Framing Genetically Modified (GM) Foods:
An analysis of news coverage of
how to think about GM foods in South Korea

Sang-Hwa Oh[*]

Assistant Professor in the Department of
Advertising at the University of Illinois at Urbana-Champaign

Sei-Hill Kim

Eleanor M. & R. Frank Mundy Professor in the School of Journalism and
Mass Communications at the University of South Carolina

Hwalbin Kim

Doctoral candidate in the School of Journalism and
Mass Communications at the University of South Carolina

Sooyun Kim

Doctoral student in the School of Journalism and
Mass Communication at the University of Wisconsin-Madison

Analyzing newspaper articles and television news transcripts, this study attempts to understand how the Korean news media have presented GM foods. In particular, the currnet study examined how news media have selected organizing theme, issue attributes, and story tone in presenting the

* All correspondence regarding this manuscript should be addressed to Sang-Hwa Oh
  E-mail: violet0218@gmail.com

issue. We also explore the notion of *frame building*, looking at factors that may affect the way news media present GM foods. Findings indicate that GM foods have been presented largely as a policy issue in Korea. Findings also show that liberal newspapers are more likely to talk about how to regulate the use of GM foods, while conservative newspapers are more likely to focus on economic prospects. In addition, it was found that conservative newspapers more frequently mention the reasons to support GM foods. These findings demonstrate that such frame building factors as political views of news organizations (e.g., conservative vs. liberal ideology) can influence the news media(e.g., conservative vs. liberal ideology) can ented largely as a policy issue in Korea. Findings also show that liberal newspapers are more likely to talk about how to regulate thentribute to the literature of framing by applying the three framing demensions originally developed in the United States to the context of South Korea.

Keywords: News Framing, Frame Building,GM foods, Content Analysis

Since the first release of Genetically Modified (GM) foods on the market
in the mid-1990s, the consumption of GM foods has produced a public
debate worldwide (WHO, 2016). GM foods was originally developed to
help farmers more easily grow crops by improving the resistance to adverse
weather conditions, insects, and weeds, as well as dropping costs for
fertilizer (Ison & Kontoleon, 2014). In more recent years, GM foods are
being produced with a specific purpose of giving direct benefits to
customers, such as a better ingredient and taste (Ison & Kontoleon, 2014).
However, there have been growing concerns about potential risks for human
health and ecological system. Gene transfer, for example, is considered as a
cause to provoke allergenicity, which can pose serious harms to human
health (WHO, 2016).

News media often identify the nature of a controversial social issue by
organizing it within a certain frame (Kim, Besley, Oh, & Kim, 2014; Kim,
Sheufele, & Shanahan, 2002; Nisbet & Huge, 2006). Framing is a way in
which news media present to the audience "what is important to know and
how to think about it" (Kim et al., 20014, p. 218). Emphasizing certain
aspects over others, framing can be used as an *interpretative shortcut* for the
public to understand and make better sense of an issue (Kim et al., 2002;
Nisbet & Huge, 2006; Price & Tewksbury, 1997).

The first purpose of this study is to offer an initial summary of news
stories of GM foods in South Korea. The current study particularly looks at
the three dimensions of framing: organizing theme (e.g., the storyline or the
key theme), issue attributes (e.g., the key arguments in the story), and story
tone (e.g., affective attributes) (Gamson & Modigliani, 1989; Kim et al.,
2014; Nisbet & Huge, 2006). First, we explore which *organizing theme*
typically found in news stories of GM foods. In news media, for example,

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GM foods can be presented as an economic issue, focusing on economic benefits such as higher productivity and less pesticide usage. Alternatively, a story of GM foods can be framed as a policy issue, talking about calling for stricter regulations of industry. It is also possible to present the issue as a science issue, introducing scientific information about GM foods. News media can also focus on ethical concerns which involve dilemmas between human control and the nature. Second, we investigate *issue attributes - the reasons to support or oppose* GM foods presented in the media (Kim et al., 2014). This study looks at which attributes have presented more frequently than others. Lastly, the current study analyzes *story tone* of GM foods stories. The tone of a story indicates whether the story supports or opposes the use of GM foods on the whole (Ghanem, 1997; Kim et al., 2014). While the three dimensions of framing can be applicable across different issues worldwide, they have been examined mostly in Western countries, particularly in the United States. The current study aims to examine the validity of the previous theorizing in different political and cultural contexts.

The second purpose of this study is to investigate factors that may influence news media's selection of a certain frame. The concept, *frame building* (Kim, Carvalho, Davis, & Mullins, 2011; Scheufele, 1999; Sheafer & Gabay, 2009) explains how the news media make a selection of a particular frame to use in addressing an issue. *Frame building* captures factors of news publishers and features of individual journalists in shaping frames. Such factors as political views (e.g., conservative vs. liberal view) and typical professional norms (e.g., the use of episodic framing to present an issue) are often reflected in the way the media construct a news story (Scheufele, 1999). The current study looks at how the frame-building factors have influenced the selection process of a particular organizing theme, issue

attribute, and story tone. We explore if there are meaningful differences between conservative newspapers and liberal newspapers in the way they talk about GM foods. We also investigate if the type of news media (e.g., newspapers vs. television) affects the way the journalists present the same issue.

Organizing Theme

An organizing theme is a main idea or storyline that explains what an issue is about (Gamson & Modigliani, 1989; Kim et al., 2014; Nisbet & Huge, 2006). By choosing a particular frame, news media can provide an *interpretative package* that the public can apply to their prior cognitive schemes and use to understand the issue (Gamson & Modigliani, 1989; Nisbet, 2009; Scheufele, 1999). Through the selection process, the media can lead the public to shape their opinion about the issue in a certain way (Kim et al., 2014; Nisbet, 2009; Scheufele, 1999).

This study draws five organizing themes to present GM foods from previous studies of science and technology issues (e.g., Gamson & Modiliani, 1989; Kim et al., 2014; Nisbet & Lewenstein, 2002; Nisbet, Boossard, & Korepsch, 2003; Nisbet & Huge, 2006). First, GM foods can be presented as a *policy issue*. Typical stories in this frame involve the discussion of "public accountability" (Kim et al., 2014; Nisbet & Lewenstein, 2002). Stories can talk about calling for stricter control, regulations, or legislations. In these cases, the stories are classified as *calling for regulation*. A story of GM foods can also focus on *political conflicts*. This kind of story primarily talks about what happened regarding a battle between groups (e.g., producer or distributor of GM foods and environment-

friendly non-governmental organizations), or countries (e.g., the trading conflicts between importers and exporters). Another way to present GM foods is to introducing *new scientific research findings*. Stories in this frame often introduce general scientific or technological information about GM foods (Kim et al., 2014; Nisbet & Lewnstein, 2002). Sorties may include new scientific research findings released by government agencies or scientific journals. Stories that talk about uncertainty of GM foods in terms of its influence on human health or environment also belong to this frame (Kim et al., 2014; Nisbet & Lewenstein, 2002). GM foods can also be organized as an *economic* issue. Framing GM foods as an economic issue often involves the discussion of how the production of GM foods can contribute potential economic benefits (Kim et al., 2014; Nisbet & Lewenstein, 2002). Finally, a story of GM foods can talk about *ethical concerns* such as conflicts surrounding the boundaries of human control or dilemmas between man and nature. Stories, for example, can discuss whether a scientific modification of nature is either against God's domain, indicating the genetic modification technology is beyond the boundaries of human control, or a great technology to improve human life (Brossard & Nisbet, 2006; Kim et al., 2014).

Previous research has found that such new technologies as biotechnology or stem cell are largely framed within either new scientific findings or economic prospect frames (Kim et al., 2014). Despite the previous findings, it seems not clear if news stories of GM foods in South Korea have been presented in the same way in which the media framed in the United States. South Korea began the import of GM crops only for animal feeds in 1995 (Lee, 2016). The government allowed food industry to import GM corns for human consumption in 2008 (Choi, 2015). As of 2014, South Korea ranked

the largestest importer country of GM foods in the world (Lee, 2016).
Unlike in the United States, the South Korean government had prohibited
any kinds of commercial growing of GM foods in the country unitl 2015
(Choi, 2015; Lee, 2016). These different contexts surrounding the
cultivation and use of GM foods in the two countries might have influenced
the way news media present GM foods differently. We, therefore, put forth
the following research question:

RQ1: What are the typical ways to organize stories about GM foods?

It is also important to examine factors of news organizations that may
affect the selection process of a particular frame. The concept, *frame
building* (Kim et al., 2014; Scheufele, 1999), explains the question of how
news media select particular frames when talking about social issues. The
selection process of a particular frame is influenced by such factors as
political orientations, cultural and professional norms, which are often
reflected in the way an individual journalist understands the issue and
develops a story (Scheufele, 1999; 2000).

Ideological orientation of news organizations, for example, can function
as organizational constraints which can affect the selection of a particular
frame (Kim et al., 2014; Kim et al., 2011). The political views of the
publisher are often mirrored in the overall story tone or the professional
practice of each news organization (Shoemaker & Reese, 1991). The
ideological orientations of publishers (i.e., conservative vs. liberal),
therefore, can influence the frame building process (Kim et al., 2011).
Conservative news media, for example, may be more likely to oppose
regulation of the market. Conservative news media, therefore, than liberal
news media tend to focus on economic benefits rather than regulations when

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talking about GM foods. Our first hypotheses examines if there are meaningful differences in presenting GM foods between conservative news media and liberal news media as follows:

H1a: Conservative news media will be more likely than liberal news media to mention *economic prospects*.

H1b: Liberal news media will be more likely than conservative news media to mention *calling for regulation*.

Professional routines that journalists usually follow can also affect the way news stories are presented (Van Dijk, 1985). A typical example of the professional journalistic routines is the frequent use of epidemic framing (Iyengar, 1991). Episodic framing refers to a way to tell a story, in which an issue is presented in a particular episode or in a personal instance. Thematic framing is another way to present a news story, in which an issue is analyzed in a broader social structure. While journalists need to prepare a significant amount of background information to present a story within thematic frame, they can use episodic framing with a relatively little effort. Given the unique features of television, news stories on television have been found to be more episodic than those on newspapers (Iyengar, 1991). Conflicts are often dramatized in news media in order to attract larger audiences (Nisbet et al., 2003; Nisbet & Lewenstein, 2002). It is likely that television news stories are more likely than those on newspapers to mention *political conflicts* to present GM foods in epidemic frame. It can be hypothesized, therefore, that television is more likely than newspapers to mention *political conflicts* when talking about GM foods**.**

H2: Television news will be more likely than newspapers to mention *political conflicts*.

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Issue Attributes

A social issue presented in the media accompanies numerous attributes (McCombs, Lopez-Escobar, & Llamas, 2000). The attributes are particular characteristics or perspectives of an issue that can be applied to make a judgment or think about the issue (Kim et al., 2014; McCombs & Evatt, 1995). A story of GM foods, for example, can emphasize some *reasons (attributes) to support* its use (e.g*., cost effectiveness*), while another story can focus on some *reasons to oppose* it (e.g., *negative health effects*) (Kim et al., 2014). Given that the media tend to emphasize certain attributes over others, selected attributes can function as a compelling argument for the audience to understand and evaluate an issue (McCombs, 2005). Framing, in this respect, can be defined as a *reasoning device* to interpret an issue because selected aspects can influence the way in which the audience make a judgment about the causes and results of an issue (Ferree, Gamson, Gerhards, & Rucht, 2002; Kim et al., 2014).

After reading sampled news stories and reviewing previous literature, we draw several key attributes for consideration. Many supporters of GM foods, on the one hand, argue that the use of GM foods can bring economic benefits to both manufactures (*agricultural benefits*) and consumers due to cheaper prices than those of non- GM foods. More specifically, using GM crops as a raw material can reduce the cost to produce food items and as a result, lower the final cost for consumers. Another attribute that is used to support GM foods is its innocuousness. For example, World Health Organization (WHO) has announced that GM foods do not have negative impacts on either human health or the environment (*no evidence for negative health effects or negative environmental effects*). Lastly, as a reason to

support, the media can emphasize that the use of GM foods can be a solution for people suffering from famine and starvation (*solution to world hunger*).

Many opponents, on the other hand, have questioned potential health risks associated with GM foods (*negative health effects*). Two kinds of safety concerns have mainly been discussed over the years (WHO, 2016): specific health concerns (e.g., the potential for transferring allergens across foods) and unknown long-term damages which have been revealed yet. Another attribute that the media can focus on is trade conflicts between importing countries and exporting countries (*trade conflicts between importers and exporters*). Predominantly GMO-adverse countries (e.g., Europe) criticize the diplomatic pressure of major exporters (e.g., United States, Canada) for their excessive profit-driven attitudes. Those GMO-favor countries, whose GMO policy is driven by large export-oriented farmers and biotechnology industry, argue current regulations of importers are too strict and unnecessary. As one of major importers of GM crops, such as corns and soybeans, Korea also faced a trade dispute on North American Free Trade Agreement (NAFTA) in 2004 due to America's aggressive attitude on exporting GM foods (Miles & Ahn, 2011). Finally, negative impacts on environment are also questioned (*negative environmental effects*). Opponents are concerned that the use of GM foods may cause unexpected mutations, such as super weeds, which are not easily controlled by regular herbicides. They argue that the unexpected mutations may eventually require even more pesticides and stronger herbicides than other crops.

Based on the issue attributes of both sides discussed, our second and third research questions explore how news media have presented attributes of GM foods and how the way to present GM foods has been changed over the years:

RQ2: Which attributes of GM foods have presented more often than others in news coverage?

RQ3: How have the attributes in news coverage of GM foods changed over the years?

This study also makes a comparison between literal and conservative newspapers in using issue attributes to support or oppose GM foods. Our hypotheses reflect previous studies suggesting that conservative papers are more likely to represent government standpoints which advocate the use of GM foods (e.g., Kim, Kim, & Besley, 2013).

H3a: The liberal newspapers will be more likely than the conservative newspapers to mention the reasons (attributes) to oppose GM foods.

H3b: The conservative newspapers will be more likely than the liberal newspapers to mention the reasons (attributes) to support GM foods.

Story Tone

Story tone indicates an affective aspect, linking a story a negative, positive, or neutral connotation (Kim et al., 2014). The tone of a story elicits emotional reactions from audiences when evaluating an issue presented in news stories (Kiousis, Bantimaroudis, & Ban, 1999). Artificial modification of foods, for example, may provoke a negative emotion response among customers (Kim et al., 2013; WHO, 2016). In our study, story tone was categorized into positive, negative, or neutral/balanced. A positive tone was conceptualized as a story's overall support of GM foods (pro-GM foods)

while a negative tone was recognized as a story opposing GM foods (anti-GM foods). In the case of a neutral/balanced, both negative and positive sides were equally mentioned or the story purely explained scientific knowledge (e.g., definition of GM foods). We put forth the following research question:

RQ4: Has the tone been largely positive or largely negative toward GM foods?

Methods

Sample

In order to represent a broad range of South Korean news media, five national daily newspapers (the *Chosun Ilbo*, the *Donga Ilbo*, the *Joongang Ilbo*, the *Kyunghyang Shinmun*, and *The Hankyoreh)* and three national television networks (*KBS*, *MBC*, and *SBS*) were selected. The three newspapers, the *Chosun Ilbo*, the *Donga Ilbo*, and the *Joongang Ilbo* were chosen because they had more than 70% of the market share for daily newspapers in South Korea (Kweon, 2006). These newspapers are considered to hold a conservative ideological view. The other two, the *Kyunghyang Shinmun* and *The Hankyoreh,* were selected as liberal newspapers.

The Korean integrated news database system, *MEDIAGAON,* was used to retrieve news articles. The sixteen-year period (1995-2010) was selected because the import of GM foods into South Korea began in 1995. We used the keywords, *genetically modified foods, genetic modification, GM foods,*

or genetic modification foods. As the *Chosun Ilbo* and the *JoongAng Ilbo* do not share its contents with *MEDIAGAON*, the newspaper's websites were used to retrieve news articles. In order to retrieve television news transcripts, each television network website was used. We found a total of 2,309 articles from the five newspapers ($n = 1,853$) and three television networks ($n = 456$) using the keywords. Then we randomly selected 600 news articles as a manageable sample size to analyze. After eliminating unrelated articles, a total of 456 GM foods-focused articles were analyzed; 308 news stories from newspapers and 148 from television news.

Coding

The coding sheet for the current study was developed through an extensive literature review of framing analysis research within the field of science communication (e.g., Kim et al., 2014; Nisbet et al., 2003; Nisbet & Huge, 2006). We revised it several times to the final version. Two coders examined the full text of each article after a series of training and pilot-test sessions. For pilot-test sessions, we produced a manageable random sample of 86 articles from each media outlet by selecting every 7th article for analysis. Then, we calculated inter-coder reliability by double-coding a random subsample ($n = 86$ or 19%) of the whole sample. The inter-coder reliability tests reached reasonably good reliability scores. For the organizing theme, the score of *Scott's pi* was .80. For the issue attributes, the points are ranged from between .74 (*no evidence for negative health effects*), and .97 (*agriculture benefits*). For the story tone, it yielded .68.

More specifically, organizing theme was coded by examining the main focus of each article. Two coders categorized each article into one of the five

organizing themes: *economic prospect, scientific background, calling for regulation, political conflicts*, and *ethical concerns*. We borrowed these five organizing themes from the previous framing categories instead of creating new ones, as suggested by Shoemaker and Reese (1991). Stories that did not belong to any one of the five organizing themes were all coded as "others." Two coders were instructed to make a selection of the most dominant idea as the organizing theme. When a news story had more than one dominant emphasis, coders were asked to decide the dominance through numbering and calculating the organizing theme of each paragraph.

Second, two coders marked issue attributes as "not present" (0) or "present" (1). We had ten issue attributes: the first five issue attributes were categorized as positive (*agricultural benefits, no evidence for negative health effects, solution to world hunger, no evidence for negative environmental effects, and others*) and the latter five as negative (*negative health effects, trade conflicts between importers and exporters, negative environmental effects, ethical concerns, and others*). The same attributes can be appeared more than once in many news stories. Regardless of how many times attributes were mentioned in one article, we coded each issue attribute only once as "present," to prevent overinflating the number of specific attributes reported.

Lastly, two coders selected "overall impression" of an article toward the use of GM foods as "negative" (1), "neutral/balanced" (2), and "positive" (3). According to the method applied by Einsiedel (1992), coders first determined a) the focus of the lead, and b) the proportion of the benefits and problems of the use of GM foods. For an article to be considered "*positive*" or "*negative,*" it must have had more than 66% majority in either direction. If a two-thirds majority could not be reached, the article was coded as

"*neutral/balanced.*"

Findings

Figure 1 shows the total number of news articles and transcripts over the last 10 years (2001-2010) matching the keywords *genetically modified foods, genetic modification, GM foods, or genetic modification foods* in the eight news media outlets and the import volume of GM foods in South Korea. Since the data of the import volume has been available since 2001, we
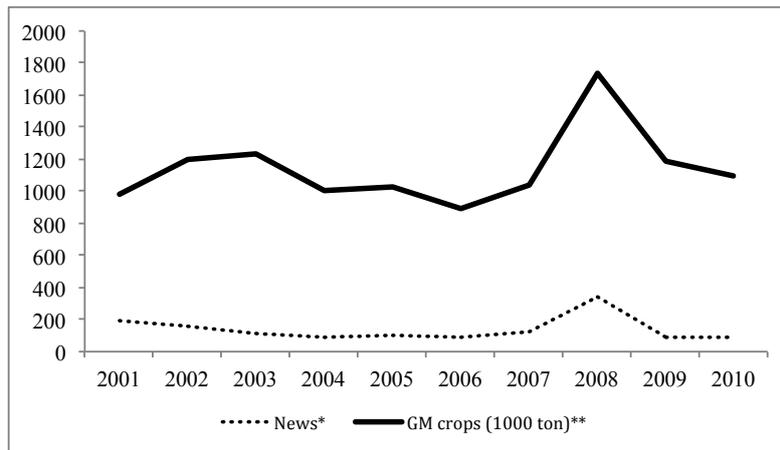
Figure 1. Comparison between the number of stories and
the amount of GM food imports (2001-2010).

 * The amount of news coverage includes stories from the South Korean newspapers (the *Chosun Ilbo,* the *Donga Ilbo,* the *Joonang Ilbo,* the *Kyunghyang,* and *The Hankerae*) and television news (KBS, MBC, and SBS), matching the keywords "genetically modified foods," "genetic modification," "GM foods," or "genetic modification foods."
** The amount of the import of GM crops is estimated by Korea Safety Clearing House (Chung, 2011).

compared the amount of news coverage of GM foods with the volume of GM foods from that point. As shown in Figure 1, the amount of news coverage has increased and decreased, corresponding to the total amount of GM foods imported across the years. The major peak of media coverage of GM foods occurred in 2008 along with a huge increase in the amount of the import of GM foods. Media coverage fell sharply again in 2009 with a reduced amount of the import of GM foods.

RQ1 investigates a typical way to present a story of GM foods. As seen in Table 1, the Korean news media presented GM foods largely as a policy issue. A frame of *calling for regulation* was used most often, appearing in 50 % ($n = 228$) of the total articles. Another 26.1% of articles ($n = 119$) emphasized *political conflicts*. The media were less likely to use the *science/technology* frame (9.9%, $n = 71$) and the *economic prospect* frame (8.3%, $n = 38$). Another 5.7% ($n = 26$) stories had none of these frames. The least used frame was the *ethical concerns* frame. None of news articles and transcripts presented GM foods within this frame. This pattern was consistently found across all the news media investigated and the proportions were significantly different from equal ($\chi^2 = 314.72$, $p < .001$).

To examine our H1a and H1b, comparisons were made between conservative and liberal newspapers. H1a predicted that the conservative newspapers would be more likely than the liberal newspapers to present GM foods within the *economic prospect* frame. Findings revealed that 17.3% ($n = 28$) of the conservative newspapers stories used this frame, while 2.7% ($n = 4$) of the liberal newspapers articles presented GM foods in this way. This difference was statistically significant ($\chi^2 = 17.448$, $p < .001$), supporting H1a. H1b hypothesized that the liberal newspapers would be more likely

Table 1. Organizing themes in GM foods stories

Organizing themes	Newspapers					Television news			
	CI (n)	DI (n)	JI (n)	KS (n)	HK (n)	KBS (n)	MBC (n)	SBS (n)	Total (n)
A calling for regulation	46.8% (22)	43.3% (26)	45.5% (25)	67.1% (51)	71.4% (50)	25.4% (18)	40.9% (9)	49.1% (27)	50.0% (228)
Political conflict	31.9% (15)	16.7% (10)	18.2% (10)	17.1% (13)	14.3% (10)	52.1% (37)	50.0% (11)	23.6% (13)	26.1% (119)
Science/ technology	6.4% (3)	11.7% (7)	14.5% (8)	6.6% (5)	10.0% (7)	9.9% (7)	9.1% (2)	10.9% (6)	9.9% (45)
Economic prospect	8.5% (4)	25.0% (15)	16.4% (9)	5.3% (4)	0% (0)	4.2% (3)	0% (0)	5.5% (3)	8.3% (38)
Others	6.4% (3)	3.3% (2)	5.5% (3)	3.9% (3)	4.3% (3)	8.5% (6)	0% (0)	10.9% (6)	5.7% (26)
	n = 47	n = 60	n = 55	n = 76	n = 70	n = 71	n = 22	n = 55	N = 456

CI (the *Chosun Ilbo*); DI (the *Donga Ilbo*); JI (the *Joongang Ilbo*); KS (the *Kyunghyang Shinmun*); HK (*The Hankyore*).[a] The "Others" category included stories where a dominant and apparent theme was not identified. The same category also included stories that did not belong to any one of the four major themes (regulation, political conflicts, science, and economic). None of stories used the ethical concerns frames, so the organizing theme was not listed in the Table 1.

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than the conservative newspapers to present GM foods in the *calling for regulation* frame. Findings show that 69.2% of news stories in the liberal newspapers included mentions of *calling for regulation* (101 out of 146 articles) in comparison with 45.1% of the articles from conservative newspapers (73 out of 162 articles). The difference between the liberal and conservative newspapers were statistically significant ($\chi^2 = 18.171$, $p < .001$). H1b was supported.

To explore H2, we compared television news and newspapers. H2 predicted that television news would be more likely than newspapers to present GM foods within the *political conflicts* frame. A chi-square test indicated that 41.2% (61 out of 148 articles) of television news coverage used the *political conflicts* frame in reporting on GM foods, while 18.8% (58 out of 308 articles) of newspapers used the same frame. The difference between television news and newspapers was statistically significant ($\chi^2 = 25.973$, $p < .001$), supporting H2.

RQ2 addresses the question of which attributes were mentioned more often than others. Overall, when combined the five reasons to oppose GM foods (with the "other" category included), the negative attributes were more mentioned ($M = .53$, $SD = .84$) than the five reasons to support ($M = .61$, $SD = .83$). The difference was marginally significant ($t = -1.72$, $p = .086$).

More specifically, of the four reasons (attributes) to oppose GM foods, *negative health effects* was the most frequently mentioned attribute (36.2%, $n = 165$). A series of *McNemar's* test[1] confirmed that the *negative health effects* was significantly more often mentioned than *negative environmental effects* (15.6%, $n = 71$, $\chi^2 = 69.75$, $p < .001$), *trade conflicts between*

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[1] *McNemar's chi-square* assesses the significance of the difference in *percentages* between two variables.

importers and exporters (5.5%, *n* = 25, χ^2 = 120.76, *p* < .001) and *ethical concerns* (3.5%, n = 16, χ^2 = 134.38, *p* < .001). *Negative environmental effects* was mentioned significantly more often than *trade conflicts between importers and exporters* (χ^2 = 25.31, *p* < .001) and *ethical concerns* (χ^2 = 43.52, *p* < .001). The difference between *trade conflicts between importers and exporters* and *ethical concerns* was not statistically significant (χ^2 = 1.94, *p* = .16).

When it comes to the reasons to support GM foods, *agricultural benefits* was the most frequently mentioned attribute (16.9%, *n* = 77), followed by *no evidence for negative health effects* (16.4%, *n* = 75), *solutions to world hunger* (15.1%, *n* = 69), and *no evidence for negative environmental effects* (4.4%, *n* = 20). A series of *McNemar's* tests indicated that *agricultural benefits* (χ^2 = 40.73, *p* < .001), *no evidence for negative health effects* (χ^2 = 39.95, *p* < .001), and *solutions to world hunger* (χ^2 = 32.45, *p* < .001) were mentioned significantly more often than *no evidence for negative environmental effects.* The differences between *agricultural benefits, no evidence for negative health effects,* and *solutions to world hunger* were not statistically significant.

To answer our H3a and H3b, a series of *t*-tests were conducted between the liberal and conservative newspapers. H3a predicted that the liberal newspapers would be more likely than the conservative newspapers to mention the reasons to oppose (*negative attributes*) GM foods. While the five reasons to oppose GM foods were mentioned 68 times in the 146 articles (46.6%) from the liberal newspapers, the same reasons to oppose GM foods were mentioned 66 times in the 162 articles (40.7%) from the conservative papers. This difference between the liberal and conservative

Table 2. Issue attributes: Reasons to support or oppose GM foods

| | Attributes | Newspapers | | | | | Television news | | | Total (n) |
| | | Conservative | | | Liberal | | | | | |
		CI (n)	DI (n)	JI (n)	KS (n)	HK (n)	KBS (n)	MBC (n)	SBS (n)	
Reason to oppose GM foods	Negative health effects	53.2% (25)	23.3% (14)	36.4% (20)	30.3% (23)	41.4% (29)	31.0% (22)	50.0% (11)	38.2% (21)	36.2% (165)
	Negative environmental effects	27.7% (13)	16.7% (10)	14.5% (8)	13.2% (10)	25.7% (18)	9.9% (7)	18.2% (4)	1.8% (1)	15.6% (71)
	Trade conflicts between importers and exporters	4.3% (2)	1.7% (1)	9.1% (5)	11.8% (9)	8.6% (6)	1.4% (1)	4.5% (1)	0% (0)	5.5% (25)
	Ethical concerns	4.3% (2)	3.3% (2)	3.6% (2)	9.2% (7)	2.9% (2)	0% (0)	0% (0)	1.8% (1)	3.5% (16)
	Others[a]	8.5% (4)	6.7% (4)	5.5% (3)	13.2% (10)	8.6% (6)	1.4% (1)	0% (0)	3.6% (2)	6.6% (30)
Reason to support GM foods	Agricultural benefits	25.5% (12)	16.7% (10)	36.4% (20)	18.4% (14)	10.0% (7)	4.2% (3)	9.1% (2)	16.4% (9)	16.9% (77)
	No evidence for negative health effects	31.9% (15)	20.0% (12)	34.5% (19)	7.9% (6)	11.4% (8)	14.1% (10)	0% (0)	9.1% (5)	16.4% (75)
	Solution to world hunger	21.3% (10)	18.3% (11)	36.4% (20)	13.2% (10)	10.0% (7)	4.2% (3)	0% (0)	14.5% (8)	15.1% (69)
	No evidence for negative environmental effects	8.5% (4)	6.7% (4)	7.3% (4)	5.3% (4)	2.9% (2)	2.8% (2)	0% (0)	0% (0)	4.4% (20)
	Others[b]	4.3% (2)	8.3% (5)	12.7% (7)	3.9% (3)	2.9% (2)	0% (0)	4.5% (1)	3.6% (2)	4.8% (22)

Note: More than one issue attribute appeared in the same article or transcripts; total number of issue attributes coded in GM food stories does not equal to the total number of sample (N = 456) examined. [a] The "Others" category (other reasons to oppose GM foods) included such arguments as "GM food is not the absolute solution to world hunger," etc. [b] The "Others" category (other reasons to support GM foods) included such claims as "GM food can increase variety of food choices for consumers," etc.

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newspapers, however, was not statistically significant (t = -.92, p = .36). H3b hypothesized that the conservative newspapers would be more likely than the liberal newspapers to mention to the reasons to support *(positive attributes)* GM foods. The five reasons were mentioned 92 times in the 162 articles (56.8%) from the conservative newspapers (M = .96, SD = 1.09), while the liberal newspapers mentioned the same attributes 43 times in their 146 articles (29.5%, M = .43, SD = .76). This difference was significant (t = 4.93, p < .001), supporting H3b.

RQ3 asks how the attributes in news coverage of GM foods have changed over the years. Findings showed that the media's mentions of reason to support and reason to oppose GM foods have changed over the years. As Figure 2 shows, the mentions of positive attributes [F *(linearity)* = 7.04, p < .01] indicated a statistically significant increase over time. When it comes to the reasons to oppose GM foods, the mentions of the negative attributes showed a statistically significant decrease over the years [F *(linearity)* = 6.93, p < .01].
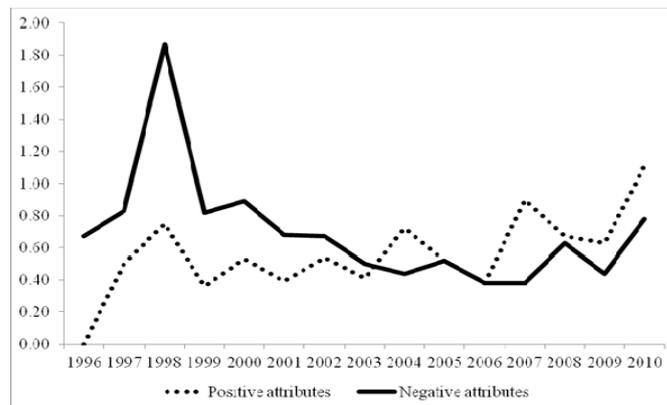

Figure 2. Proportion of Articles Mentioning Positive and
Negative Attributes over the Years (1996-2010).

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RQ4 questions whether GM foods stories have been largely positive or negative. Of the 456 articles analyzed, 44% (n = 201) were coded as negative, 42% (n = 195) were either neutral or balanced, and 13% (n = 60) were positive (see Figure 3). That is, the Korean news media have largely presented GM foods either negatively or neutrally. However, Figure 3 shows that the tone of GM foods stories has become increasingly positive over the years. There was in fact a marginal but significant positive linear relationship between the tone and the years [F (linearity) = 3.07, p = .08].
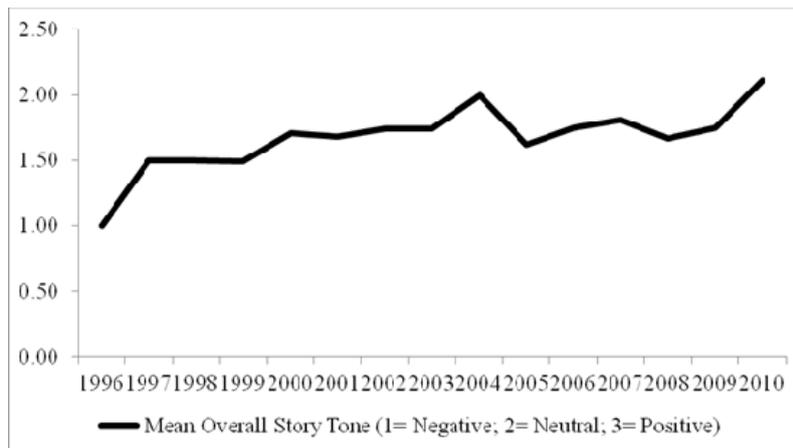

Figure 3. Story tone of GM foods stories over the years (1996-2010).

Discussion

This study explored how South Korean news media have presented GM foods by analyzing newspaper articles and television news transcripts. More specifically, we examined how news media have selected organizing theme,

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issue attributes, and story tone in presenting the issue. What does the current
study tell us about news stories of GM foods in South Korea?

First, findings show that GM foods have been presented mostly as a
policy issue (see Table 1). Given the fact that biotechnology issue has been
largely presented as a science issue or economic issue in the United States, it
is noteworthy that more than 75% of the Korean news coverage presented
GM foods as a policy issue. There are a couple of potential explanations.
First, it can be partly explained by the fact that media attention to GM foods
in South Korea has increased in response to the government's major GM
foods-related policy decisions (e.g., the import of GM corns for human
consumption, and the introduction of a mandatory labeling law). The South
Korean government has banned any kinds of commercial productions of
GM foods in the country. Further, the use of GM foods for human
consumption has been allowed since 2008. These circumstances regarding
the farming and consumption of GM foods in the country might have
affected the way the media talk about GM foods as a policy issue. Second,
policy-making processes often involve newsworthy components such as
"drama, conflict, and competition," which easily attract the audience's
attention (Kim et al., 2014, p. 231). As McComas and Shanahan (1999)
pointed out, the general public members can find a scientific issue difficult
to understand and easily turn their attention to other interesting or urgent
issues. A policy issue generally has a distinct beginning, conflict, and
resolution phase as a legislative process develops (Nisbet et al., 2003). News
coverage of science issues, therefore, is largely event-oriented so that
journalists can construct the issues as an interesting story (Nisbet &
Lewenstein, 2002). Nisbet and Huge (2006), for example, found that
American news media coverage of biotechnology has been largely

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corresponded to major policy decisions. Our findings support the idea that the newsworthy component such as competitions or conflicts in policy-making processes can be an important frame-building factor that affects the way journalists present GM foods (Kim et al., 2014; Nisbet et al., 2003).

While the issue of GM foods has been presented largely as a policy issue in South Korea, our findings also demonstrate while liberal newspapers were more likely to focus on how to regulate the use of GM foods, conservative newspapers were more likely to talk about economic prospects in debating GM foods. The findings are consistent with previous literature of frame-building (Kim et al., 2011; Scheufele, 1999), suggesting that a particular factor of news organizations can influence the way a news story is framed. It is likely that the overall political views of news organizations are another important organizational restraint that may influence the frame building process. We also found that conservative newspapers mentioned the reasons to support GM foods significantly more often than liberal papers. As conservatism in essence advocates limited interventions of the market, conservative news media are more likely than liberal news media to support financial benefits of the use of GM foods. Majority of journalists claim that their selections of a particular frame are decided by the fact that is thought to be most significant (Kim et al., 2014). However, given the difficulties journalists have to encounter when they try to comprehend a given issue while having pressure to quickly generate news stories under deadline, the significance is indeed a mediated concept (Kim et al., 2014; Tewksbury, Jones, Peske, Raymond, & Vig, 2000). Our findings support the idea that the political ideology of news organizations may function as an important frame-building factor, influencing the news media's selective use of a particular frame.

Lastly, our findings reveal that news coverage of GM foods has been largely negative or neutral/balanced rather than positive. The dominant use of the negative or neutral/balanced story tone can be explained in large part by the fact that the negative attributes were mentioned more often than the positive attributes in the news media. The most frequently used frames, *a calling for regulation* and *political conflicts,* may also influence the story tone of GM foods. When journalists present biotechnology within a policy issue rather than a science or economic issue, the overall story tone was likely to be negative or balanced rather than positive (Marks, Kalaitzandonakes, Wilkins, & Zakharova, 2007). However, as seen in figure 2, the story tone has turned to more positive since 2008 when the import of GM corns for human consumption started. It seems likely that the change in story tone also reflected public opinions about the use of GM foods. According to a national survey (Chang, 2008), more than 60% of the participants agreed that GM foods would be beneficial, rather than harmful, to consumers.

Before discussing the findings further, it is necessary to address a limitation of this study. First, there was a limitation in the way in which issue attributes were coded. We coded when any of issue attributes were presented in a news story. It was found that a same attribute, in many cases, was mentioned more than once in an individual news story. However, it was counted as one mention no matter how many mentions was made if it came from the same story. In this way, we aimed to preclude any possibilities that the total number of a particular attribute would be unnecessarily inflated. Another limitation is that the numerous attributes categorized in this study might be imbalanced. While some attributes denote very particular points (e.g., "conflicts between countries"), others talk about broader and more

inclusive aspects (e.g., "negative environmental impacts"). There is a possibility that some attributes were appeared more often partly because they fall into broader categories.

With these shortcomings in mind, how can the current study contribute to the literature of framing? This study demonstrates such frame-building factors as political orientations of publishers (e.g., conservative vs. liberal view), or professional practices (e.g., the frequent use of episodic frame) embedded in a society can affect the way in which journalists construct a news story. Findings support the idea that such frame building factors can be a form of organizational constraint or pressure which can influence the media's selective use of frames (Sheafer, Shenhav, Takens, & van Atteveldt, 2014; Shoemaker & Reese, 1991). Furthermore, the findings suggest that news media can focus on different and even directly-opposed attributes depending on their political orientations. As Nisbet and Huge (2006) pointed out, by emphasizing some attributes over others, news media help the general public and policy-makers evaluate the causes and effects of a controversial issue. It is likely that audiences can shape their perceptions and attitudes towards such controversial issues as GM foods depending on the way in which news media they consume frame the issues. For future research, it will be worthwhile to examine how news media affect the way individuals perceive a controversial issue and shape their attitudes toward policies related to the issue.

Lastly, this study examines the typology of framing invented and developed in the United States was applicable to the context of South Korea. The current study demonstrates the usefulness of pre-existing coding schemes in Korean society. While there have been studies to apply the typology to different topics, such as stem cell (e.g., Nisbet et al., 2003),

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global climate change (e.g., McComas & Shanahan, 1999; Nisbet, 2009), or ethanol (e.g, Kim et al., 2014), little research has examined whether those frameworks were applicable to other contexts. As Shoemaker and Reese (1991) suggested, it can be valuable for researchers to use pre-existing coding categories for comparing studies rather than creating them.

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한국 언론의 유전자 조작 식품 프레임 분석: 한국에서 유전자 조작 식품은 어떻게 보도되고 있는가?

오상화
일리노이대학교 어바나 샴페인

김세일
사우스캐롤라이나대학교

김활빈
사우스캐롤라이나대학교

김수연
위스콘신대학교 메디슨

본 연구는 한국 언론이 어떻게 유전자 조작 (GM) 식품을 보도하였는지 프레이밍 이론의 세 가지 차원인 핵심 주제, 이슈 속성, 그리고 기사의 톤을 분석함으로써 살펴보았다. 또한 뉴스가 유전자 조작 식품을 보도하는데 있어 언론사의 정치적 정향성 (예를 들어, 보수 대 진보 이데올로기)과 업무관행 (예를 들어 우화적 프레임 빈번한 사용)이 영향을 미쳤는지도 함께 살펴보았다. 분석결과, 핵심주제의 측면에서는 한국에서 유전자 조작 식품에 관한 기사는 대부분 정책 이슈로 다루어지고 있음을 알 수 있었다. 이슈 속성과 관련해서는 진보 신문들이 유전자 조작 식품의 사용을 어떻게 규제할 것인지를 보다 자주 다룬 반면, 보수 신문들은 경제적 전망에 대해 주로 보도한 것으로 나타났다. 또한 보수 신문들은 유전자 조작 식품을 지지하는 이유에 대해 보다 자주 논의한 것으로 나타났다. 이러한 결과들은 언론 조직의 정치적 정향성과 같은 프레임 빌딩 요인이 뉴스 미디어의 특정 프레임의 선택적 사용에 영향을 줄 수 있음을 잘 보여준 것이다. 기사의 전반적인 톤은 긍정적이기 보다는 부정적 혹은 중립적인 톤으로 보도되어 온 것으로 나타났다.

키워드 : 프레이밍, 프레이밍 빌딩, 유전자 조작 식품, 내용분석

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