The Effects of Perceived Risk of Radioactive Contamination on Consumer Purchase Intentions in Japan's Food Market

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The Effects of Perceived Risk of Radioactive Contamination on Consumer Purchase Intentions in Japan’ s Food Market

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The purpose of this study is to examine how Japanese consumers' concerns about food from areas that experienced radioactive contamination following the Fukushima Daiichi nuclear accident on March 11, 2011, affected their purchasing intentions. Through structural equation modeling, it examined how the country-of-origin affects consumers' purchase intentions as influenced by their perceived risk with regard to the food product. The result indicates that consumers are inclined to feel uneasy about food products from radioactive contaminated areas, which subsequently influences their purchase intentions.Providing domestic and foreign consumers with accurate and detailed information on food products from such areas through social media and mass media will lead to the development and expansion of Japan's food culture industry in the future.

Key words: radioactive contamination, perceived risk, purchase intentions, country-of-origin, food image

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I. Introduction

The Great East Japan Earthquake, which occurred in Fukushima and its neighboring areas on March 11, 2011, and the nuclear accident that followed, resulted in food safety and quality concerns both within and outside of Japan. In the aftermath of the Fukushima nuclear power plant accident, the global brand image of Japanese food products may have deteriorated. In particular, consumers in other countries became concerned about the potential radioactive contamination of food produced in Japan. This became an important factor affecting consumers' trans-border purchasing decisions (Yeh, Chen and Sher 2010). International consumer preference for food products is strongly affected by their source of origin. "Made in Japan" used to be a brand image that represented high quality, but since the disaster, it has witnessed a continuous deterioration, especially with regard to fishery and agricultural products.

Moreover, even domestic consumers are concerned about buying food produced in the disaster hit areas. This study examines the image of Japanese food products with respect to their country-of-origin (Nagashima 1970, 1977), in particular Fukushima and the neighboring radioactive contaminated areas, by investigating the purchasing behavior of domestic consumers. Moreover, it explores how consumers' concerns about food from radioactive contaminated areas of Japan can affect their purchasing intent. In Japan, the impression is that domestically produced is good. Behind this is a strong commitment to food safety, security and high quality.

What is the impact of the Fukushima nuclear accident on March 11, 2011 on Japanese food culture and the environment, and how has the food image of Fukushima and radioactive contaminated areas affected consumers' purchasing intentions? This study analyzed the impact of consumers' perceived risk (Cox 1967) of food in radioactive contaminated areas on food image and purchasing intent (Insch and McBride 2004; Knight and Calantone 2000; Munjal 2014), and formulated a plan to clarify consumers' perceptions of radioactive contaminated areas.

Nine years have passed since the Fukushima nuclear accident. In the global Japanese cuisine boom, it is essential to make Japanese food using Japanese ingredients in order to convey the original Japanese culture and tradition. In order to resume the export of Japanese food products overseas, which has been suspended since the nuclear accident, this study aims to provide accurate and detailed information on food in radioactive contaminated areas to domestic and overseas consumers. This study recognizes that the provision of information is urgent.

II. Literature Review and Hypotheses

This study sought to determine the extent to which the image of Japanese food products influenced the purchase intentions of consumers since the nuclear accident of 2011 with respect to consumers' level of perceived risk regarding Japanese food products.

Fukushima and its neighboring areas in Japan are considered to be radioactive contaminated areas. The country-of-origin effect claims that consumers evaluate products based on particular information about any country, and that country's general standing when looking at the "made in (name of country)'s image" (Han and Terpstra 1988; Nagashima 1970, 1977).

Perceived risk indicates consumers' subjective perceptions regarding the level of risk (Bauer 1960). As people become more anxious about food safety and radioactive contamination, and any perceived risk in this regard influences purchase intentions (Alden et al. 1993; Loewenstein, Weber, Hsee and Welch 2001; Slovic 1987; Slovic and Peters 2006). Slovic and Peters (2006) investigated the effects of nuclear power to explain practical responses in many risk situations. They stated that risk refers to individuals' instinctive and intuitive reactions to danger. When purchasing a product from a radioactive contaminated area, if a consumer perceives risk (physical, social, and psychological), this affects the food image enough to avoid purchasing it.

Food image refers to the perception formed by integrating all the information a consumer experiences in regard to a particular food. The country-of-origin allows consumers to perceive and recognize the quality of the food, which subsequently influences their food image. It is a comprehensive and complex image formed on the basis of diverse information that consumers have about a certain area. Information cues, intrinsic (taste, design, fit, etc.) and extrinsic (price, brand name, warranties etc.) cues, related to the country-of-origin affect consumer evaluations and purchase intentions(Bilkey and Nes 1982; Wall and Heslop 1991; Rezvani, Shenyari, Dehkordi, Salehi, Nahid and Soleimani 2012).According to Rezvani et al. (2012), extrinsic cues for the country-of-origin affect purchase intentions more than intrinsic cues.

Purchase intentions are defined as mediators of attitudes and behaviors, and are influenced by beliefs about and attitudes towards these products (Fishbein and Ajzen 1975). The country-of-origin affects purchase intentions (Al-Sulaiti and Baker 1998; Dinnie 2003; Herz 2015; Lee and Lee 2009; Lo, Tung, Wang and Huang 2017; Peterson and Jolibert 1995; Verlegh, Steenkamp and Meulenberg 2005; Yang, Ramsaran and Wibowo 2016). If people perceive risk about radioactive foods, they will not have a good food image, and their purchase intentions may be more likely to avoid these products. The food image, thus, may have affected their intention of purchasing.

Therefore, five hypotheses were drawn:

H 1: Country-of-origin image affects perceived risk.

H 2: Country-of-origin image affects food image.

H 3: Country-of-origin image affects purchase intentions.

H 4: Perceived risk affects food image.

H 5: Food image affects purchase intentions

The model used in this study, which consists of country-of-origin (COO), perceived risk (RISK), food image (FI), and purchase intentions (PI), is based

on structural equation modeling. By formulating the above hypotheses, relationships between these four constructs were evaluated to investigate purchase intentions of domestic consumers with respect to the country-of-origin image of food products.

III. Methods

This study investigated the perceptions of consumers in Japan during the period December 11-13, 2018 through a survey. There were a total of 317 respondents in East Northern cities ［93 male students (29.3%), 224 female students (70.7%); age range: 18-24 years］. SPSS Statistics 25 and SPSS Amos 25 Graphics software were used for all analyses (IBM, Armonk, NY). For food image (FI), among nine variables, three were significant (FI1, FI3, and FI4). For country-of-origin (COO), among eight variables, three were significant (C5, C6, and C7). For perceived risk (R), among five variables, three were significant (R1, R2, and R5). For purchase intentions (PI), among seven variables, two were significant (P1 and P2). The variables with standard estimates greater than .75 were selected and analyzed.

IV. Results

A model comprising of four constructs, country-of-origin, perceived risk, food image, and purchase intentions was set up. The X^2 value was 50.700 with a degree of freedom of 39. The composite reliability (CR) values of the model, country-of-origin (.96), perceived risk (.80), food image (.86), and purchase intentions (.83), were all more than .80, which is considered to be highly acceptable.

<Table 1> Constructs and Variables

Constructs and Variables	SE
Country of Origin(COO)	
C1: Feels anxious about purchasing food produced in radioactive contaminated areas.	.98
C2: Feels anxious about purchasing agricultural, livestock, and fishery products produced in radioactive contaminated areas.	.99
C3 Feels anxious about purchasing processed products produced in radioactive contaminated areas.	.95
Perceived Risk(R)	
R1: Domestic food seems to have taste and quality issues due to radioactive contamination.	.85
R2: Domestic food may affect health due to radioactive contamination.	.88
R3: I don't want to purchase domestic food products due to radioactive contamination.	.84
Food Image (FI)	
F1: Domestic food is assured.	.76
F2: Domestic food is hygienic.	.80
F3: Domestic food is safe.	.90
Purchase Intentions (PI)	
P1: I usually buy domestic ingredients.	.88
P2: I am willing to buy domestic food.	.92

Note: SE=Standard estimate

The values of average variance extracted (AVE) to measure the validity of the four constructs were as follows: country-of-origin (.90), perceived risk (.60), food image (.68), and purchase intentions (.71). The AVE values were also considered to be acceptable more than .60. The overall fitness of this model was measured by the goodness-of-fit index (.97), adjusted goodness-of-fit index (.95), and root mean square error of approximation (.03). The results indicated that the model was a very good fit for the data (Fornell and Larcker 1981). <Table 1> shows the standard estimates of each variable under the five constructs, all of which were greater than .75.

<Table 2> Results of the Model

Hypotheses	SE①	SE②
H 1: Country of origin → Perceived risk	.68***	.04
H 2: Country of origin → Food image	- .19*	.04
H 3: Country of origin → Purchase intentions	.23***	.05
H 4: Perceived risk → Food image	.22**	.06
H 5: Food image → Purchase intentions	.21***	.09

*|t|>1.65, p< .05 (one-tailed test), **|t|>1.96, p< .03 (one-tailed test), ***|t|>2.33, p< .01 (one-tailed test)
Note: SE①: Standard estimate, SE②: Standard error

<Table 2> shows the results of the model. The following hypotheses were supported: H 1 showed a strong relationship, while H 2, H 3,H 4, and H 5 showed weak relationships.

V. Discussion

In this study, the country-of-origin strongly effects influenced perceived risk and food image, and weakly affects purchase intentions. Hence, in Fukushima and the neighboring radioactive contaminated areas, consumers seem to perceive risk strongly.

In the demographic survey, respondents were asked the following question: "If you feel anxious about buying domestic foods, what are the factors causing such anxiety?" Their biggest concern was that they did not know the source of the raw materials used. Another concern was that food may be radioactive contaminated. They reported feeling anxious about food originating from radioactive contaminated areas.

H 1 (country of origin → perceived risk) was found to be true, with a strong relationship. Consumers perceived risk strongly when they considered the country-of-origin of food products, especially with respect to radioactive contaminated areas. The result was positively significant. H 2 (country of origin → food image) was found to be true, with a weak negative relationship. As regards H 3, in the case of Japanese food products, the country-of-origin effect was found to weakly influence food image negatively, and purchase intentions positively. Perceived risk to food images are a weak influence in the direct relationship, and peoples' feeling of risk influences the food image. When consumers have a positive food image, purchase intentions were also affected positively. This result indicates that when people buy Japanese food products, their awareness about the source of these products influence their purchase intentions.

This can be interpreted as follows: If consumers were to discover that products came from a radioactive contaminated area, they would perceive it to be risky, and be unwilling to buy them. In the buying environments, there

are some factors that influence purchasing intentions such as price, supporting the economy of the radioactive contaminated area, or some other situational factors.

VI. Implications for Future Studies

This study investigated how the country of origin affects food image, perceived risk, and purchase intentions among domestic consumers in Japan in the aftermath of the nuclear accident. Given that exports of agricultural, livestock, and marine products and processed goods are still banned in Japan, this study aims to investigate consumers' purchasing intent for radioactive contaminated regional products. It also investigates the current situation of purchasing intention, and suggests a solution.

The Fukushima nuclear accident must be considered as a base to review traditional food culture, in order to develop and expand food as a cultural industry. It is also necessary to focus on how to develop Japanese food culture in the future, its exchange with Asian food culture, Western food culture, and expand the Japanese food industry. Japanese food has been registered as a UNESCO Intangible Cultural Heritage, and is being recognized worldwide, as well as in Japan. However, Japan's government and society should also recognize that the domestic and foreign consumers want to clarify the problem of radioactive contaminated Japanese food.

The study was limited by the sample used, which comprised of only college students from the north eastern area of Japan.Future studies should involve more sampling and neurological data collection (fMRI, EEG, and fNIRS, etc.) to measure mental reactions and brain responses.

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