A Social Media Strategy for Public Communication on Food Safety Matters

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I   Introduction «

1. Research background

Food safety is an issue that directly affects the daily lives of citizens and therefore requires the utmost attention of policymakers. Scandals over food contamination and poisoning, however, continue to occur, and it is becoming increasingly difficult for policymakers and industry stakeholders to predict them. Some scandals present only minor or short-term risk and are forgotten quickly; others, however, such as radioactive contamination of food, carry far more serious implications for public health and society in general.

Table 1 summarizes the major food scandals that have erupted in Korea over the past decade. These include food poisonings of bacterial or viral origins, illegal use of unauthorized additives, contamination of food with residual pesticides and animal medicines, and worries over potentially radioactive food ingredients imported from overseas, particularly Japan. The globalization of the Korean food market has led to the concomitant globalization of food scandals and risks, as seen in the cases of the fungi-poisoned nuts imported from overseas, dioxin-contaminated pork from Ireland, and baby formula from France in which *Enterobacter sakazaki* was discovered.

〈Table 1〉 Major Food Scandals in Korea over the Past Decade

Year	Originating in Korea	Originating overseas
2014	- Coliform groups detected in cereals	- Imported food products from the U.S. containing azodicarbonamide, a hazardous additive - Intentional injection of pesticides by manufacturer into frozen food produced in Japan - Inedible fats found in edible oil and other related products produced in Taiwan
2013	- Blowfish skins containing glacial acetic acid - Farmed catfish containing malachite green - Norovirus detected in kimchi made with groundwater - Zilpaterol, a fodder additive, found in beef imported from the U.S. - Noodles containing traces of metal - Fermented ginseng drinks containing glass fragments	- Fake shark fins in China - Radioactive contamination of land-based food due to Fukushima nuclear disaster in Japan - Radioactive contamination of seawater and seafood in Japan - Horse meat mixed into beef products in Europe - Maleic acid, an industrial agent, found in starch and related products produced in Taiwan - Suspicions regarding botulinum toxins in dairy products produced by Fonterra in New Zealand
2012	- Farming agents containing sulfuric and chloric acids used on seaweed farms - Benzopyrene detected in ramyun noodles made with contaminated smoked bonito	
2011	- Distribution of kimchi containing food poisoning bacteria	- Food poisoning caused by EHEC in food in the EU - Listeria in melons produced in the U.S.
2010	- Snacks containing traces of metal - Cadmium detected in octopus heads	
2009	- Enterobacter sakazaki found in French baby formula - Re-packaging of industrial saccharine imported from China	

Year	Originating in Korea	Originating overseas
2008	- Diverse objects (heads of mice, razor blades, insects, etc.) found in food (snacks, canned tuna, ramyun noodles, etc.) - Dioxin found in pork imported from Ireland - Melamine found in snacks imported from China - Scandal over mad cow disease in U.S. beef - Avian influenza - GMO corn imported from overseas	
2007	- Enterobacter sakazaki found in baby formula and baby food - Pesticides found in green tea	
2006	- Food additives in snacks - Food poisoning at schools	- Fungal toxins in pistachio and other nut products produced in the EU
2005	- Intestinal parasite eggs found in kimchi - Lead found in kimchi - Malachite green found in eels and grey mullets	

Source: Jeong, G. et al. (2012), *Strategy for the Improvement of Information Exchange on Food Hazards*, KIHASA.

The competency and capability of the Korean government to deal with such food safety issues have improved significantly over the years. Since the establishment of a government-wide food safety management system, the quality of communication and transparency and objectivity of related information has been improving. Measures for ensuring food safety have also become more scientific and reliable.

⟨Table 2⟩ Evolution of Korean Government's Handling of Food Safety Issues

Past	Present
Unilateral announcements of issues by investigative authorities, administrative authorities, the press, and consumer groups	- Scientific data used to build social consensus - Risk-based approach to food safety management
Communications focused more on social controversies than on scientific facts	- Growing social consensus on and pressure for self-restraint in the media
Exaggerating the issues of a few products in the food industry	- Increasing efforts to deliver transparent and objective information promptly - Greater efforts to reassure the public
Inability of government authorities to deal with crises	- Crisis management system established, clarifying communication strategies for each phase of a crisis - Risk communication committees established (Food Safety Policy Committee in Prime Minister's Office (PMO) and Ministry of Food and Drug Safety (MFDS))
Sensationalization of overseas issues in Korea	- National Food Safety Information Service (NFSIS) established as expert agency responsible for collecting, analyzing, and managing food safety information inside and outside Korea

Nevertheless, the Internet and social media serve to exaggerate and amplify any hint or suggestion of food controversy, thereby creating unnecessary alarm among the public. The advancement of information and communication technology has dramatically increased the Korean public's access to the Internet and significantly increased the influence of social media as channels of communication. As this trend will likely continue in the future, it is important for policymakers to analyze and understand how communication via social media works.

Moreover, the increasing public interest with quality of life and food safety in Korea has caused Koreans' food-related worries to multiply. While the expectations of Korean consumers regarding food continue to rise, food scandals keep occuring, amplifying consumers' anxiety.

Bilateral communication between the public and government authorities is crucial to the effective management of food safety scandals. In particular, communication concerning food safety matters ought to reflect the information and opinions of multiple stakeholders, including consumers, food industry insiders, experts, the media, and policymakers.

Consumers' sensitivity to issues such as food safety reflects their mistrust of the government and its policies, resulting from individuals' ideological convictions, subjective assessments, and distrust of incomplete science. Prompt and effective communication with government authorities is thus key to assuaging public concern.

2. Research objectives

Effective communication and policymaking by government authorities require, first and foremost, scientific and technical grounds for informed decision-making. In order to address and alleviate the public's prejudices and groundless concerns, it is critical to identify the root causes of the public's fear over food

safety, and respond to such concerns with sufficient information and public campaigns in a timely manner.

Multiple studies on this issue have been conducted in Korea, involving opinion polls on food safety. However, no studies, aside from the present one, have attempted to analyze Korean consumers' perceptions of food safety as expressed on social media. In-depth analyses of consumers' perceptions of food safety carry significant implications for public health and are essential to effective public communication and policymaking on related matters.

This study therefore analyzes the levels and intensity of the Korean public's concerns over food safety, as expressed via social media, by hour and year. The goal is to devise a citizen-to-government public communication strategy in which citizens can actually participate and have their opinions on worrisome food safety issues heard. The strategy will involve developing an instrument for monitoring and measuring the public's concerns in order to enable government authorities to manage the public's responses to possible food scandals more effectively.

3. Research methodology

The following methods have been used in this study.

□ Literature review, which involved:

○ Collecting and analyzing articles from academic journals and published policy reports, content from the websites of government authorities, and reports in the press, both inside and outside Korea, including:

  - An analysis of documented food risks and the public's responses;

  - A survey and comparison of the methods and results of consumer opinion polls;

  - An analysis of instances in which social media and other modern channels of communication were used; and

  - An analysis of studies on indicators of social and psychological anxiety in social data.

□ A survey of the press coverage of food safety issues, involving:

○ Counting the number of press reports on food safety issues.

□ A survey of public opinion polls, and their methods and results

○ Specifically:

  - Food Safety Panel Surveys by the MFDS and Consumer Confidence in Food Safety Surveys by the PMO; and

  - Other opinion polls conducted by consumer groups, etc.

○ Items of analysis:

- Organizers and purposes of polls;

- Poll scales and methods; and

- Outcomes.

□ Measuring public sentiment toward food safety using a social media analysis system

Ⅱ Literature Review

1. Trend of public's perception of food safety
2. Results of opinions polls on food safety
3. International comparison on food safety

II   Literature Review 《

1. Trend of public's perception of food safety

We reviewed previous studies and opinion polls on food safety in Korea with a view to finding implications for the present study.

A. Food safety statistics

As of 2015, a total of 935 official statistical studies were published pursuant to Korean law. However, no officially approved studies on food safety topics have been conducted by Statistics Korea (http://kostat.go.kr). Sources of food-related statistics in the Korean government today include the Office for Government Policy Coordination (OGPC, part of the PMO), Statistics Korea, the NFSIS, the Korea Rural Economic Institute (KREI), the Ministry of Agriculture, Food and Rural Affairs (MAFRA), and the MFDS.

Of these, the only agency that collects and publishes statistics on a regular and consistent basis is the Bureau of Food Safety at the OGPC, which has been producing statistics on food safety as part of the social surveys conducted by Statistics Korea since 2013. Even these, however, are not included among the

officially approved statistics from Statistics Korea. Therefore, at present, there are no official sources of food safety statistics in Korea.

As for statistics on food in general, there are the Food Industry and Ingredient Consumption Surveys by the MAFRA and the Records of Food Sampling and Inspection, the Imported Food Surveys, and the Records on the Production of Food Additives by the MFDS. The Children's Diet Safety Index, the Saha-gu Borough Safety Assessments (Busan), and the National Surveys on Safety in Daily Living are statistical surveys that collect data on safety in general, including food safety.

These surveys commonly collect data on the state of food ingredients, food additives, food packages and containers, imported food, and food hygiene and distribution in Korea. Of these, the Saha-gu Borough Safety Assessment specifically measures the damages and losses suffered by the residents of Saha-gu, a borough in Busan. The National Surveys on Safety in Daily Living, conducted by the Korean Institute of Criminology (KIC), examine actual crimes and their victims, pursuant to the Criminal Victims Protection Act, and are not directly correlated to food safety.

B. Surveys on consumers' satisfaction with food safety

Various government and semi-public agencies have been

surveying Korean consumers' satisfaction with food safety. While some of these statistical studies have received official government approval, they mostly involve data from single years only. In addition, some regional and local surveys lack questions regarding food safety, and the number of questions included in the questionnaires varies from survey to survey. Most surveys use either five- or seven-point scales along which polltakers are to rate their answers.

Surveys on consumers' perceptions of food safety were a part of Statistics Korea's official social surveys until 2012. The food safety surveys, however, were separated from the rest of the social surveys and transformed into the OGPC's Survey on Consumer Confidence in Food Safety. This survey has gained only partial official approval due to issues with its sample design. Although the Rural Living Index Survey also used to include a section on food safety, that section was removed after the survey was merged with the Survey on the Welfare of Farmers and Fishers.

Surveys on food safety can yield different results depending on which scale—five- or seven-point—they use, as well as the number of items used on the scale. A scale may be either two-tailed (e.g., asking the polltaker to choose between two options, ranging from "Very safe," "Safe," "Average," "Unsafe," and "Very unsafe") or one-tailed (e.g., asking the polltaker to rate his answer along a single dimension, also ranging from

"Very safe," "Safe," "Average," "Not safe," and "Very not safe." However, while consumers' perceptions of food safety overlap with their anxiety over food safety, to some extent, the two are not identical. Consumers may not perceive a given food as unsafe, but that does not mean they would absolutely trust the food's safety at all times.

Table 3 shows how the results of surveys on food safety, using one-tailed and two-tailed five- and seven-point scales, yield different results.

⟨Table 3⟩ Scales and Results of Different Surveys on Food Safety Perceptions

No.	Survey	Scale	Results				
1	Survey of Consumers' Confidence in Food Safety (2013)	Five-point scale (converted to ratios)	Very unsafe	Unsafe	Average	Safe	Very safe
			2.1%	25.8%	54.0%	17.2%	1.0%
2	Survey of Consumers' Confidence in Food Safety (2014)	Five-point scale (converted to ratios)	Very unsafe	Unsafe	Average	Safe	Very safe
			1.5%	24.7%	48.9%	24.2%	0.8%
3	Survey of the General Perception of Food Safety (2012)	Five-point scale (converted to ratios)	Very unsafe	Unsafe	Average	Safe	Very safe
			33.4% (2012)		50.5%		15.1%
			37.3% (2010)		47.6%		15.1%
4	Survey on Food Safety in Korea (2013)	Five-point scale (converted to ratios)	Very not safe	Not safe	Average	Safe	Very safe
			2.1% (Adults)	19.5%	46.4%	30.6%	0.3%
			0.3% (Teenagers)	11.3%	50.8%	28.3%	1.0%

No.	Survey	Scale	Results						
5	Survey on Confidence in Food Safety Risks (2013)	Seven-point scale (converted to ratios)	Very worried	Worried	A little worried	Average	A little reassured	Reassured	Very reassured
			27.0	19.9	18.6	25.1	5.6	3.0	0.8
6	Survey on the Perception of Food Safety Risks (2006)	Five-point scale (converted to percentage scores)	Risk score: 83.7 (out of 100)						

Sources: Jeong, G. et al. (2013), *Survey on Consumers' Confidence in Food Safety 2013*, OGPC/KIHASA; Jeong, G. et al. (2014), *Survey on Consumers' Confidence in Food Safety 2014*, OGPC/KIHASA, p. 182 (averages of the first and second halves of the year); Statistics Korea (2012), *Statistics Korea Social Survey* (press release); Lee, G. et al. (2013), *Basic Analysis on Food Consumption Behavior*, KREI, p. 350; KIPA Social Research Center (2013), *Survey on Koreans' Perceptions of Safety*, p. 17; Lee, G. et al. (2006), *Consumer Perception of Food Safety and Suggestions for Institutional Improvements*, KCA Policy Report, pp. 160-294.

2. Results of opinions polls on food safety

Table 4 summarizes the results of opinion polls conducted on food safety in Korea. What should be noted here is that interpreting answers of "Average" as meaning "Safe" may make Koreans seem more confident in food safety than they actually are. The answers of "Average" indicate neither affirmation nor rejection of food safety, and therefore require a consistent guideline for interpretation.

⟨Table 4⟩ Results of Opinion Polls on Food Safety in Korea

Area	2012	2013	2014
Food safety in general	66.6%(Average 50.5%)[1]	72.2%(Average 54.0%)[1]	73.8%(Average 48.9%)[5]
Imported food safety	45.3%(Average 37.3%)[1]	52.9%(Average 42.4%)[2]	51.8%(Average 39.9%)[5]
Food safety at school cafeterias	72.9%(Average 52.6%)[1]		
Safety of food available around schools	52.0%(Average 44.3%)[1]	43.0%(Average 34.2%)[2]	49.7%(Average 37.4%)[5]
Food safety at restaurants		74.5%(Average 58.0%)[2]	72.4%(Average 56.4%)[5]
Group meal safety		73.4%(Average 46.4%)[2]	78.5%(Average 43.6%)[5]
Risk-specific confidence/worry (about food safety scandals)		65.5%[3]	
Food safety assessment (adults)		77.3%(Average 46.4%)[4]	
Food safety assessment (teenagers)		80.1%(Average 50.8%)[4]	

Notes: All answers were measured using a five-point, two-tailed scale (ranging from "Very unsafe," "Unsafe," "Average," "Safe," and "Very safe"), with the answers of "Average," "Safe," and "Very safe" counted as affirming food safety.
Sources: 1) Statistics Korea (2012); Jeong, G. et al. (2013); KIPA Social Research Center (2013); Lee, G. et al. (2013); Jeong, G. et al. (2014).

After surveying and reviewing food safety opinion polls conducted in Korea in the past (see Table 5), we derived the following implications.

⟨Table 5⟩ Summary of Opinion Polls on Food Safety in Korea

Survey	Organizers	Conclusions
Food Consumption Behavior Survey (2013)	KREI	- Food safety was the most important criterion in making decisions regarding the purchase and consumption of food for 66.5% of adults and 59.1% of teenagers. - Three out of 10 rated food in Korea as safe (30%). - 50.7% of adults said they were willing to pay more for safe food. - Adults and teenagers gave food in Korea safety scores of 3.5 and 3.6, respectively, out of five.
Children's Diet Safety	MFDS	Children's diet safety index scores: 67.65 for

Survey	Organizers	Conclusions
Index (2014)		large cities (63.69 in 2013), 67.87 for small-to-medium cities, 67.34 for rural towns
Survey on Consumers' Confidence in Food Survey (2014)	OGPC/ KIHASA	- Confidence rating: 73.8% ("Average": 48.9%) *72.2% ("Average": 54.0%) in 2013
Social Survey (2012)	Statistics Korea	- Imported food safety: answer of "Unsafe" given by 54.7% (polltakers aged 15 or older) - School cafeteria food safety: answer of "Average" or "Safe" given by 72.9% ("Safe": 20.3%, "Average": 52.6%, and "Unsafe": 27.1%) - Safety of food available around schools: answer of "Unsafe" given by 48.0% (polltakers aged 15 or older) - Food safety in general in Korea: answer of "Average" or "Safe" given by 66.6% ("Safe": 16.1%, "Average": 50.5%)
Survey on Koreans' Perceptions of Safety (2013)	Korea Institute of Public Administration (KIPA)	- Rating 17 factors that pose a threat to safety and society: sexual abuse of children (75.6%), school violence (72.0%), sexual violence (68.2%), domestic violence (46.0%), violent crimes (67.8%), traffic accidents (52.0%), food safety accidents (65.5%) - Experiences with food safety issues: 20.2% (as opposed to 49.5% with traffic accidents, 19.8% with natural disasters, 14.0% with accidents in daily surroundings, and 14.0% with threats to mental health)
Study on Safety Perception Surveys and Effective Management (2013)	KIPA	- Importance of increased government efforts to ensure food safety as compared to the other three major concerns of public safety: answer of "Important" given by 78.6% (as opposed to 92.9% for violent crimes, 92.9% for sexual violence, and 100.0% for school violence)
Consumer Perception of Food Safety (2013)	Korea Chamber of Commerce	- Worried about food safety?: "Yes" 39.2% ("Average": 45.0%, "No": 15.8%). - Imported food safety: "Unsafe" 57.8% ("Average": 35.8%, "Safe": 6.4%).
Perception of Food Safety (2013)	Gyeonggi Research Institute (GRI)	- Worries about food safety found to be inversely correlated to income and education levels - Perception of food safety: answer of "Safe" given by 12% - Worried about society: 34.5%, Worried about food safety: 39.1%
Survey of Food Safety	Consumer Safety	- All 28 surveyed items of baby formulae and

Survey	Organizers	Conclusions
for Infants and Toddlers (2011)	Center	baby food delivered to homes meet legal standards on general bacteria, E. coli and coliform bacteria, Staphylococcus aureus, Bacilus cereus, and other germs. - Some liquid formulae for infants and toddlers exceeded legal standards on general bacteria. - Three porridges for toddlers and one food for children exceeded legal standards on Bacilus cereus.
Survey on the Perception of Food Safety (2010)	Trend Monitor Korea (http://trendmonitor.co.kr)	- Root causes of food safety scandals: lack of awareness of food safety among sellers (29.5%), lack of awareness among distributors (20.3%), lack of legal and institutional measures (18.3%) - Experience with food safety concerns in past year: "Yes" 61.5%
Nationwide Opinion Poll on Radioactive Contamination of Food (2013)	National Assembly people's Research Group for Nuclear-Free World for Children / Justice Party	- Safety of radioactive food imported from Japan: answer of "Not safe" given by 96.6% (including "Very unsafe," 69.2%, and "Unsafe, 27.4%) - Government's handling of food imports from Japan: answer of "Not appropriate" given by 93.1 percent ("Appropriate,": 4.6%).
Opinion Poll on Food Safety by Origin and Radioactive Leaks from Japan (2013)	Gallup Korea	- Perceptions of food safety by origin: "Unsafe" for Japan (85%), U.S. (47%), China (90%), Australia/New Zealand (17%), and Korea (17%) / "Safe in general" for Japan (6%), U.S. (40%), China (4%), Australia/New Zealand (70%), and Korea (75%).

The surveys show that Koreans are more worried about food safety than the state of the social order (39.1 percent vs. 34.5 percent) and more worried about imported food than food in general (57.8 percent vs. 39.2 percent). Koreans were particularly concerned about food imports from China (90 percent) and Japan (87 percent).

It was found that 65.5 percent of polltakers considered food scandals to be the fifth most serious threat (65.5 percent), out

of 17, to social safety, with 20 percent reporting personal ex-
periences with food scandals—to put this in perspective, more
polltakers experienced natural disasters and accidents in their
daily surroundings. Also, over half of polltakers (50.7 percent)
were willing to pay more for safe food.

3. International comparison on food safety

Notwithstanding the series of food safety scandals that have
erupted in Korea over the past decade, Koreans report that they
have become less worried about food safety. Yet Koreans tend
to be more worried about food safety than their counterparts in
the United States and other countries, as shown in Table 6.

〈Table 6〉 International Comparison of Consumers' Satisfaction with Food Safety

(Unit: percentage)

Country	2005	2007	2008	2009	2010	2011	2012	2013	2014
UK[1]	65	55(64)	–	(64)	–		24		22
US[2]	–	–	81	–	–				
Korea	–	–	40[3]	–	15.1[3]		16.1[4]	18.2[5]	25.0[6]

Sources: 1) http://www.food.gov.uk/news/pressreleases/2006/mar/cas2005ukpressregion;
http://www.food.gov.uk/news/newsarchive/2009/oct/tracker; Food Standards
Agency (2012), *Exploring food attitudes and behaviors in the UK:
Findings from the Food and You Survey 2012* ("definitely agree" +
"tend to agree"); Food Standards Agency (2014), *The 2014 Food and
You Survey*, UK Bulletin, Government Statistical Service.
2) Eurostat (2008), Food: from farm to fork statistics, Eurostat Pocketbooks.
3) Statistics Korea (2010), Social Survey 2010.
4) Statistics Korea (2012).
5) Jeong G. et al. (2013).
6) Jeong G. et al. (2014) (averages of the first and second halves of the year).

Most opinion polls on food safety are conducted on a quarterly or yearly basis with the goal of assessing consumers' general and normal perceptions of food safety. However, they lack the systems necessary to track changes in consumers' perception in the immediate aftermath of specific food safety scandals. These surveys also require polltakers to choose their answers along either a two-tailed (divided between "safe" and "unsafe") or one-tailed (divided between "safe" and "not safe") scales. The tools for measuring consumers' perceptions of food safety thus lack consistency and also fail to gauge how worried consumers are about food safety. Moreover, the results of these surveys can show dramatic differences depending on how answers of "Average" are interpreted. This requires a consistent standard for interpretation.

Ⅲ Results

III

Results ≪

1. Food safety and fears

Food refers to everything, aside from medicines, that we eat, according to Article 2 of Korea's Framework Act on Food Safety (FAFS). Food is indispensable to life, but the contamination of food can lead to serious illnesses and even death.[1]

Food safety is a concept that is opposite to food risk. It can be defined as the probability of not being seriously harmed by eating a given food[2] and has been a major interest of humankind since our very beginnings. For early humans, it was an absolute necessity to identify and avoid any substances that contained toxins.[1]

The World Trade Organization (WTO), on the other hand, defines food safety more broadly, as an issue pertaining to the entire food production process—ranging from the cultivation and harvest of agricultural and fishery produce to its storage and processing—as well as food distribution and sales and cooking and eating. Food safety is the state in which all measures necessary to ensure the safety, integrity, and soundness of

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1) Griffith. (2006). Food safety: where from and where to? *British Food Journal,* Vol.108, No.1, pp.6-15.
2) Henson, S. & Trail, B. (1993). Consumer perceptions of food safety and their impact on food choice. *Food Safety: The Challenge Ahead*, pp. 39-55.

food ingredients, throughout all processes involved, are in place.[3]

In Korea, food safety is generally understood as the capacity of food ingredients and products, aside from medicines, to assuage the concerns and ensure the health of consumers by posing no risks or risks below levels considered to be hazardous to health.

As Korean consumers have been increasingly bombarded with reports on food safety issues, the general level of fear they harbor concerning food have increased accordingly. Koreans are especially sensitive to food safety issues not only because they place great emphasis on eating in the first place, but also because their expectations of food safety have been rising, driven by the series of food safety scandals that have erupted in recent years, directly contradicting those expectations.[4]

Another major factor of the Korean public's growing concern over food safety in general can be traced to the lack of effective communication between the Korean government and the public. As Figure 1 shows, Koreans place greater trust in the press than in the government, with Koreans' rating of the former's trustworthiness rising from 48 to 50 between 2014 and 2015, while their rating of the latter's trustworthiness dropped

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3) Lee, J. (2005), "Institutional Measures to Ensure Food Safety under the Amended Food Sanitation Act," *Chungang Journal of Law*, 7(2), pp. 41-61.
4) Kim, J. (2015), "Strategy for Improving the Public Perception of the Safety of Food Additives," *Health and Welfare Issue & Focus*, 294, KIHASA.

from 45 to 33 during the same period. Much of this decline appears to be attributable to the government's mishandling of the sinking of the Sewol ferry and the outbreak of the Middle East respiratory syndrome (MERS). In other words, Koreans are influenced more by media coverage and press reports than official communications from the government.

〔Figure 1〕 Korean Public's Ratings of the Trustworthiness of the Media and Government

(Unit: points)
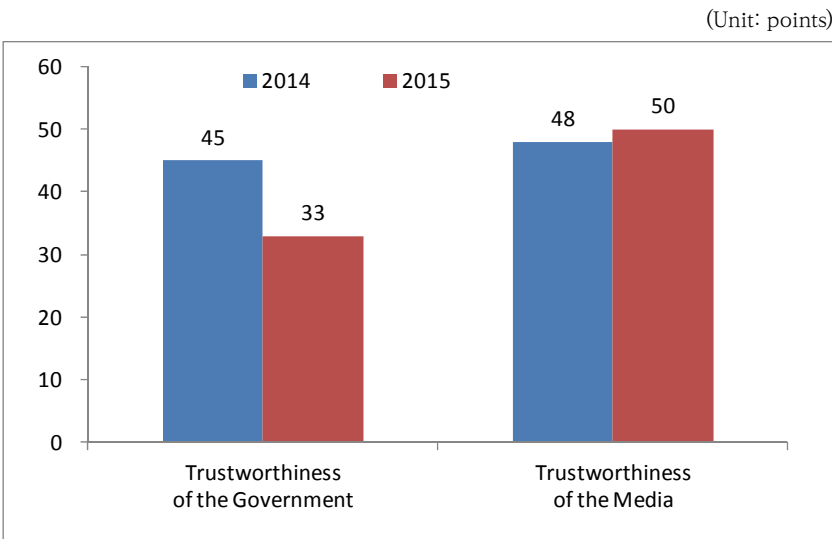
Source: MFDS (2015), *Edelman Trust Barometer Global Results*, 2015 International Symposium on Food and Drug Crisis Management (reconfigured).

Food safety is rapidly becoming a major social and political issue amid the recent series of food scandals. As the environment in which food is produced, distributed, and consumed grows increasingly complex and globalized, the actual and po-

tential factors of food fears will similarly grow all the more diverse and unpredictable.

The absence of accurate information on food safety itself can be a major cause of public concern. In a 2013 opinion poll on Koreans' perception of food additives, polltakers picked "shortage of information on safety" as one of the main factors influencing their concern about the safety of synthetic food additves.[5]

Much of consumers' fears over food safety originate from the absence of objective grounds or information with which they could evaluate the safety of food.[6] This absence of information serves to amplify the provocative nature of reports on food safety in the media. When a food scandal arises, it instantly monopolizes the public's attention and spreads quickly by way of popular media and word of mouth. The advancement of the Internet and social media has accelerated the spread of rumors and fears even further.[7] The problem with food scandals on social media is that they tend to reflect distorted and negative information based on consumers' misinformation. The absence of accurate information and prevalence of falsehoods spread by the press, popular media, and online communities only

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5) Kim, J. et al. (2013), *Natural Food Coloring and Flavoring Management Plan*, MFDS-KIHASA.
6) Seong, M. et al. (2010).
7) Kim, J. (2014), "*Food Safety Control in the EU and Member States: Cases and Implications*," Health and Welfare Issue & Focus, 294, KIHASA.

serve to reinforce the deterioration of the public's mistrust of, and bias against, food safety.

[Figure 2] Factors and Channels of Food Risk Perceptions
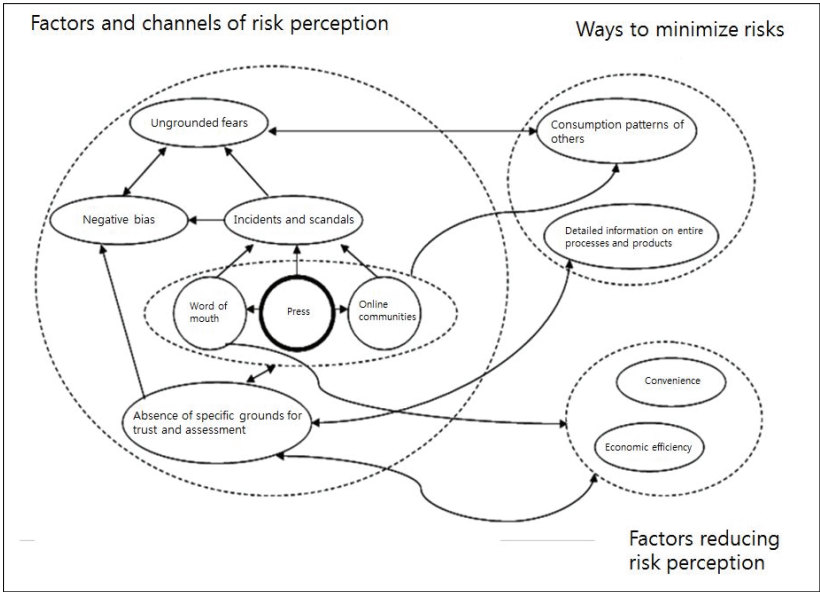
Source: Seong, M. et al. (2010), "Consumers' Purchases of Products and Communications Based on Perceptions of Risks," *KADPR Proceedings*, 12(4), pp. 555-589.

Therefore, when an incident occurs that could potentially cause an outbreak of fear over food safety among the public, it is critical to ensure the effective and prompt communication of accurate information on related risks.

Risk communication can be defined as the process of minimizing risks by relaying information to, or exchanging opinions with, all stakeholders involved in the risk assessment and man-

agement processes, including consumers, producers, govern-ments, industries, and academia.[8]. Providing information on risks is an essential part of the risk analysis system, consisting of risk assessment, management, and communication, and forms the cornerstone of of the management of any and all crises.

The current Korean government has been found to have little competency in terms of communication regarding food safety risks.[9] In order to prevent public confusion due to uncertain or inaccurate information, it is critical to establish a centralized, government-led system of risk communication, complete with an effective response system capable of quickly identifying the causes and factors of consumers' fears and assuage those fears by providing accurate information.

In an effort to help develop such a government-centered risk communication system, this study reviews the current status and utility of diverse modern channels of communication, in-cluding the Internet, social media, and popular media.

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8) Jeong, G. (2013), "Policy Aims for Enhancing Risk Communications on Food Safety," *KIHASA Health and Welfare Forum*, 196, pp. 73-87.
9) So, Y., Kim, S., Lee, J., Park, E., Kim, H., and Kim, J. (2013), "Consumer Group Survey for Improving Risk Communications on Food Additives," *Korean Journal of Food and Cooking Science*, 29(2), pp. 105-113.

2. Social media and its utility in communication concerning food safety

1) Current status of social media in use today

The explosive growth in the use and number of smartphones in circulation in recent years has led to astonishing increases in the number of social media users. Of all Internet users (including WiFi users) surveyed, 65.0 percent maintained social media accounts (including personal blogs, online communities, Twitter, Facebook, Band, KakaoStory, and the like) for communication purposes. The proportion rose further to 87.6 percent among people in their 20s, decreasing in proportion to age thereafter.[10]

The largest proportion of social media users, 72.8 percent, answered that they used social media "to share their personal interests," while 69.1 percent answered that they used social media as a "leisure activity or hobby." In the meantime, 27.9 percent used social media to share specialized information and knowledge, while 9.2 percent used it to spread news of accidents and events and express opinions and share updates on current affairs, politics, and other issues. In other words, the vast majority of social media users use social media for personal reasons. The communication of information and issues was a relatively minor concern of users.

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10) Lim, J. et al. (2014), *2014 Mobile Internet Use Survey*, MSIP-KISA.

2) Disseminating food safety information via social media

An analysis of keywords used in queries on a major portal website in Korea shows that, in April 2015, when the "fake *Cynanchum wilfordii*" scandal erupted, the number of queries containing related keywords increased abruptly. This suggests that policymakers may be able to trace the public's reactions to scandals and fears by monitoring social media trends.

[Figure 3] Sample Social Media Keyword Analysis: "Fake *Cynanchum wilfordii*"
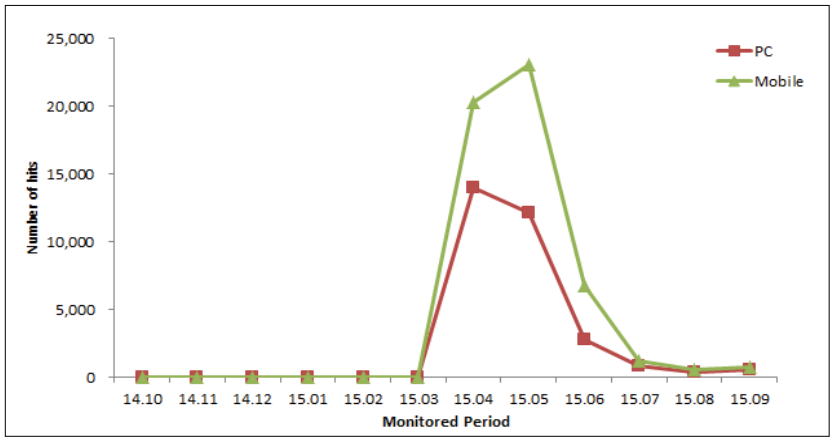
Period	Number of hits(PC)	Number of hits (Mobile)	Period	Number of hits(PC)	Number of hits (Mobile)	Period	Number of hits(PC)	Number of hits (Mobile)
2014.10	3	14	2015.02	5	17	2015.06	2,802	6,785
2014.11	11	10	2015.03	8	12	2015.07	836	1,245
2014.12	9	29	2015.04	14,037	20,287	2015.08	405	529
2015.01	5	14	2015.05	12,129	12,129	2015.09	604	747

Source: Keyword advertising on Naver.com (http://searchad.naver.com).

However, as the Internet and smartphones are not equally accessible to all age or income groups, policymakers should also consider using popular broadcasting media as channels of communication. The Internet usage rate, rising well above 90 percent in the younger age groups, begins to decline rapidly among older people in their 50s, particularly beyond the age 60. Television is still the most popular source of information for seniors. It is therefore important for policymakers to understand how fears over food safety arise and spread, and to tailor their messages and channels of communication in consideration of diverse age and income groups.[11].

For instance, people in their 20s and 30s are more likely to be concerned about the safety of food for young children than other age groups. The information they need can be effectively communicated via the Internet. On the other hand, information on health supplements, in which people in their 50s or older take greater interest, may be more effectively provided via conventional media, such as TV broadcasting and newspapers.

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11) Lim, J. et al. (2014).

3. Big data analysis of food safety and public perception

1) Overview

As part of this study, we performed social media research (an "online buzz analysis") using the SKT Smart Insight platform. Subject to our analysis were keywords related to food safety, including "food safety," "food risk," "risk food," "food scandal," "food safety scandal," "food accident," "food sanitation," "junk food," and "contaminated food." We used data spanning a period of four years and six months, from January 1, 2011, to June 30, 2015.

The data used for our analysis were collected from 257 news and media websites, the four major blog service channels (Daum.net, Naver.com, Nate.com, and Tistory), web "cafes" of Naver.com and Daum.net, 19 popular online communities with active bulletin boards (i.e., MLBPARK_BULLPAN, YouTube, Jishik-In of Naver.com, Nate Talk, Nate Pan, Daum TIP, Daum Miznet ["Episodes from Daily Lives"], Daum Agora, This Is Game, DC Inside Gallery, RuliWeb, Beautipl, Beauty Toc, Ppomppu, Cetizen, Seeko [Mini Devices Bulletin Board], Today Humor, Ilbe, and Clien), and Twitter.

2) Results

(1) Online "buzz" analysis

There is an ongoing public discourse on food safety all year round. In particular, Twitter became a major channel of controversy when, in December 2012, the Korean government named junk food as one of "the four major social vices" to be combatted.

[Figure 4] Monthly Online Buzz Trend
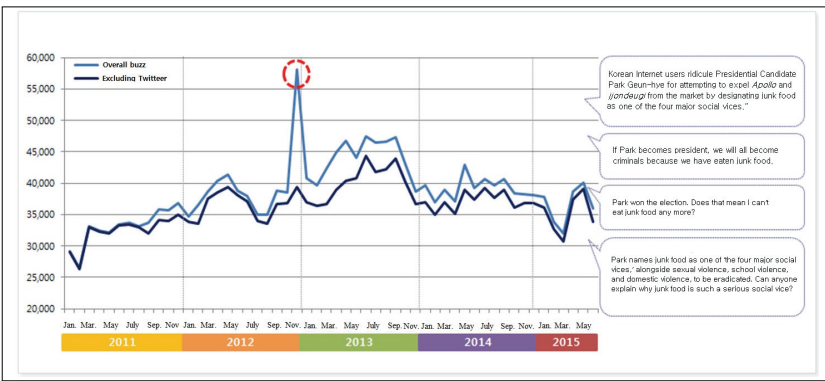
Note: As the data available on Twitter were collected for a period ending in September 2011, the mass of data from Twitter could bias the overall buzz trend. We therefore added a trend that excluded the data from Twitter.

"Korean Internet users ridicule Presidential Candidate Park Geun-hye for attempting to expel Apollo and jjondeugi from the market by designating junk food as one of the four major social vices."

"If Park becomes president, we will all become criminals because we have eaten junk food."

"Park won the election. Does that mean I can't eat junk food any more?"

"Park names junk food as one of 'the four major social vices,' alongside sexual violence, school violence, and domestic violence, to be eradicated. Can anyone explain why junk food is such a serious social vice?"

(2) Risk factors

When Park Geun-hye won the presidential election in 2012, her campaign pledge of "eradicating junk food" became a national issue. In the meantime, the nuclear disaster in Fukushima in February 2011 increased the frequency of the keyword "radiation" and caused public outcry over the news of water being contaminated with radioactive isotopes from the defunct nuclear reactor in 2013.[12] The keyword "cholesterol" garnered consistent attention and aroused concern as a major cause of lifestyle diseases.

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12) See newspaper article published online, http://news.nate.com/view/20130826n01766, accessed at 13:00 on July 26, 2015.

[Figure 5] Food Risk Rankings by Year

2011		2012		2013		2014		2015(6개월)	
keyword	frequency	keyword	frequency	keyword	frequency	keyword	frequency	keyword	frequency
junk food	14,112	junk food	34,612	junk food	42,156	junk food	21,790	junk food	9,114
cholesterol	10,673	cholesterol	10,114	contamination	10,627	cholesterol	10,104	cholesterol	5,525
contamination	10,180	contamination	6,582	radiation	10,428	contamination	7,178	contamination	3,190
germs	5,682	germs	5,015	cholesterol	8,429	safety	5,873	safety	3,102
radiation	5,616	safety	4,850	processed food	5,875	germs	4,834	germs	2,459
detected	4,876	pesticide	4,053	detected	5,733	processed food	4,549	toxicity	2,332
coloring agent	4,263	coloring agent	3,992	pesticide	4,503	pesticide	4,302	processed food	2,292
pesticide	4,188	carcinogenic substances	3,703	germs	4,290	detected	3,965	sodium	2,154
processed food	4,106	processed food	3,438	carcinogenic substances	3,395	toxicity	3,220	detected	1,835
toxicity	4,034	toxicity	3,381	toxicity	2,884	carcinogenic substances	2,730	pesticide	1,716
carcinogenic substances	2,937	preservative	2,899	preservative	2,041	preservative	2,688	virus	1,470
virus	2,889	detected	2,838	smoking	2,007	radiation	2,454	carcinogenic substances	1,254
toxin	2,465	toxin	2,461	cesium	1,991	coloring agent	2,057	food additive	1,060
preservative	2,358	mad cow disease	2,263	coloring agent	1,913	food additive	2,036	hazardous substance	982
radiation	2,276	heavy metals	1,744	hazardous substance	1,904	toxin	1,850	toxin	964

(3) Analysis of the bias against and mistrust of food safety expressed on social media

The series of food scandals that have erupted in Korea over the last several years, including those relating to the Fukushima nuclear disaster, mad cow disease, genetically modified organisms (GMO), and avian influenza, have led to an escalation of social conflicts and concomitant costs. We thus attempted to understand the public's bias against, and mistrust of, food safety in general as expressed on social and popular media.

First, we examined big data concerning the periods during

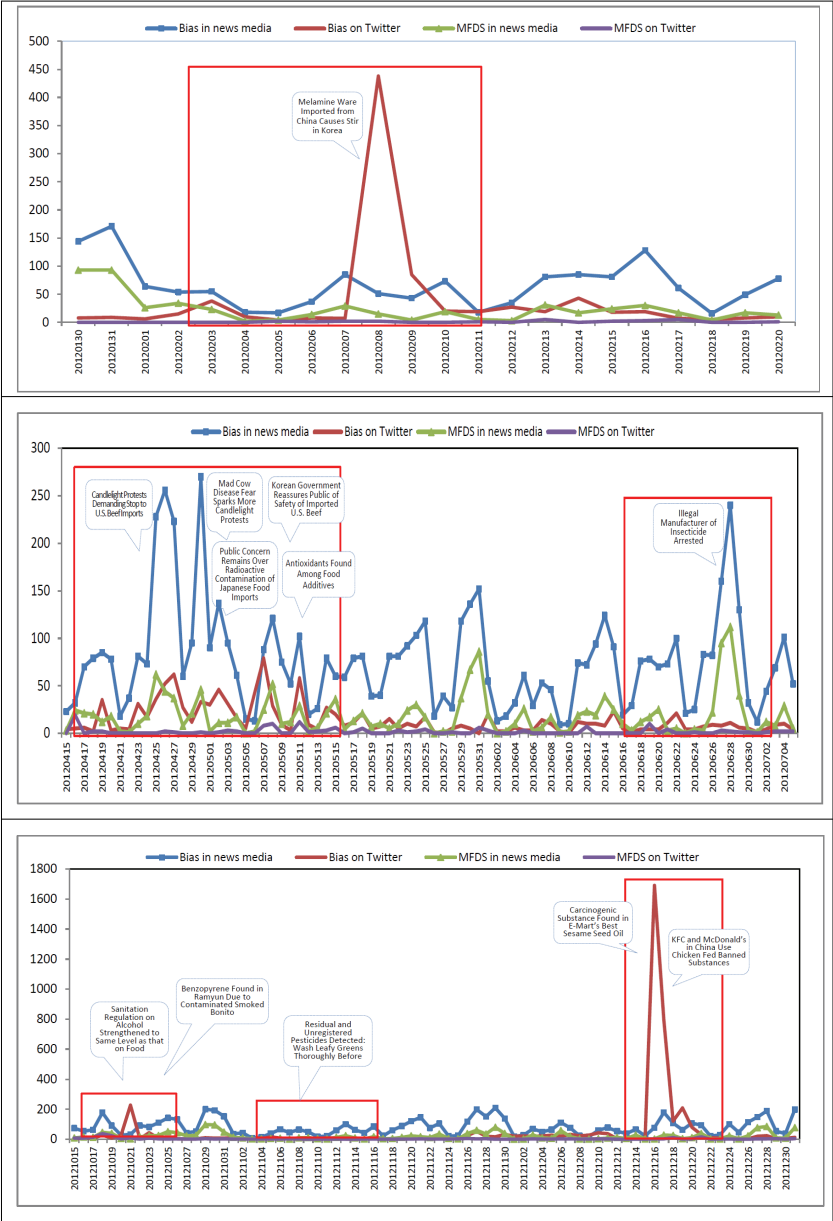which keywords related to food safety worries appear with increased frequency, and identified the 20 major issues that caused such spikes in public fear. These issues included: radioactive contamination of food in the wake of the nuclear disaster in Japan; hazardous chemicals detected in melamine (plastic) ware made in China and distributed in Korea; American beef imports and the mad cow disease scandal; traces of metal detected in snacks; spread of the Norovirus; benzopyrene detected in *ramyun* (instant noodles) soups; possible health risks of junk food available around schools; mass arrest of numerous junk food manufacturers; ban on the distribution and sale of sesame seed oil in which benzopyrene was detected; dispute over the safety of monosodium glutamate (MSG); recall of flavored cooking oil in which benzopyrene content was found to exceed the legally permitted level; glass fragment found in readymade spaghetti sauce available at grocery stores; insects found in chocolate manufactured by a large company; maggots found in Pocky sticks; recycling of bad eggs by confectionery manufacturers; mass distribution of rejected beef imports; detection of pesticides in bananas; food poisoning bacteria found in misutgaru grain powders; arrest of a food manufacturer using dried anchovies contaminated with fungus; and scandal over fake *Cynanchum wilfordii*. In particular, the Fukushima nuclear disaster, caused by the Great East Japan Earthquake in March 2011, appears to have fuelled public fears over the possible radioactive contamination of food ingredients.
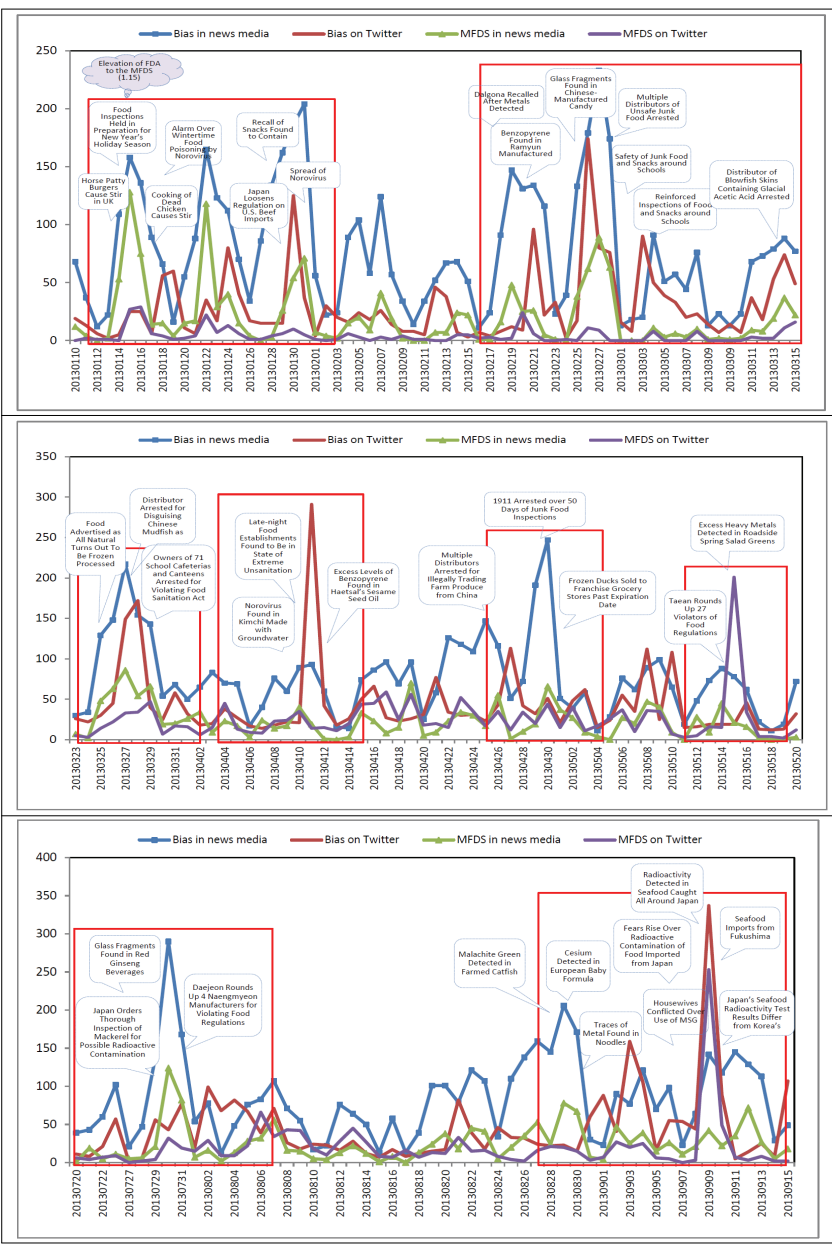
[Figure 6] Major Food Safety Issues in 2011
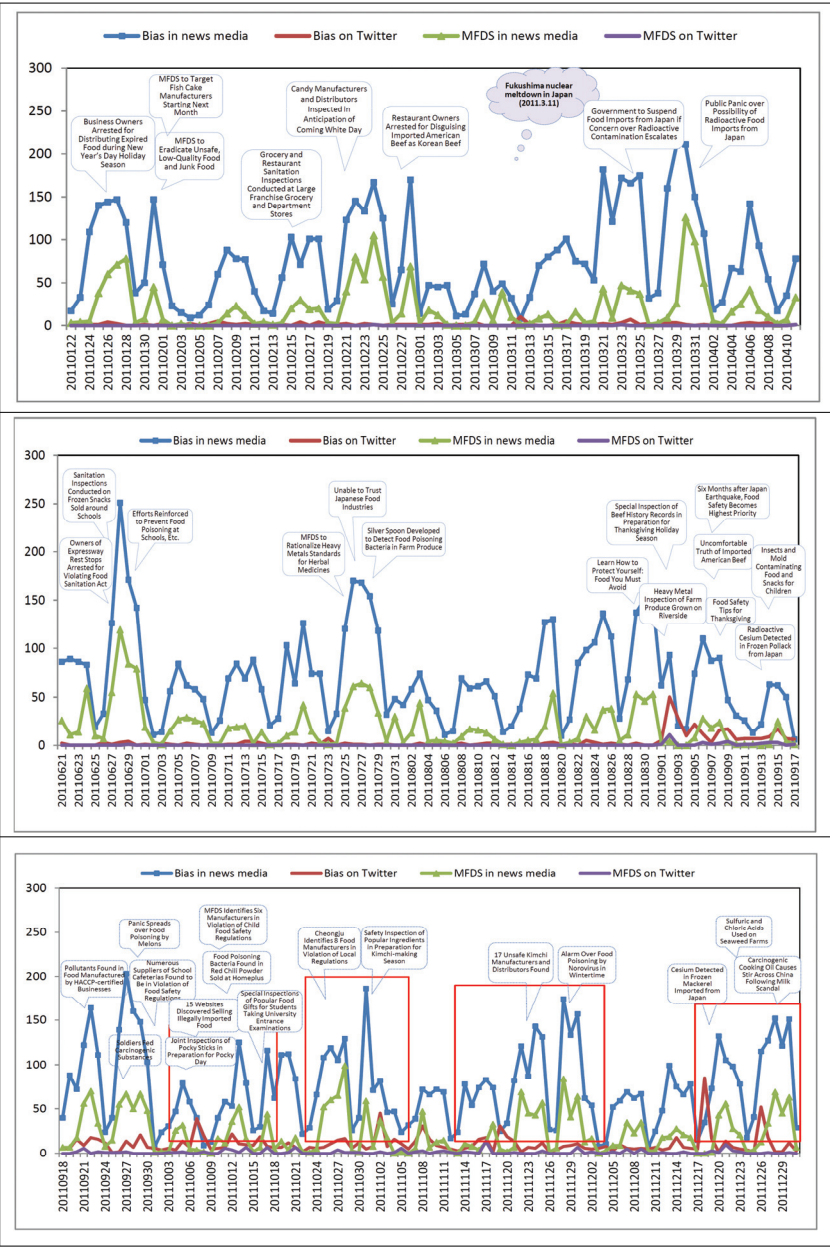
〔Figure 7〕 Major Food Safety Issues in 2012

[Figure 8] Major Food Safety Issues in 2013
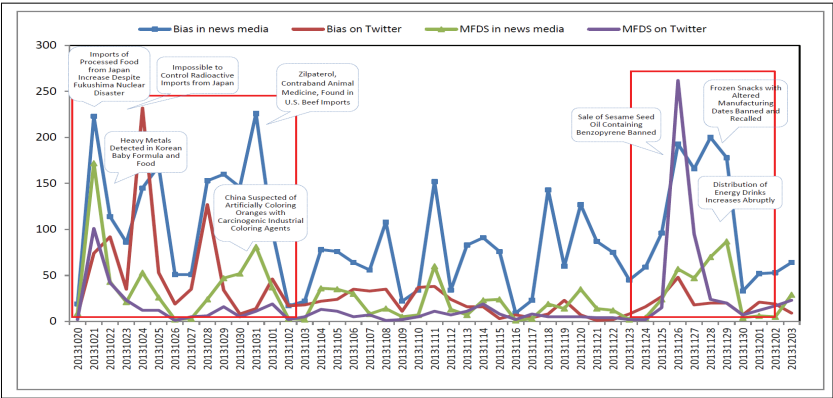
[Figure 9] Major Food Safety Issues in 2014

Bias in news media — **Bias on Twitter** — **MFDS in news media** — **MFDS on Twitter**

Flavored Food Products Made with Unlabeled Syrup Recalled

Owners of 44 Restaurants and Businesses Arrested for Violating Food

Business Owner Arrested for Violating Livestock Sanitation

Flavored Oil with Excess Levels of Benzopyrene Recalled

Bias in news media — **Bias on Twitter** — **MFDS in news media** — **MFDS on Twitter**

Coliform Bacteria Found in Cereal from Dongsuh: Some Coliform Bacteria Can

Harim, Maniker, Moguchon, and Other Brand-Name Food Manufacturers Found to Maintain Less Than Sanitary

Are Pesticide-retaining Bananas Safe to Eat

Diet Powder Formulae with Food Poisoning Bacteria Recalled

Up to Double Usual Cadmium Levels Found in Seafood, Including Octopi and Red Snow

Glass Fragments Found in Ottogi's Spaghetti Sauce

[Figure 10] Major Food Safety Issues in 2015

(4) Clash of experts and lay public over food safety issues

An expert opinion poll was conducted regarding consumer sensitivity to and persistence and risks of the 20 major food safety issues found on social media to determine the relative importance of each issue. The results are summarized in Table 7.

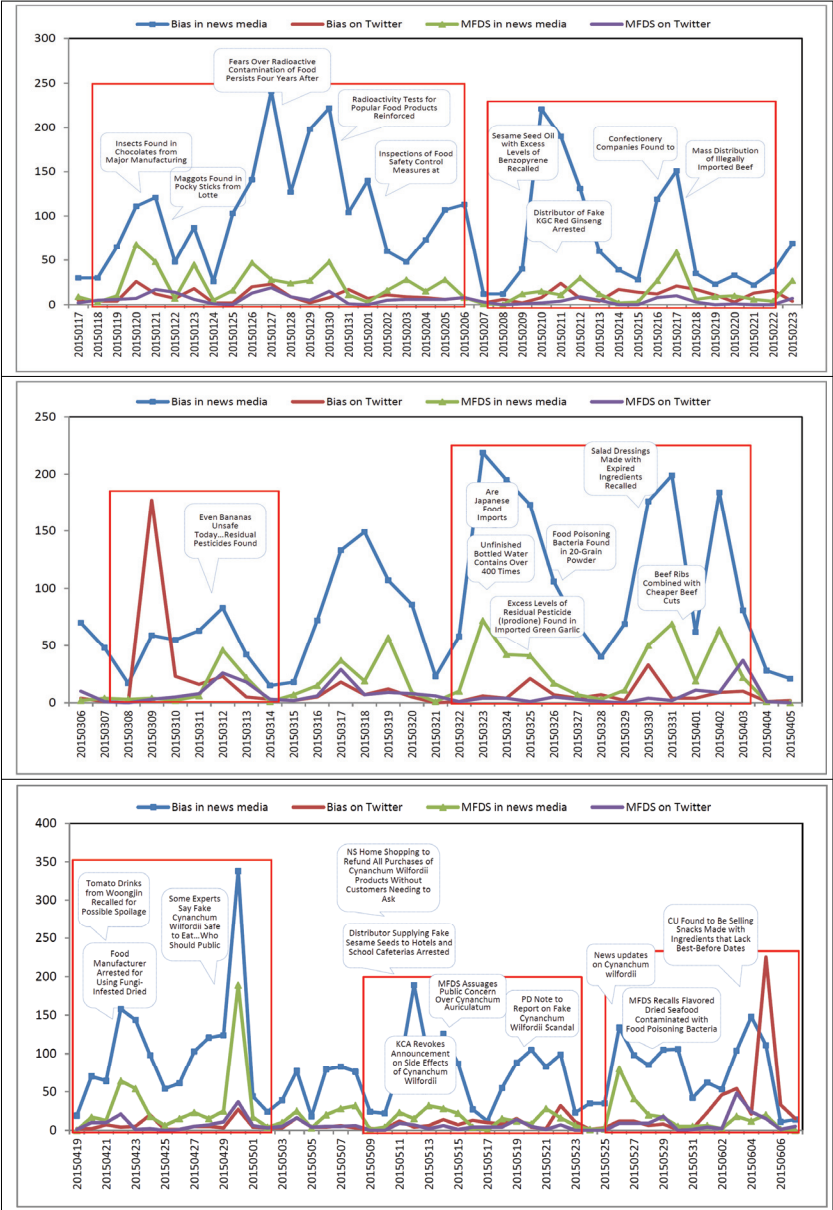The assessment reveals that the radioactive contamination of food following the nuclear disaster in Japan, American beef imports and mad cow disease, and recycling of bad eggs by confectionery manufacturers were the three most worrisome issues in terms of consumer sensitivity. The radioactive contamination of food, safety of MSG in food, and safety of food available around schools topped the list of the most persistent issues. The radioactive contamination of food again topped the list of the highest-risk issues, along with the arrest of food manufacturers that were using dried anchovies contaminated with fungus, spread of the Norovirus, and illegal import of beef. Biological risk factors, such as fungi, viruses, and germs, emerged as major causes of public fear over food safety.

〈Table 7〉 Importance of Food Safety Issues

	Consumer sensitivity		Persistence		Risk		Total score	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Radioactive contamination of food	4.57	1	2.57	1	4.43	1	11.57	1
Risks of melamine ware imported from China	3.14	9	1.14	7	3.57	3	7.86	7
U.S. beef imports and mad cow disease	4.29	2	2.14	3	3.14	6	9.57	2
Metal traces found in snacks	3.00	10	1.14	7	2.71	9	6.86	11
Spread of Norovirus	3.14	9	1.43	5	3.57	3	8.14	5
Benzopyrene found in ramyun soups	3.57	6	1.14	7	3.00	7	7.71	8
Health risks of food available around schools	3.43	7	2.14	3	3.14	6	8.71	3
Mass arrest of junk food manufacturers	3.57	6	1.29	6	2.86	8	7.71	8
Ban on benzopyrene-containing sesame oil	2.57	12	1.14	7	2.86	8	6.57	12
Safety of MSG	3.57	6	2.29	2	2.14	10	8.00	6
Recall of flavored oil with excess levels of benzopyrene	2.57	12	1.00	8	2.86	8	6.43	13
Glass fragments found in Ottogi spaghetti sauce	3.29	8	1.14	7	2.86	8	7.29	10
Insects found in brand-name chocolates	3.71	5	1.14	7	2.86	8	7.71	8
Maggots found in Lotte's Pocky sticks	3.86	4	1.14	7	2.86	8	7.86	7
Bad eggs used by confectionery businesses	4.00	3	1.14	7	3.43	4	8.57	4
Mass distribution of illegally imported beef	3.00	10	1.57	4	3.57	3	8.14	5
Pesticides found on bananas	3.14	9	1.29	6	3.29	5	7.71	8
Food poisoning bacteria found in 20-grain powder	3.00	10	1.29	6	3.43	4	7.71	8
Arrest of food manufacturer over use of fungi-infested dried anchovies	2.86	11	1.00	8	3.71	2	7.57	9
Fake Cynanchum wilfordii scandal	3.57	6	1.43	5	3.00	7	8.00	6

Having rated the relative importance of the 20 major food safety issues in terms of consumer sensitivity, persistence, and risk based on the expert poll, we performed a correlation analysis between the importance of these scores and the frequency

with which they appeared in social and popular media. A correlation analysis involves determining the level of linear relationship between two continuous variables.[13].

In analyzing the correlation between the experts' scoring of the importance of food safety issues, press reports mentioning the MFDS, and "buzzes" on Twitter, we raised the following questions: Do experts and the lay public share similar views of food safety issues and their importance? How does the public express its food-related concerns on social media? How could the government's communication on these issues be improved?

The correlation analysis revealed a particularly high level of correlation between experts' assessment, the MFDS' assessment, and the public's fear of the radioactive contamination of food in the wake of the Japanese nuclear disaster expressed on Twitter. In other words, food safety issues related to the nuclear disaster and consequential radioactive contamination of food had a far greater impact on public opinion and health for much longer periods than other food safety issues. The concerns expressed on social media reflect the public's awareness of this fact. Policymakers therefore need to pay attention to the public opinions expressed via social media when deciding policy on food risk communication.
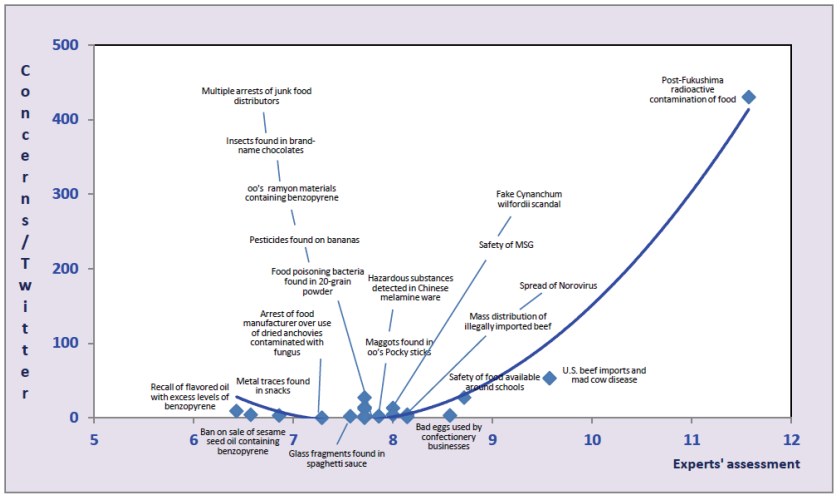
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13) Cho, I. (2006), *SAS Lectures and Statistics Consulting*, Youngjin: Seoul, p. 141.

[Figure 11] Experts, MFDS, and Public Opinion (Twitter) on Food Safety Issues
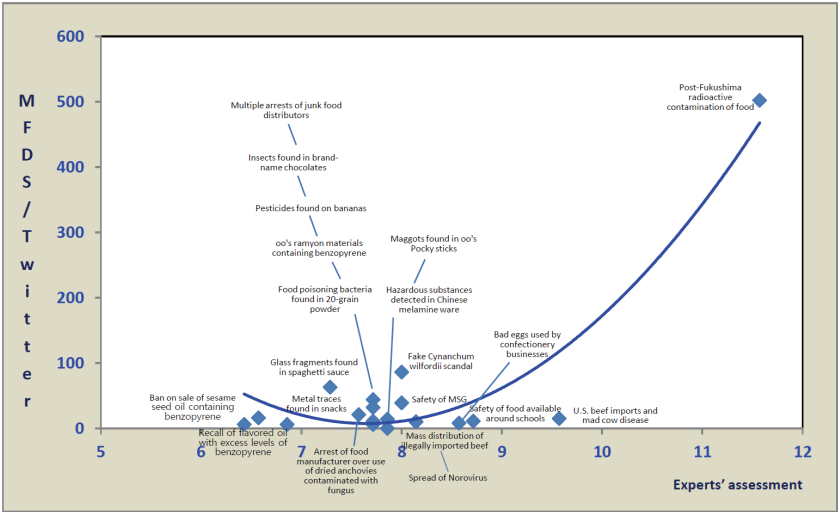
[Figure 12] Experts and Public Opinion (Twitter) on Food Safety Issues

4. Communication strategy for social media

1) Conceptualization of instruments for timely identification and responses

(1) Preventing escalation of public fear

Food safety continues to be a source of controversy and fear, as poisonous or contaminated food poses a direct threat to human health. In addition, the unsanitary environments in which such food is produced also pose a problem, and the media continue to raise related issues.

In an effort to develop a proper course for official responses to food safety concerns, we performed an expert poll to determine the relative importance of the 20 major food safety issues. Based on the results of the poll, we suggest the following responses to the top three issues in each of the three categories of our assessment, i.e., consumer sensitivity, persistence, and risk.

Fear over the risks posed by food requires countermeasures that focus on the dissemination of results of official risk assessments. Issues that feature high degrees of consumer sensitivity require timely and prompt responses via the Internet as well as other more conventional and popular media, such as television. Persistent food issues require mid- to long-term public campaigns and education. The MFDS and other related

government agencies should provide accurate information through Internet portal websites and organize venues for public discourses, such as forums and workshops, on an ongoing basis.

Consider the example of sodium caseinate, which is found in instant coffee mixes in Korea and poses no proven risk to human health but continues to generate public concern. The messy controversy between Dongsuh Food and Namyang Dairy, the two major producers of instant coffee mix products, that broke out over the alleged health risks of sodium caseinate in March 2012 had little practical connection to public health. It originated from misleading advertising campaigns that exaggerated the risks of the substance. After a TV program addressed the issue in February 2014, the public began to recognize the distorted and exaggerated aspects of the controversy and the importance of press reports and marketing campaigns. Moreover, the controversy highlighted the importance of respected communication forums and channels through which media experts and other actors work to ensure the dissemination of accurate information.

Public fears, identified in a timely manner via a systematic monitoring program, require differentiated responses depending on their causes and origins. Issues with high degrees of consumer sensitivity require, above all else, prompt responses, followed by high-risk issues and issues with great persistence.

There are a number of ways to mitigate and assuage public fears over food safety. First, the proper channels of communication should be chosen, and they should be differentiated by age, issue, and time in order to tackle public concerns effectively.

Second, experts should be actively involved in communication efforts. The public places greater trust in experts who are well informed on specific issues than they do in government departments. It is therefore crucial to recruit and employ experts capable of providing objective scientific information.

Third, interdepartmental coordination concerning official government responses is crucial. A proper response plan for multiple and predictable food safety issues that involve the Food Safety Policy Committee of the Prime Minister's Office and other government agencies should be established in advance, as should systematic networks of communication and collaboration among all departments involved.

(2) Development of a response strategy

The food safety management system in Korea today revolves around reinforced inspections and control at certain times of the year, including the start of school semesters, holidays (New Year's Day and Thanksgiving), and kimchi-making season. During these periods, the system issues different warnings and

safety tips. Food-related issues also gain greater attention on certain days, such as Food Safety Day and the day on which the National Assembly inspects the administration and its agencies. In addition, there are sporadic, one-time issues.

At the start of school semesters, the authorities conduct inspections of junk food and snacks available around schools. Special inspections are also carried out during kimchi-making season. Food used for ancestral rituals becomes the center of attention during the holiday seasons. In springtime, heavy metals in salad greens become an issue, while food poisoning becomes a major cause of concern in the summertime. Norovirus infections caused by drinking contaminated water have also made headlines in recent winters.

As part of this system, Korea needs a program capable of closely monitoring the turns in public opinion regarding food safety issues, allowing it to keep track of regular and sporadic food risks all year round.

The development of such a monitoring program requires preliminary research to extract relevant data from social media and determine what types of information can be derived from those data. The system should also be capable of producing appropriate graphs and charts.

Standards should be established concerning the forms or types of data, graphs, and charts to be analyzed and produced by the monitoring program. The characteristics of different

types of data, such as RSS feeds from news services and tweets on Twitter, should be analyzed, as should the differences in real-time and past data. The program also needs to display the real-time results of big data and past data analyses, provide a dashboard-style operation board, and offer explanations on how tableau-type information is to be created and used.

The monitoring program should use the data it collects and processes to create various graphs and charts concerning specific periods of time. The real-time data analysis page needs to be designed in a way that enables the viewer to identify the amounts of real-time data being fed hourly, the proportions of different types of data, and the frequency with which specified keywords appear in the data by region.

[Figure 13] Dashboard-Style Operation Board
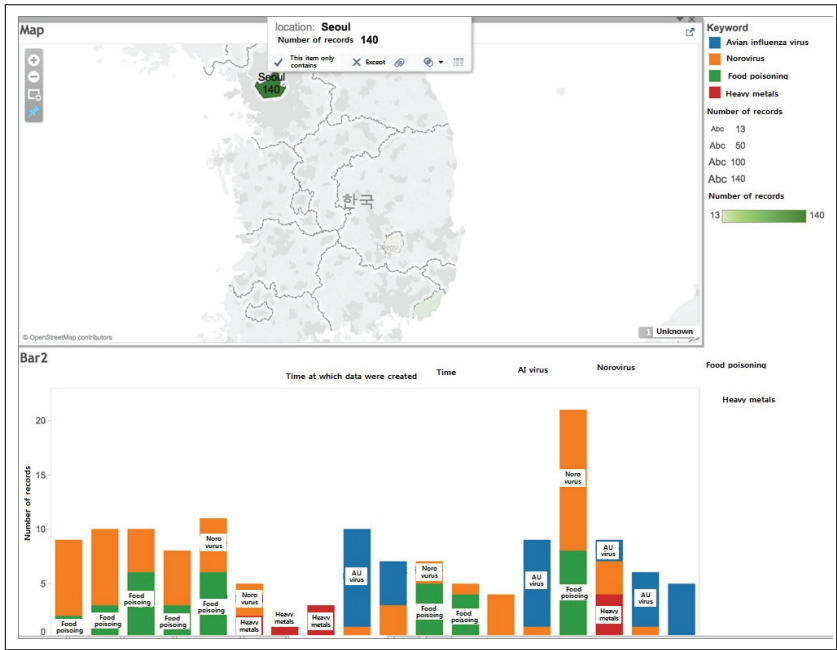
The tableau program provides bar graphs and maps as part of its dashboard to allow the viewer to observe changes in the status of data by hour. The map in the upper section visualizes data with location information on the given map, while the chart in the bottom tracks changes in the amounts (y-axis) of data by hour (x-axis). By clicking certain points on the map, the user can see the changes in the data concerning the selected locations in the form of a bar graph. The program also allows for the analysis of data both in real time and over certain time periods.

2) Application of the monitoring program

With the development of such a monitoring system, policy-makers will be able to bring all of the government departments, agencies, and experts involved onto a shared network, enabling them to share information on the changing levels of public fear over food safety by region, hour, and keyword. This effective sharing of information will enable authorities to devise prompt response strategies and communicate with the public accordingly.

Food-related fear that persists over a long stretch of time with fluctuating intensity, such as the fear surrounding the post-Fukushima radioactive contamination of food, requires year-round monitoring. Issues that cause fear greater than the actual level of risk warrants, such as the case of U.S. beef imports, demand prompt response strategies designed to prevent minor worries from escalating into massive public fear.

Providing experts with information generated by the monitoring program via smartphone would be an effective and ubiquitous way of sharing information and would go a long way toward ensuring prompt and timely responses to public concerns.

Interactive features may be added to the monitoring program so as to enable experts to maintain bilateral communications with the public, thereby more effectively combating the preva-

lence of negative or false information.

The monitoring program proposed herein is a citizen-to-government (C2G) model, which tracks actual fluctuations in public fears and worries so as to support appropriate policymaking. Food safety issues, regardless of the actual extent of the risks involved, have the potential to evolve into major public scandals, which would lead to greater public fear and confusion. The monitoring program helps policymakers minimize unnecessary public fear by providing instruments with which they can measure the level of public anxiety and monitor potential causes of concern. The program will allow policy experts to decide the proper messages to communicate to the public, as well as when those messages should be delivered.[14]

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14) Kim, J. (2015).

IV Policy Implications

IV Policy Implications 《

An analysis of the food safety statistics available in Korea today reveals that the Korean public is highly sensitive to, and aware of, food safety issues. Official statistics compiled by the government regarding food safety issues are intended to allow the government to identify levels of public food fear by quarter or year, and therefore fail to enable policymakers to identify real-time changes in public opinion and decide on prompt responses accordingly. The surveys used to gather these statistics require polltakers to choose their answers from one-tailed or two-tailed scales, and lack consistent and direct measures of public concern.

While numerous studies have been conducted to gauge public perceptions of food safety in Korea, there are none that have attempted to analyze big data from social media. The big data analysis this study provides gives important insights into the consciousness of the public and holds significant implications for future policymaking on effective and timely public communication regarding food safety.

A survey on the use of the Internet and mobile technologies in Korea from 2014 shows that 98.5 percent of Koreans are connected to the Internet, and the number of smartphone users has consistently and rapidly increased, with 78.5 percent of all

Koreans above the age of six now owning smartphones. The explosive growth of smartphones has led to abrupt increases in the number of social media users as well, turning social media into open platforms of public communication on various social issues and affairs. The Korean government thus needs to actively incorporate social media and big data into the development of effective response and countermeasure strategies regarding food safety issues.

Our analysis of big data from social media concerning food safety reveals that there are ongoing public discourses on various food safety issues online. Food keywords related to children, lifestyle diseases, healthy diets, unethical and unsanitary practices of food manufacturers, contamination of food with hazardous substances, infections, and food poisoning appear on social media all year round.

The Korean government needs to tackle the spread of these concerns by disclosing accurate and scientific information on possible risks. It also needs to focus more on ensuring the safety of food for children.

Analyses of food fears using big data from social media are free of the shortcomings of conventional surveys and opinion polls and provide glimpses into the sentiments, emotions, and trends of the epoch as expressed and manifested online. Analyses of social big data provide more pertinent and useful information for food safety policies and communications than

conventional research.

Popular media and the word-of-mouth effect have a decisive impact on the spread of fear among the public, and policymakers need to use these same effects in order to assuage public concern. The Internet, a widespread channel of communication and information in Korea, appears to be the most timely and accessible channel of information. As most Internet and smartphone users use these mobile technologies to search and access information and communicate with others, the Internet can both amplify and mitigate public fears.

The Internet can, first, serve as a window of official communication with the government. Second, it can provide a timely means of observing the tides in public opinion as manifested in online communications via blogs and social media, and serve as a channel of monitoring the possible causes and factors. As policymakers need to reach out to and communicate with diverse age groups via diverse channels and media, the government needs to consider the different characteristics of diverse media (reliability, accessibility, speed, etc.) when choosing the channels it will use to communicate important public information.

Policymakers should also be aware of the growing importance of social media as major platforms of open communication amid the rapid spread of the Internet and mobile devices. Our analysis of big data from social media confirms

the pertinence of food safety as a major topic of online public discourses. Health threats and social anxiety resulting from food scandals figure prominently in these online discussions, indicating that the Korean public perceives food-health correlations with a high degree of sensitivity.

As part of the process of developing a government communication strategy for social media, we identified the 20 major food safety issues that have arisen in recent years, and conducted an expert assessment of these issues based on the assumption that public fear over food risks cause significant social conflicts and costs. We then analyzed the correlations among expert assessments, the MFDS' responses, and public opinion expressed via Twitter. The analysis revealed that the post-Fukushima radioactive contamination of food was a far more important and prominent issue than all other issues, exerting by far the greatest influence on public opinion and public health in the long term. In deciding policies on food risk communication, policymakers need to first read and gauge public opinion as expressed on social media.

Public concern and fear, detected and identified in a timely manner through the monitoring program, will require different response strategies depending on the risks involved and the target groups they affect most. Issues with high consumer sensitivity, for instance, will require prompt responses compared to high-risk or persistent issues.

In order to mitigate public concern effectively, it is important to first select the proper channels of communication for the age groups, types of issues, and periods involved. Second, experts should be actively involved in communication. The public places greater trust in experts who are well informed on specific issues than they do in government departments. It is therefore essential to recruit and employ experts capable of providing objective and accurate scientific information. Third, interdepartmental coordination over official government responses is crucial. A proper response plan concerning multiple and predictable food safety issues that involve the Food Safety Policy Committee of the Prime Minister's Office and other government agencies should be established in advance, as should systematic networks of communication and collaboration among all departments involved.

The quarterly and yearly statistics provided by conventional surveys and opinion polls can be useful in allowing policymakers to ascertain the normal and general state of public opinion regarding food safety. Social media monitoring and analysis, on the other hand, provide keyword-specific information on the public's bias against and fears over unsafe food, and are therefore better suited to support the establishment of more realistic and effective communication strategies. Based on our social media analysis, we make the following suggestions regarding future policymaking for food risk

communication.

First, develop a monitoring program that analyzes big data from social media and establish a system of interdepartmental communication and coordination in advance. Such a monitoring program can effectively serve to prevent minor concerns from spreading and escalating into major scandals and public fear.

Second, tailor the choice of communication media to different age groups and types of issues so as to ensure prompt and effective responses. Consumers in their 20s and 30s, over 90 percent of whom are Internet users, spread and share consensuses on food information and perceptions via the Internet rather than conventional media, such as television and newspapers. Communication strategies targeting these younger groups therefore need to actively incorporate social media analyses. However, such analyses may fail to capture the opinions and sentiments of older and less financially secure groups, who do not enjoy such easy access to the Internet. Conventional surveys and opinion polls should thus be used to devise communication strategies targeting these groups.

Third, establish response strategies that are differentiated based on the characteristics of the given food safety issue (high-risk, high sensitivity, and/or persistent). Issues with high consumer sensitivity require prompt responses via the proper channels. High-risk issues, on the other hand, demand the

timely delivery of accurate information based on risk assess-
ments and analyses. Finally, persistent issues require the desig-
nation of an agency or organization capable of conducting
mid- to long-term public campaigns and education and estab-
lishing mid- to long-term information communication plans.

References

Cho, I. (2006), SAS Lectures and Statistics Consulting, Youngjin: Seoul, p. 141.

Consumer Safety Center (2011). Survey of Food Safety for Infants and Toddlers

Eurostat (2008), Food: from farm to fork statistics, Eurostat Pocketbooks.

Food Standards Agency (2012), Exploring food attitudes and behaviors in the UK: Findings from the Food and You Survey 2012

Food Standards Agency (2014), The 2014 Food and You Survey, UK Bulletin, Government Statistical Service.

Gallup Korea (2013). Opinion Poll on Food Safety by Origin and Radioactive Leaks from Japan

Griffith. (2006). Food safety: where from and where to? British Food Journal, Vol.108, No.1, pp.6-15.

Gyeonggi Research Institute (GRI) (2013). Perception of Food Safety

Henson, S. & Trail, B. (1993). Consumer perceptions of food safety and their impact on food choice. Food Safety: The Challenge Ahead, pp. 39-55.

Jeong, G. (2013), "Policy Aims for Enhancing Risk Communications on Food Safety," KIHASA Health and Welfare Forum, 196, pp. 73-87.

Jeong, G. et al. (2012), Strategy for the Improvement of Information Exchange on Food Hazards, KIHASA.

Jeong, G. et al. (2013), Survey on Consumers' Confidence in Food Safety 2013, OGPC/KIHASA

Jeong, G. et al. (2014), Survey on Consumers' Confidence in Food

Safety 2014, OGPC/KIHASA, p. 182 (averages of the first and second halves of the year);

Kim, J. (2014), "Food Safety Control in the EU and Member States: Cases and Implications," Health and Welfare Issue & Focus, 294, KIHASA.

Kim, J. (2015), "Strategy for Improving the Public Perception of the Safety of Food Additives," Health and Welfare Issue & Focus, 294, KIHASA.

Kim, J. et al. (2013), Natural Food Coloring and Flavoring Management Plan, MFDS-KIHASA.

KIPA (2013). Study on Safety Perception Surveys and Effective Management

KIPA Social Research Center (2013), Survey on Koreans' Perceptions of Safety

Korea Chamber of Commerce (2013). Consumer Perception of Food Safety

KREI (2013). Food Consumption Behavior Survey

Lee, G. et al. (2006), Consumer Perception of Food Safety and Suggestions for Institutional Improvements, KCA Policy Report, pp. 160-294.

Lee, G. et al. (2013), Basic Analysis on Food Consumption Behavior, KREI, p. 350;

Lee, J. (2005), "Institutional Measures to Ensure Food Safety under the Amended Food Sanitation Act," Chungang Journal of Law, 7(2), pp. 41-61.

Lim, J. et al. (2014), 2014 Mobile Internet Use Survey, MSIP-KISA.

MFDS (2014). Children's Diet Safety Index

MFDS (2015), Edelman Trust Barometer Global Results, 2015

International Symposium on Food and Drug Crisis Management (reconfigured).

National Assembly people's Research Group for Nuclear-Free World for Children / Justice Party (2013). Nationwide Opinion Poll on Radioactive Contamination of Food

OGPC/KIHASA (2014). Survey on Consumers' Confidence in Food Survey

Seong, M. et al. (2010), "Consumers' Purchases of Products and Communications Based on Perceptions of Risks," KADPR Proceedings, 12(4), pp. 555-589.

So, Y., Kim, S., Lee, J., Park, E., Kim, H., and Kim, J. (2013), "Consumer Group Survey for Improving Risk Communications on Food Additives," Korean Journal of Food and Cooking Science, 29(2), pp. 105-113.

Statistics Korea (2010), Social Survey 2010.

Statistics Korea (2012), Statistics Korea Social Survey (press release);

Statistics Korea (2013). Social Survey

Trend Monitor Korea (2010). Survey on the Perception of Food Safety (http://trendmonitor.co.kr)

Keyword advertising on Naver.com (http://searchad.naver.com).

http://news.nate.com/view/20130826n01766, accessed at 13:00 on July 26, 2015.

http://www.food.gov.uk/news/pressreleases/2006/mar/cas2005ukpressregion

http://www.food.gov.uk/news/newsarchive/2009/oct/tracker;