1. Questionnaire to Muslim and non-Muslim consumers in Japan

We investigated consumer awareness of 50 Muslim and 50 non-Muslim respondents in Japan. In other words, this investigation was carried out among (1) non-Japanese Muslim and (2) non-Muslim Japanese. Table 1 shows gender, age, home country, and length of stay of non-Japanese Muslim respondents. The 50 non-Muslim respondents were all Japanese, and their age was 20–29 years old. Their gender was 33 males and 14 females, but three respondents did not respond.

The questionnaire was composed of four sections. The first section was demographic characteristics (gender, age, home country, length of stay for Muslim; gender, age, hometown in Japan, travel experience outside Japan for non-Muslim). The second section was about whether they knew about halal certification and Muslim friendly policy. In the third and fourth sections, we asked respondents about required information of food and restaurant selection. For food selection, a respondent checked required information from ten choices to purchase foods in Japan: halal certification, Muslim friendly, ingredient labelling, place of production, producer, price, breeding method, processing method, distribution method, and expiration date. Finally, we asked where the respondent purchased halal foods in Japan: supermarket, department store, online shopping website, and others.

For restaurant selection, we first asked availability of restaurants which the respondent often used. Similar to food selection, we asked required information from ten choices to select a restaurant. Furthermore, the additional choice of Muslim employee was included in the questionnaire. Respondents checked their required information from eleven choices.

Table 1 Demographic property of 50 Muslim respondents.

Gender		*Home Country*	
Male	42	Afghanistan 2, Bangladesh 17,	
Female	8	India 1, Indonesia 8, Iran 4,	
		Malaysia 6, Pakistan 4,	
		Sri Lanka 2, Tajikistan 1, Turkey 5	
Age		*Length of Stay*	
Below 20 years	1	Less than 1 years	8
20–29 years	30	1 or less than 5 years	24
30–39 years	14	5 or less than 10 years	9
40–49 years	4	10 or less than 20 years	7
N.A.	1	20 years and over	1
		N.A.	1

2. Correspondence analysis

Required information for food and restaurant selection was analyzed by correspondence analysis using IBM SPSS Statistics 23.0. It was a type of principal component analysis of categorized data [1].

3. Results of food selection

Most Muslim respondents had knowledge of halal certification, but four respondents did not. They came from South or West Asia. Muslim friendly policy had not been known widely within Muslim respondents. Twenty-nine respondents (58%) had knowledge of it, but the others (42%) did not. This knowledge did not depend on home county and length of stay.

Correspondence analysis of Muslim respondents showed six dimensions to explain 86.2%. Table 2 shows the result of the correspondence analysis. The mass was higher for halal certification (0.257), ingredient labelling (0.229), Muslim friendly (0.123), expiration date (0.123), and price (0.106), meaning that most Muslim consumers needed such information for food selection. Fig. 1 (a) illustrates the biplot of required information and Muslim respondents for the dimensions 1 and 2.

They were categorized into four groups. The first pursued required how to produce foods, i.e., breeding and processing methods. The second had priority to distribution method. The third demanded more information of Muslim friendly policy. On the contrary to the first, the fourth checked information of producer and place of production.

Non-Muslim respondents did not need halal certification and Muslim friendly for their food selection. Correspondence analysis showed that four factors were adopted until 80.8% as shown in Table 3. The mass was higher for price (0.295), expiration date (0.295), ingredient labelling (0.181), and place of production (0.174). The top three information was the common which non-Muslim and Muslim respondents demanded in Japan. Fig. 1 (b) illustrates the biplot of required information and non-Muslim respondents for the dimensions 1 and 2. Some of them required how to produce and deliver foods (breeding, process, and distribution methods as well as producer).
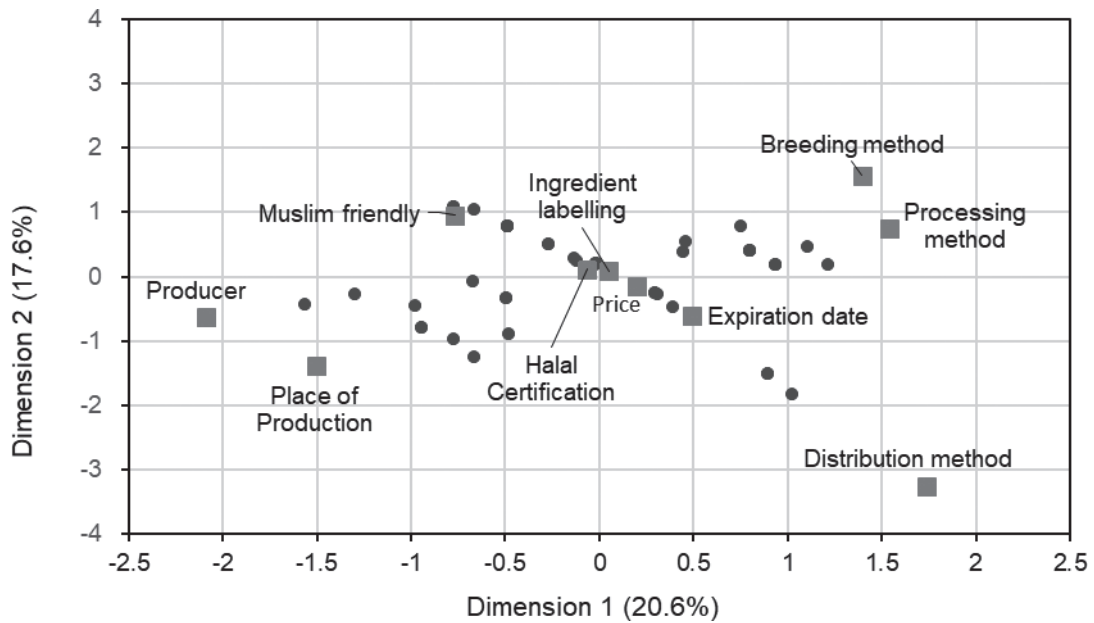
Table 2 Result of correspondence analysis for food selection of Muslim respondents.

(a) Abstract

Dimension	Inertia	Contribution	
		Individual	Cumulative
1	0.292	0.206	0.206
2	0.249	0.176	0.381
3	0.222	0.156	0.538
4	0.178	0.126	0.663
5	0.145	0.102	0.766
6	0.137	0.097	0.862

(b) Mass of required information

Required Information	Mass
Halal Certification	0.257
Muslim Friendly	0.123
Ingredient Labelling	0.229
Place of Production	0.050
Producer	0.022
Price	0.106
Breeding Method	0.006
Processing Method	0.067
Distribution Method	0.017
Expiration Date	0.123

Table 3 Result of correspondence analysis for food selection of non-Muslim respondents.

(a)　　Abstract

Dimension	Inertia	Contribution	
		Individual	Cumulative
1	0.312	0.299	0.299
2	0.209	0.201	0.500
3	0.180	0.172	0.672
4	0.142	0.136	0.808

(b)　　Mass of required information

Required Information	Mass
Ingredient Labelling	0.181
Place of Production	0.174
Producer	0.027
Price	0.295
Breeding Method	0.006
Processing Method	0.013
Distribution Method	0.007
Expiration Date	0.295

(a) Muslim consumers in Japan
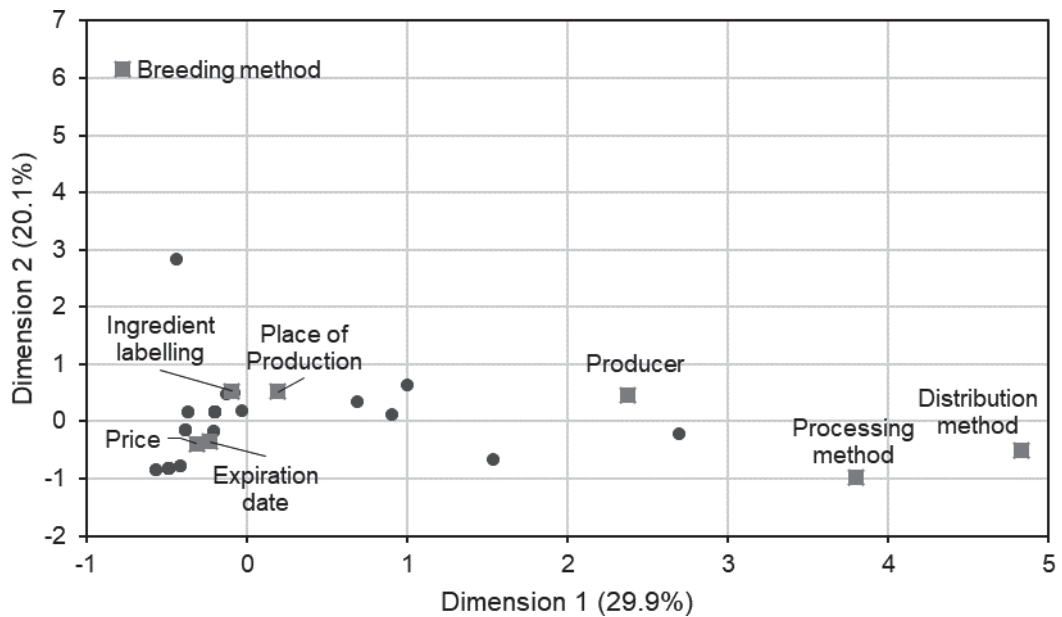
(b) Non-Muslim consumers in Japan

Fig. 1 Correspondence analysis of food selection for (a) Muslim respondents and (b) non-Muslim respondents in Japan. Square shows required information, and circle means respective respondents.

Table 4　Result of correspondence analysis for restaurant selection of Muslim respondents.

<table>
<tr><td colspan="2">(a)　Abstract</td><td colspan="2"></td><td colspan="2">(b)　Mass of required information</td></tr>
</table>

Dimension	Inertia	Contribution		Required Information	Mass
		Individual	Cumulative		
1	1.000	0.319	0.319	Halal Certification	0.264
2	0.472	0.150	0.469	Muslim Friendly	0.121
3	0.413	0.132	0.601	Ingredient Labelling	0.165
4	0.331	0.106	0.706	Place of Production	0.033
5	0.274	0.087	0.794	Producer	0.011
6	0.243	0.077	0.871	Price	0.044
				Processing Method	0.033
				Distribution Method	0.011
				Expiration Date	0.033
				Muslim Employee	0.286

Table 5　Result of correspondence analysis for restaurant selection of Muslim respondents.

(a)　Abstract　　　　　　　　　　(b)　Mass of required information

Dimension	Inertia	Contribution		Required Information	Mass
		Individual	Cumulative		
1	0.540	0.321	0.321	Ingredient Labelling	0.097
2	0.474	0.281	0.602	Place of Production	0.081
3	0.393	0.233	0.835	Producer	0.016
				Price	0.726
				Expiration Date	0.081

4.　Results of restaurant selection

The thirty-seven Muslim respondents （74%） had their available restaurants, but the twenty-three consumers （26%） did not have. Correspondence analysis for restaurant selection of Muslim respondents, six dimensions were adopted until 87.1% as shown in Table 4, but none selected bleeding method. The mass was higher for Muslim employee （0.286）, halal certification （0.264）, ingredient labelling （0.165）, and Muslim friendly （0.121）. Muslim consumers had similar needs of restaurant selection compared with food selection.

Non-Muslim respondents did not need halal certification and Muslim friendly similar to food selection. In addition, they did not need how to produce and deliver foods at restaurants （bleeding, processing, and delivery methods）. Correspondence analysis showed that three dimensions were adopted until 83.5% as shown in Table 5. Price was the highest mass （0.726） among required information.

5.　Discussion

5. 1　Selection of foods and restaurants by consumers in Japan

Correspondence analysis indicated that Muslim and non-Muslim respondents had similar

needs of ingredient labelling, expiration date, and price for food selection. In addition, Muslim respondents primarily demanded halal certification. Currently, halal foods had not been widely available in Japan; therefore, Muslim friendly policy was the second priority in food supply chain for Muslim consumers. However, Muslim consumers had relatively diverse needs in Japan for food selection.

As shown in Fig. 1 (a), Muslim respondents were categorized into four groups. The first and second groups needed detailed information regarding how to produce and deliver foods (breeding, processing, and distribution methods). They did not feel relieved to Muslim friendly policy. In addition, the second group had anxiety of distribution method. On the other hand, the third and fourth groups needed information of producer and place of production. As described previously, some manufactures adopted Muslim friendly policy with information disclosure. This strategy satisfied needs of the third and fourth groups of Muslim consumers.

Some Muslim respondents (26%) did not have available restaurants. The other respondents (74%) had available restaurants, but they primarily demanded Muslim employee and halal certification if they selected the restaurant as top priority. Muslim friendly policy partly fulfilled consumer needs. Muslim consumers also require halal foods at the restaurant in Japan, but they also confirm similar information (expiration date, ingredient labelling, and price) to non-Muslim consumers if higher priority needs of halal foods are satisfied.

5. 2 Supply chain integration of halal foods in Japan

The companies adopted either halal certification or Muslim friendly as their policy. Most manufactures had moderate integration from suppliers to consumers. It was regarded as periphery-facing [2]. The four manufactures obtained halal certification. They achieved supply chain integration of halal foods by selecting suppliers and by considering specific processing and distribution methods to retailers and restaurants. The other five manufactures adopted Muslim friendly policies by disclosing information to their clients such as whether food materials (meats, vegetables, etc.) and/or ingredients are certified as halal, or from which country they are procured.

All the retailers adopted the same strategy as the manufacture with Muslim friendly policies. Retailers provided foods and other materials to all people which included non-Muslim and Muslim consumers in Japan. The restaurant adopted either halal certification or Muslim friendly as their policy similar to manufactures. Retailers and restaurants emphasized whether food materials were halal at the point of supplier and/or manufacturer selection. Muslim friendly policy could maintain halal food integrity through disclosure of information in Japan.

Frohlich and Westbrook [2] proposed two types of supply chain integration. One was delivery integration from suppliers to customers: the forward physical flows of deliveries. The other was information integration from customers to suppliers: the backward coordination of data. The companies with Muslim friendly policy adopted a strategy of information integration rather than delivery information. For example, some companies provided information for consumers through their websites and SNS on their food integrity. The companies which had obtained halal certification adopted both directions of supply chain integration. For delivery integration, some companies partly used private containers to deliver halal foods to clients or consumers. The manager direct-
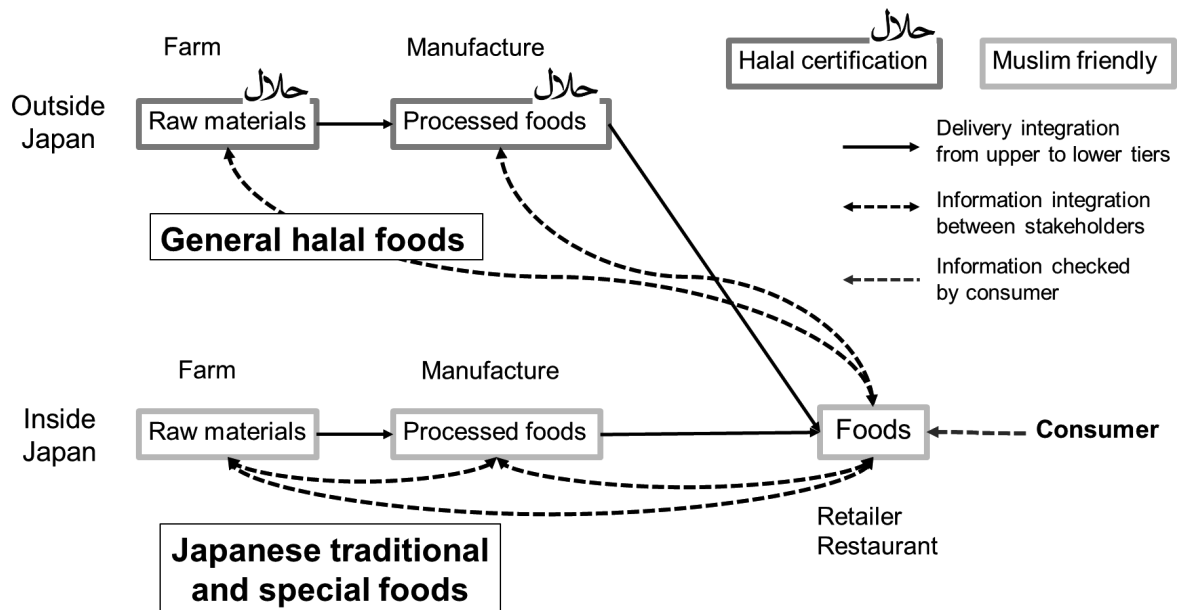
Fig. 2　Desirable supply chain framework of halal foods to ensure higher food integrity in Japan.

ly procured halal food materials from a manufacturer to avoid halal food delivery with non-halal materials. However, it was difficult in Japan to achieve fully conformant halal food delivery because most transportation did not consider avoiding mixed delivery of halal foods with non-halal materials. As for information integration, some manufacturers gave retailers/restaurants and consumers some information about halal foods, such as food materials and ingredients, production and storing methods.

5. 3　Desirable supply chain integration for halal food integrity in Japan

Some manufactures and restaurants obtained halal certification. However, all retailers as well as other manufactures and restaurants adopted Muslim friendly policy. From consumer perspective, Muslim respondents primarily demanded halal certification for food and restaurant selection, but non-Muslim respondents did not need them. Currently, halal foods have not been widely available in Japan, and most non-Muslim consumers do not have knowledge of halal certification. Thus, Muslim friendly is more adequate policy of supply chain integration with current awareness of all consumers including Muslim people in Japan.

In addition, this study indicated explicitly that Muslim consumers had different needs for food selection in Japan. Some Muslim respondents required information regarding how to produce and deliver foods, but others needed Muslim friendly policy with information of producer and place of production as shown in Fig. 1 (a). In food supply chain, stakeholders have faced their business issues to consumers and other stakeholders. Therefore, we suggest that information disclosure and transparency are the most essential points to ensure higher food integrity as supply chain framework of halal foods in Japan as shown in Fig. 2. Manufactures should produce halal foods in which facilities outside Japan they obtain halal certification using halal-certified raw materials. Furthermore, Muslim consumers have higher needs of Japanese foods because Japanese cuisine is popular similar to other traditional ones. Alternatively, food production followed

by Muslim friendly policy is also available service in Japan. As shown in Fig. 2, beef and chicken should be generally excluded in food supply chain inside Japan. However, we can consider customer loyalty to be brand equity of Japanese traditional and special foods such as "Wagyu" beef [3, 4]. Retailers and restaurants should disclose their information regarding halal certification and/or Muslim friendly policy. Muslim consumers can take foods and dishes by checking this information. Some manufacturers, retailers, and restaurants provide such information through SNS and/or the website. Muslim consumers require different information regarding foods provided in Japan in accordance with their believe. Transparency with cross-cultural understandings is the key factor to achieve supply chain integration with food integrity in Japan.

6. Conclusions

Supply chain integration and consumer awareness of halal foods were studied in Japan. The companies, which had obtained halal certification, adopted both directions of delivery and information integration. The other companies, which had adopted Muslim friendly policy, provided fruitful information to which Muslim consumers could select foods in Japan as information integration. Muslim consumers primarily demanded halal certification, and Muslim friendly policy was the second priority. However, they were categorized into four groups with diverse needs in Japan. As supply chain framework, food integrity should be ensured in a higher level by information disclosure and transparency of halal foods in Japan to achieve cross-cultural understandings of all the consumers for the diverse society.

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