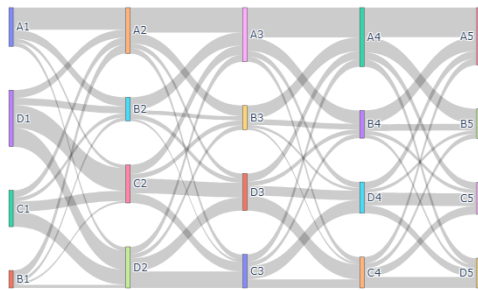
(a) In scenario 1

Scenario 2



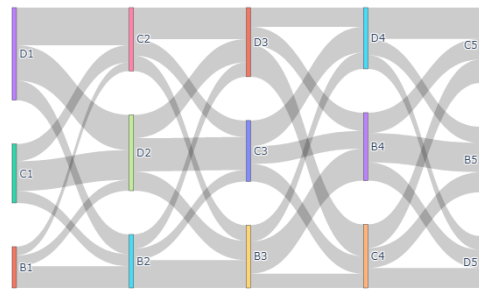
(b) In scenario 2

Scenario 3



(c) In scenario 3

Scenario 4

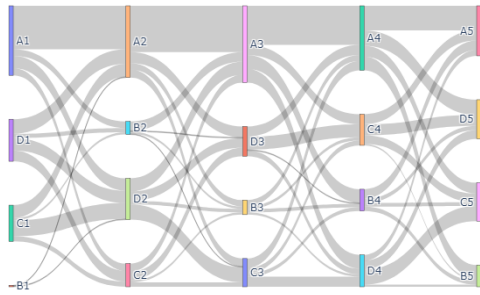


(d) In scenario 4

Figure 1.14: Sankey diagram of foreign visitors

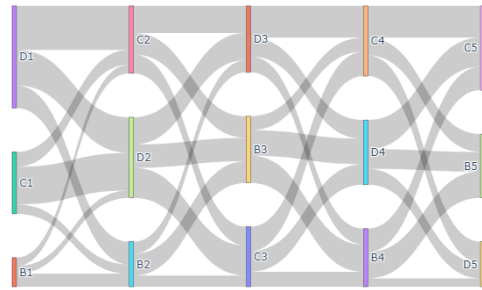


Scenario 1



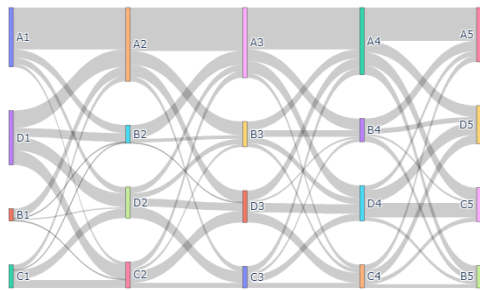
(a) In scenario 1

Scenario 2



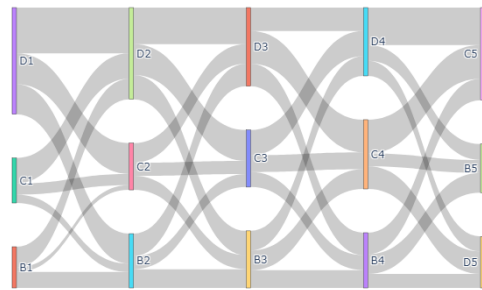
(b) In scenario 2

Scenario 3



(c) In scenario 3

Scenario 4



(d) In scenario 4

Figure 1.15: Sankey diagram of Japanese

Scenario 1	Order	No-faca-to-face	Face-to-face	Self evacuation	Following evacuation	Scenario 3	Order	No-faca-to-face	Face-to-face	Self evacuation	Following evacuation
Japanese	1st	96	2	50	58	Japanese	1st	82	17	32	75
	2nd	99	18	32	57		2nd	102	25	36	43
	3rd	106	20	39	41		3rd	97	35	30	44
	4th	89	30	43	44		4th	93	32	32	49
	5th	69	30	53	54		5th	75	31	47	53
Foreigners	1st	289	111	352	478	Foreigners	1st	320	144	300	466
	2nd	348	169	356	357		2nd	379	196	315	340
	3rd	426	176	299	329		3rd	447	200	277	306
	4th	496	210	285	239		4th	488	299	255	258
	5th	519	204	253	254		5th	475	245	264	246
Scenario 2	Order	No-faca-to-face	Face-to-face	Self evacuation	Following evacuation	Scenario 4	Order	No-faca-to-face	Face-to-face	Self evacuation	Following evacuation
Japanese	1st	N/A	31	66	109	Japanese	1st	N/A	44	48	114
	2nd		48	72	86		2nd		58	50	98
	3rd		71	64	71		3rd		61	61	84
	4th		62	75	69		4th		59	74	73
	5th		68	90	48		5th		52	99	55
Foreigners	1st	N/A	230	417	583	Foreigners	1st	N/A	263	376	591
	2nd		298	430	502		2nd		341	405	484
	3rd		386	383	461		3rd		400	389	441
	4th		435	387	408		4th		434	405	391
	5th		455	472	303		5th		418	481	331

Figure 1.16: Summary of Sankey diagram data

# References

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