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Consumer Attitude of Risk and Benefits toward Genetically Modified (GM) Foods in South Korea: Implications for Food Policy

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With highly negative publicity, GM food marketing in South Korea has become a major challenge for potential marketers who are interested in entering the South Korean market. Several consumer groups and non-government organizations (NGOs) in South Korea initiated anti-GM food campaigns. South Korean consumers are reported to be more concerned about potential risk associated with GM food compared to counterpart consumers in the U.S and Europe (KFDA, 2009). Many South Korean food processors and marketers are responding to this consumer concern by ignoring the labeling requirement of GM contents in their products. There is apparent lack of coordination in the South Korean food supply chain regarding GM food management with South Korean consumers' negative attitude toward GM foods and South Korean food suppliers' avoidance of GM food labeling. Despite the apparent benefits of GM food, GM food may not have sufficient market value in the market if consumers have distrust and insecurity toward such product. This paper develops a quantitative model which identifies major determinants of South Korean consumers' choice behavior for GM foods. The proposed model elicit constructs which form South Korean consumers' attitude which in turn affect their willingness to purchase GM foods. Our study developed a socio-cognitive model of South Korean consumers' behavior, using Fishbein's framework, which has two attitudinal constructs (Perceived Benefits and Perceived Risk) and one construct that capture effect of individual respondent's socioeconomic variance (Socio-Economic Status (SES). Consumers' beliefs and attitudes regarding the risks and benefits of GM foods and their individual socio-demographic status are hypothesized to be linked to consumers' choice behavior of GM foods. A sample of 360 consumers was drawn from a survey study in the capital city, Seoul. Results reveal that consumers' Socio-Economic Status (SES) and their Perceived Benefits associated GM food were found to be strong indicators of consumers' GM food purchase intention. This implies that consumer's background and diversity in South Korean demographic may have significant effect on their purchase intention for GM food. This suggests that further extensive study on South Korean consumer market need to be conducted in order to fully understand the difference among various South Korean consumer market segments in terms of how they respond to GM food issues. Comprehensive market segmentation on South Korean consumer market should be done in terms of their GM risk appetite, GM food knowledge, information search behavior and food consumption pattern. Our results show that favorable attributes of GM food such as medical benefits and nutritional enhancement were found to have significant influence on consumers' attitude toward GM food positively. Results show potentials for second generation GM food in South Korea, if specific of consumer benefits can be effectively developed and promoted to South Korean consumers. Regarding Perceived Risk of GM food, uncertainty/ lack of understanding on GM food and potential environmental hazard of GM food were found to affect consumers' attitude toward GM food negatively. Educating consumers about GM food may be a viable strategy to mitigate their concerns about unknown health risks and adverse environmental effects and the communication of scientific uncertainty is critical to improving consumers' negative attitude toward GM foods.

Keywords: *Genetically Modified (GM) food commercialization, GM Labeling policy, South Korea, and Risk/Benefits of GM foods.*

Introduction

After two decades of debate on genetically modified (GM) foods, concerns about the safety of GM foods is still an ongoing important issue around the world. Supporters of this technology state that there are significant benefits from biotech crops in productivity, economics, health and society, and many scientific reports conclude that GM foods that are currently authorized and available on the international market have undergone risk assessments and are not likely to present risks for human health in any other form than their conventional counterparts (WHO 2005; Kleter et al., 2005; EFSA 2006). However, consumers in many countries are still very cautious regarding GM food issues due to a few factors. First, various highly publicized food scares in North America, Europe and Asia have led to development of negative attitude towards GM foods. Second, limited knowledge and awareness towards GM foods, lack of trust in experts and regulators for risk management are found to affect consumers' perception of GM foods. Furthermore, increased trade and globalization raises interchange of food products among trading partner countries, which complicates the issue of food safety management. There is no global concensus on the manner

in which GM foods should be labeled; the US does not require mandatory labeling on products containing GM ingredients, while Europe, Japan, Australia, New Zealand, Brazil, China and South Korea require labeling of products containing GM components (O'Fallon et al., 2007; Thorpe & Robinson, 2005; Huffman, 2003).

Consumers in different regions show different attitude toward GM foods. While European consumers are negative toward adoption of GM food based on ethical ground, American consumers have neutral position toward GM food as they recognize the benefits of GM food for both producers and consumers (Bredahl et al., 1998). Consumers' attitude and acceptance of GM food in South Korea is particularly important, as South Korea is a major food importing nation in the world, and is known for its sensitivity towards imported food products in the past. For example, when South Korea and the U.S. concluded the KORUS free trade agreement (FTA) on April 1, 2007, which included lift on import ban for US beef, South Korean public expressed their heightened concerns and challenged the South Korean government by having the first candlelight vigil on May 2, 2008, protesting in central Seoul, which was followed by massive demonstrations, gathering over 100,000 citizens on the streets of Seoul (Kim, 2009a). South Korea is an important market for major food exporters, yet a challenging import market. South Korea may have some aversion towards GM food which has been exemplified by the heated debate over labeling and marketing of GM food in South Korea in recent years. Several consumer groups and non-government organizations (NGOs) in South Korea initiated anti-GM food campaigns. South Korean consumers are reported to be more concerned about potential risk associated with GM food compared to counterpart consumers in the U.S and Europe (KFDA, 2009).

Twenty five countries in the world produced GM commodities in 2008 (The World Bank, 2009) and 53 % of the world soybean production consisted of GM soybean (Stein and Rodriguez-Cerezo, 2009). The U.S. is producing 90% of soybeans and 80 % of corn in GM production (Clive James, 2010). It is expected that most of the corn and soybean in the world market transform to GM production. Consequently, South Korea may increase the import of GM soybeans from the US (e.g. Roundup Ready Soybean, RRS from Monsanto). The South Korea Food and Drug Administration (KFDA) introduced a testing procedure for this RRS soybean, using Polymerase Chain Reaction (PCR) in 2009, and has been testing RRS soybean with this testing procedure prior to marketing in South Korea (KFDA, 2009). KFDA also provide guideline to food processors and manufacture to comply with the current GM labeling policy. The current South Korean GM labeling policy suggests that food products that contain minimum 3% of GM ingredients in final form should be labeled as GM food. However the participants in the South Korean food supply chain were found to be uncooperative and 54% of tofu products in South Korea were found to contain GM soybean ingredients with no GM labeling (Hankyoreh Newspaper, 2008). Between 2001 and 2007, 6 million tones of GM soybean have been imported to South Korea which were used in processing tofu, soy sauce and cooking oil. Nevertheless, none of these products which used GM soybean were labeled as GM food.

South Korean consumers prefer to have more stringent GM labeling policy to be able to avoid these types of GM products which are not properly labeled (Han, 2009). The middlemen in the South Korean food industry respond to this negative attitude of South Korean consumers toward GM food by omitting the GM labeling information. In response to the public concerns toward GM food, the South Korean government proposed to strengthen this policy in 2009 by lowering the minimum content of GM from 3 % to 1 % to be labeled as GM food. Extension of the current GM labeling policy implies constraints in the commodity supply chain and additional economic costs to the South Korean food industry. This policy change is estimated to raise operating cost of the South Korean food industry additional $38.5 million, willing reducing production volume by $334.7 million due to constraints in the supply of raw materials (Kim, 2009). Change in the labeling may address South Korean consumers' concerns toward GM food, however this may involve substantial social costs and constraints to the South Korean food industry.

There is apparent lack of coordination in the South Korean food supply chain regarding GM food management as the South Korean consumers are unwilling to accept GM food products and the middlemen are responding to this demand situation by abandoning the current GM labeling guideline. Given the consumer and the producer resistance towards GM food, South Korean food industry appears to prefer avoiding production or importation of GM food. With highly negative publicity, GM food marketing in South Korea has become a major challenge for potential marketers who are interested in entering the South Korean market. While GM food products are beginning to proliferate to the South Korean food supply chain, the middlemen and downstream of the supply chain is not receptive of changes occurring in the system. Despite the apparent benefits of GM food, GM food may not have sufficient market value in the market if consumers have distrust and insecurity toward such product.

There have been some studies focusing on South South Korean consumers' opinions of GM foods in general manners (Lee, 2008; Kim et al., 2011; Kim, 2010; Choi et al., 2010; Han, 2009). These studies examined the level of knowledge which South South Korean consumers have regarding GM technology, their concerns and awareness level. However, approximation of South Korean consumers' choice behavior of GM foods has not been fully developed. For successful market introduction of innovative technology such as biotechnology, key issue is not to consider what is driving public concern *per se* but rather to consider how public attitudes impact on technology acceptance and their implications for institutional reform (Frewer, 2003). This requires development of consumer choice model which entails major determinants of GM food purchase which reflect consumers' attitude toward such product.

Understanding of South Korean consumers' attitude toward GM food may justify why due account should be given to public perceptions and attitudes when considering innovation and commercialization of the products of

emerging technologies such as GM foods (Frewer, 2003). Thus, it is imperative that policy makers and marketers should explore how South Korean consumers' attitude toward GM foods is developed and how their attitude impacts acceptance of this innovative technology in the South Korean consumer market.

Objectives of the Study

This paper develops a quantitative model which identifies major determinants of South Korean consumers' choice behavior for GM foods. The proposed model elicit constructs which form South Korean consumers' attitude which in turn affect their willingness to purchase GM foods. Our study developed a socio-cognitive model of South Korean consumers' behavior, using Fishbein's framework (Figure 1). According to the Theory of Planned Behavior (TPB; Ajzen 1991), consumers' attitude is linked to their behavior, determining purchase intentions (i.e. their behavior). Application of this framework enables assessment of the total variance in consumer behavior driven by attitude, and prediction of the extent of influential behavioral antecedent. Necessary data was collected with a survey method and analyzed with structural equation modeling (SEM) to establish the proposed model. Understanding of South Korean consumers' attitude and perception of GM food may shed light on how best to introduce GM technology and to facilitate the development of institutional mechanisms and structures. This enables integration of the values held by stakeholders into the processes surrounding regulatory decision-making and scientific innovation (Frewer, 2003).

Literature Review

Consumers may have doubt and insecurity toward GM food while acknowledging the importance of biotechnology for sustainable supply of food and improvement in food quality due to various reasons. GM food is an innovative product which offers new untested opportunities, but may also present potential unforeseen risks, causing consumers to have fear, uncertainty and doubt (Phillips and Corkindale, 2002). Consumers are also concerned about potential unexpected damage to the environment, destruction of biological diversity, and religious and ethical problems. Slovic (1999) states that consumer' concerns for food safety intensify when consumers are exposed to food risk involuntarily; when food risk is perceived to be uncontrollable; and when food risk is scientifically unproven or incompletely proven. GM food may present all these types of risk in the minds of consumers.

An individual who holds a negative attitude towards GM foods may use cognitive, affective or behavioral responses to reject GM foods or may display other behaviors that are congruent with this attitude (Frewer, 2003). Thus, consumers with an unfavorable attitude toward GM products expect to have the right to know whether products are produced using biotechnology as they view biotechnology as a risky process, thus have greater interest in food safety and quality issues associated with GM products than others (Han and Harrison, 2007). Therefore, acceptance of GM products is likely to be associated with the consumers' risk/benefit beliefs about biotechnology (Boccaletti and Moro 2000; Chen and Li 2007; Curtis and Moeltner 2006; Lusk and Coble 2005; Moon and Balasubramanian 2004; Rosati and Saba 2000; Scholderer et al., 1999; Subrahmanyan and Cheng 2000). Consumers who perceive benefits in GM food will be more willing to buy GM food, while consumers who perceive GM food as a health risk, risky to the environment will be less willing to purchase GM food (Han & Harrison, 2007).

In this paper, we hypothesize that South South Korean consumers' perception of risk and benefits which are associated with GM foods are major determinants affecting their attitude formation.

H1: Perceived risk of GM foods by South South Korean consumers is likely to lead to the reduced probability of purchasing GM foods.

H2: Perceived benefits of GM foods by South South Korean consumers are likely to lead to the increased probability of purchasing GM foods.

Some researchers showed that individual's personal capital (education, age, religion etc) and social capital (religious affiliation) significantly affect consumers' preference structure or attitude (Huffman et al, 2004; Han and Harrision 2007), thus included in our model (Table 1).

Table 1

List of Selected Variables /a

Latent Variables	***Observed Variables***
Independent Variables	
Perceived Risk Construct	Limited Information availability of GM food
	Environmental Hazards
	Ethics
	Food Safety
	Lack of Understanding on GM food & Uncertainty of GM Food
Perceived Benefits Construct	Reduced Use of Chemicals in production
	Diet Products
	Nutrition Enhancement
	Medical Function
	Price advantage
Socio-Economic Status (SES) Construct	Education
	Income (Yuan)
	Household size
	Age
	Employment
Dependent Variable	
Likelihood To Buy (LTB) GM Food	Label Checking for GM food
	Willingness to Pay (WTP) for GM food
	Reasonable Price Discount

/a Likert scale used in the SEM model is: 1=lowest level and 5 =highest level. The five latent variables, consisting of three independent variables and one dependent variable, are each constructed from the corresponding groups of observed variables on the right hand side of the table.

For example, different personal background may affect their values such as ethical legitimacy of genetically modified organism which lead to their willingness to reject or accept such products. Therefore, we expect that individuals with different socio-economic background will form their attitude toward GM foods in different manner.

H3: Socio-Economic Status (SES) of South South Korean consumers is likely to affect their willingness to purchase GM foods.

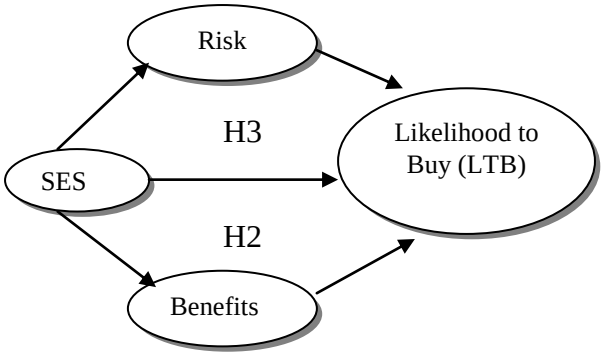

Figure 1. Structural Model of Consumer GM Choice Behavior

The present study focuses on examining consumers' attitudes toward GM foods regarding the potential benefits and risks as consumers' attitude is sensitive to these issues (Brown and Qin 2005; Huffman et al. 2003, 2004, 2007; Lusk et al. 2005). Many previous studies on GM food assumed that the genetic modification provided benefits to consumers by lowering prices, while some studies looked at situations where individuals may derive non-price benefits (e.g. improved nutritional characteristics)(Onyango et al., 2003; Hssain and Onyango 2004). Our study draws attention on non-price benefits of GM foods and evaluates relative importance of these non-price benefits and perceived risks of consumers' attitude toward GM foods. Understanding of the impact of these constructs of consumers' attitude toward GM food is important as this information provides insight for proper development of product or service design, pricing strategy, distribution-channel and communication-strategy selection (Louviere, 1992).

Research Methods

Fishbein's multi-attribute model explains that person's attitude toward any object is a function of his/her belief about the object and the implicit evaluative responses (or aspects) associated with those beliefs (Fishbein, 1963). Consumers' behavior toward GM food can be explained in this framework as attitude formation is closely related to consumers' favorable (i.e. benefits) or unfavorable (i.e. risk) evaluation of GM foods.

The multi-attribute model, which is originated from the Fishbein and Ajzen study (1975), has been well recognized as the established framework for explaining attitude, intention, and choice. This model was accepted for its widespread use in consumer research and for its diagnostic value in explicating attitudes (Mittal B. 1988; Sheppard et al 1988; Agarwal and Malhotra, 2005; Peterson and Wilson 1992).

This framework is applied in this study, which includes three constructs. *Perceived Benefits* and *Perceived Risk* are proposed as two 'attitudinal' constructs, in which consumers develop their perspectives towards specific issues related to GM foods. The empirical model included the constructs of *Perceived Benefits, Perceived Risk* and S*ocio-Economic Status (SES)*, and assesses their comparative and interactive effects on consumers' purchase intention for GM food[1].

Data used were drawn from a survey questionnaire administered among food shoppers in the capital city, Seoul, and a sample of 360 consumers was drawn from people who make real purchase-decision in retail shopping environment. Data collected for three constructs were hypothesized to provide a good fit to the theorized model. To explore the fits between the hypothesized model and the survey data, Structural equation modeling (SEM) was employed. Cronbach's reliability analysis and correlation analysis were used to select and assess the final items of the observed variables (Table 2 and 3), and the confirmatory factor analysis was employed to identify performing items and to improve the model fit. The empirical model was estimated by maximum likelihood using AMOS 5 to generate path diagram. Regarding fit statistics of the measurement model, the value of RMSEA was 0.058 and chi-square 275.0(df=116) $p<0.001$, CFI = 0.818, NFI = 0.806 which indicate reasonable fit of the model.

Table 2

Reliability Analysis: Sample Statistics for the Identified Constructs

Construct	Mean	Std. Deviation	Cronbach's alpha
Perceived Risk	2.40	0.28	0.21
Perceived Benefits	3.25	0.41	038
Socio-economic Status (SES)	3.13	0.44	0.36
Likelihood-to-Buy (LTB)	2.60	0.21	0.17

Table 3

Reliability Analysis: Correlation Matrix of the Constructs

Construct	Concern	Benefits	SES	LTB
Risk	1.00			
Benefits	0.35**	1.00		
SES	0.17**	0.14**	1.00	
LTB	0.25**	0.22**	0.15**	1.00

***significant at 1% level, * significant at 5% level.*

Results

Tables 4 and 5 present estimated parameters of the proposed model. Socio-economic status (*SES*) construct was found to have the largest impact on the Likelihood to buy (*LTB*) construct and all three constructs have statistically significant effects on South Korean consumers' likelihood to buy GM food (Table 4). This result suggests that the individual difference and variability in the South Korean demographic have significant impact on their choice behavior for GM food (Table 5). *Perceived Benefits* construct was found to affect consumers' behavior positively, while *Perceived Risk* construct affect consumers' behavior negatively. Overall, *Perceived Risk* was found to have the least effect on consumers' behavior formation toward GM food (Table 4).

[1] The empirical model which was developed by Kim R.B. (2009b) is applied in this study.

Table 4

Estimated Parameters of the Three Determinants for Structural Model

Relationship Tested	Standardized Regression Coefficient	Significant Level
Perceived Risk	-0.117	P<0.1
Perceived Benefits	0.153	P<0.1
Socio-economics Status	0.293	P<0.1

The study results reveal that heterogeneity in South Korean consumers' socio-economic status heavily affects their attitude and behavior towards GM food. Among several socioeconomic variables, income, employment and gender are distinguishing variables. Thus, consumer's background and diversity in South Korean demographic may have significant effect in determining their choice behavior for GM food. This suggests that further extensive study on South Korean consumer market needs to be conducted in order to fully understand the difference among various South Korean consumer market segments in terms of how they respond to GM food issues. Comprehensive market segmentation on South Korean consumer market should be done in terms of their GM risk appetite, GM food knowledge, information search behavior and food consumption pattern. Understanding of such information may provide valuable guideline to GM food marketers how to effectively penetrate the South Korean market.

Among five selected aspects of *Perceived Risk* that are associated with GM food, South Korean consumers were found to be most concerned with potential environmental hazards and lack of understanding and uncertainties regarding GM food (Table 5). In terms of *Perceived Benefits*, potential for medical benefits and nutritional enhancement were found to be most positively affecting consumers' attitude toward GM food (GM food). Consumers' income, employment status and gender heavily influence their behavior toward GM food (Table 5).

Table 5

Estimated Parameters for Structural Equation Model/a

Latent Dependant Variable		Major Constructs (Latent Variables)	Standardized Estimates
Likelihood to Buy (LTB)	<---	Risk	-.117*
Likelihood to Buy (LTB)	<---	Benefits	.153*
Likelihood to Buy (LTB)	<---	SES	.293**
Observable Independent Variables		**Latent Independent Variables**	
Limited Information on GM food	<---	Risk	.054
Environmental Hazards	<---	Risk	.271*
Ethics	<---	Risk	.195
Food Safety	<---	Risk	.068
Lack of Understanding of GM food	<---	Risk	.186
Reduced Use of Chemicals in production	<---	Benefits	.049
Diet Products	<---	Benefits	.171
Nutrition Enhancement	<---	Benefits	.410
Medical Benefit	<---	Benefits	.642
Price advantage	<---	Benefits	.066
Education	<---	SES	.082
Income (Won)	<---	SES	.317*
Employment	<---	SES	.727*
Gender	<---	SES	.736*
Age	<---	SES	.222
Label Checking for GM food	<---	LTB	.124
Willingness to Pay (WTP) for GM food	<---	LTB	.419**
Reasonable Price Discount	<---	LTB	.400*

***** p<0.01 * p< 0.1***

/a Likert scale used in the SEM model is: 1=lowest level and 5 =highest level.

Conclusions and Policy Implications

This study explores the importance of South Korean consumers' perception and attitude toward GM food and assesses how their perception of risk and benefits of GM foods and individual socioeconomic background affect their acceptance of GM food. In this paper, we discussed about current market situation of GM food in South Korea and how different views of various stakeholders create market inefficiency and distortion. In particular, South Korean consumer is a critical actor who drives public opinion and affects the future success of GM marketing in South Korea. Thus, we attempt to understand South Korean consumers' perception of GM food by exploring their attitude of risk and benefits of GM foods. In the proposed model, South Korean consumers' choice for GM food was hypothesized to be linked to their attitude toward GM food as well as their socio-economic status. The developed model of South Korean consumers' GM choice behavior may provide guideline for establishment of effective GM labeling and marketing policies.

Among the identified three constructs, SES was found to have the largest impact on South South Korean consumers' choice behavior for GM foods (Figure 2). In other words, diversity and heterogeneity in consumers' individual background appears to play significant role in terms of how innovative GM products are received in South Korean market. This has some marketing and policy implications. For marketers, this provides an opportunity to identify a niche segment which may be more receptive to GM foods. In future research, such market should be fully explored in terms of characteristics, risk appetites of consumers and marketing program should be designed strategically. For policy makers, this suggests that they need to be careful in terms of developing unified policy recommendation for GM food management in South Korea. Some consumer segments may expect more stringent rules and guideline for GM food management than others, and also demand more explicit risk communication of GM foods from policy makers. They

may need to consider various alternatives in terms of risk communication channel of GM foods in the market.

One noteworthy result is that the *Perceived Benefits* construct was found to have larger impact on consumers' choice behavior compared to the *Perceived Risk* construct (Figure 2). This is an important point as it suggests that demand for GM food in South Korea may increase if consumers' belief and attitude about the benefits of GM foods can be improved. Frewer (2003) explains that people will tolerate risk if they perceive some direct benefit to themselves. He states that as long as the risk is not so large as to be completely intolerable, individual's acceptance of particular technology will be driven by perceptions of personal benefit. Therefore, any efforts to increase the demand of GM foods have to deal with cognitive factors (i.e. risk/benefits perception of GM food). This is forthcoming for the marketers who are interested in entering the South Korean market with GM food.

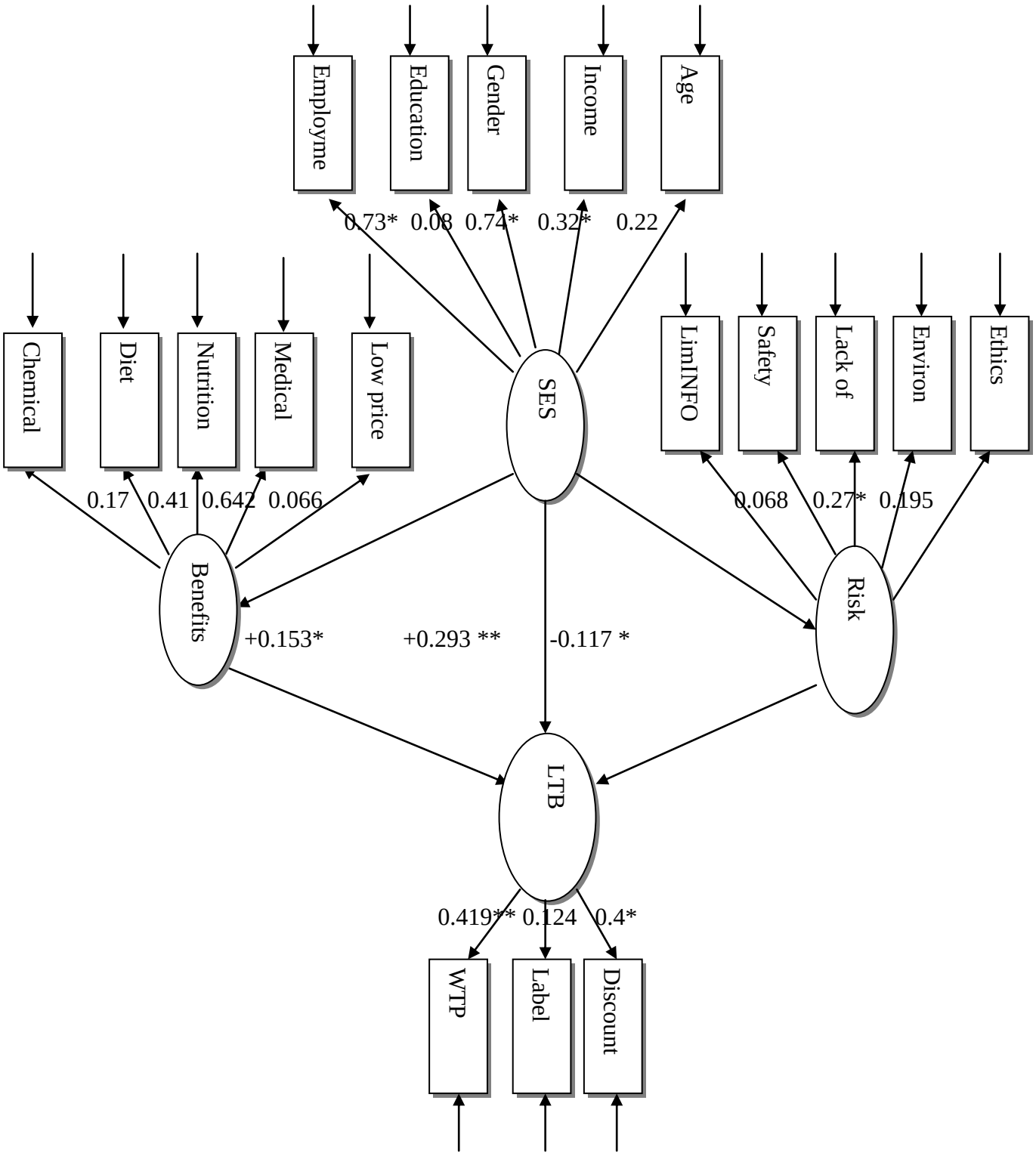

Figure 2. Structural Equation Model of Consumer GM LTB

Policy documents (European Commission, 2000; OECD, 1994), expert consultations (European Federation of Biotechnology, 1997, 1998; Scholderer et. al, 1999) have reported two types of benefits are generally believed by the expert community to have the greatest potential to improve consumer acceptance of GM foods. These relate to sustainability claims and health claims (i.e. the presence of functional ingredients or the absence of dysfunctional ingredients). Our results are consistent to this argument that favorable attributes of GM food such as medical benefits and nutritional enhancement were found to have significant influence on consumers' attitude towards GM food positively. Results show potentials for second generation GM food in South Korea, if specific of consumer benefits can be effectively developed and promoted to South Korean consumers. Currently available benefits of GM crops are designed for producers via enhanced input traits such as lower production cost due to higher yield, greater pest and herbicide resistance. These producer-benefiting GM organisms may not be sufficient to induce consumers to accept GM food, as consumers may perceive these benefits as intangible or producer-oriented. The "second generation" of GM food is claimed to bring possible enhanced output traits or tangible benefits valued by the consumers. This second generation GM food may have market potential in South Korea as the South Korean consumers show signs of positive response to specific consumer-oriented benefits of GM food.

There is an extensive biotechnological research on varying forms of product quality that may lead to consumer benefits. These include enhanced protein quality, nutritional content, novel starch types (functionality), reduced allergens, and improved freshness, storability, and shelf life for baked products (Wilson *et al.,* 2003). Increased shelf life, improved taste, and greater nutritional value are potential consumer benefits that may improve acceptance (Mayer 2002; Biane; 2001 and Wilson *et al* .,2003). Application of biotechnology to develop "functional" foods that promote these health and wellness may present potential in the market place (Riley and Hoffman 1999; Adelaja and Schilling 1999). As the second generation GM food is being developed, it may need to be targeted to specific consumer segments that may accept GM food more readily. GM food marketers' willingness to deliver a long term marketing effort is likely a prerequisite for successful positioning of GM food in a demanding market place such as South Korea.

Regarding *Perceived Risk* of GM food, uncertainty/ lack of understanding on GM food and potential environmental hazard and ethical concerns of GM food were found to affect consumers' attitude toward GM food negatively (Figure 2). South Korean consumers may relate potential risks of GM food to 'indirect' and 'delayed' and 'unknown' effects in addition to 'direct' and 'immediate' effects on health and the environment, which may discourage their acceptance of GM food. This has an important policy implication. In the eyes of South Korean consumers, debate on GM food does not only include economic issues of whether they should allow multinationals to sell their GM products or buy cheaper GM products, but also include social and ethical issues (i.e. long term impact of GM food on biodiversity). This perspective may significantly affect the way in which the topic is communicated by the public, the media, and policy makers. Public participation and transparency are essential components of good regulatory system and both help to ensure consumer trust and approval (Australian Government 2007).

Public participation includes the opportunity to provide information and comment on regulations, guidance and product applications, and transparency ensures that the public had access to information about the regulatory process, ongoing applications, clearly written decision document and information about when and where applications can be reviewed (Australian Government 2007). South Korean policy makers may need to provide sufficient information on the assessment and decision-making processes and undertake several rounds of public consultation to mitigate South Korean consumers' *Perceived Risk* of GM food.

Educating consumers about GM food may also be a viable strategy to mitigate their concerns about unknown health risks and adverse environmental effects (Han and Harrison, 2007). Scholdere and Balderjahn (1999) reported that negative public attitude towards GM foods resulted from the lack of information based on the so-called 'deficit model of risk communication'. The deficit model sought to rectify the knowledge gap between the originators (i.e. experts) of scientific information and the recipients (i.e. consumers) of this information (Hilgartner, 1990). The gap was regarded as a deficit on the part of the recipients, which could be corrected by a greater flow of information from the scientific elite to the audience (Frewer et al., 2002). Thus, the communication of scientific uncertainty is critical to improving consumers' negative attitude toward GM foods.

Frewer et al. (2003) states that the presentation of simplified and factual information in the 'balanced' information condition may reflect what scientific experts believe the public needed to know about GM foods, rather than what the public wanted to know, thus it is important that communication need to move beyond reference to expert views. Making information more salient (i.e. full disclosure) to the concerns of the public may have a greater impact on attitude change (Miles & Frewer, 2001). Change in GM labeling policy of South Korean government can be supported by this argument as the South Korean government is responding to consumers' demand for 'right to know' GM usage in food products by enforcing food processors to disclose full information on GM usage in their production process.

The EU and the US differ in their regulatory and consumer policies regarding GM food. The US policies are based on the idea of regulating GM food as the end product and on the principle of substantial equivalence, regulating GM food similarly to other food (Ramjoue 2007; Pouteau 2002; Degnan 2007). On the other hand, EU regulates GM food as a result of the specific production process and the policies are based on the precautionary principle, respecting consumers' autonomy (Ramjoue 2007; Grossman 2007; Carter and Guere 2003; Hasen 2004; Siipi and Uusitalo 2011). South Korean GM policy is becoming

similar to the EU policy which tends to respect consumers' autonomy. Thus, South Korean policy makers are responding to consumers' demand for more informative regulation on GM food.

However, consumers' knowledge and understanding of GM foods may change slowly in response to new information, thus their belief are not likely to change in the short term (Han and Harrison, 2007). In the short run, demand for GM food may even decrease due to full disclosure of GM food information (i.e. traceability and labeling of GM food), while increasing demand for non-GM food or organic food. Nonetheless, effective management of safety verification and continuous public education on GM food may assure consumers of the safety of GM food in the long term, eventually leading to more acceptability of GM foods.

Study findings imply that GM technology has both positive and negative effects on South Korean consumers' perception. Strict labeling, identity preservation and import requirements which are being developed for GM food marketing and trade impose additional socio economic costs, which in turn affect international food trade. Given that South Korea is a net food importer with low self sufficiency ratio, food security is an important issue in addition to food safety. At large, it is imperative that South Korean policy maker need to optimize its GM food policies to accommodate public concerns for safety issues of GM food while securing sustainable food supply from international trade. GM policies around the world are subject to diverse regulatory frameworks due to socio-economic, cultural and political reasons. South Korean policy maker should recognize these differences and attempt to cooperate with policy makers in important trade partner countries to establish a global, harmonized regulatory system which is flexible enough to adapt to local platform and products. Only when such system is developed, due respect can be paid for science-based risk assessment and sensible concerns of all legitimate stakeholders in South Korea.

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Rizikos ir naudos vartotojo požiūris į genetiškai modifikuotus (GM) maisto produktus Pietų Korėjoje: reikšmė maisto pramonės politikai

Santrauka

Skirtingų regionų vartotojai skirtingai vertina genetiškai modifikuotus (toliau GM) maisto produktus. Lyginant įvairių šalių požiūrį į šiuos produktus, galima teigti, kad Europos vartotojai neigiamai vertina GM maisto produktus, jų vertinimas yra pagrįstas etika. O Amerikos vartotojai laikosi neutralios pozicijos vertindami GM maisto produktus. Skirtingai nei europiečiai, jie pripažįsta GM maisto produktų teikiamą naudą tiek gamintojams, tiek vartotojams (Bredahl ir kt., 1998). Pietų Korėjoje vartotojų požiūris į GM produktus ir jų pripažinimas yra taip pat labai svarbus, nes Pietų Korėja yra daugausiai importuojanti tauta pasaulyje, turinti savitą požiūrį į importuojamus produktus. Svarbiausiu iššūkiu potencialiems pardavėjams tapo labai neigiamai paviešintas GM produktų marketingas Pietų Korėjoje. Kai kurios Pietų Korėjos vartotojų grupės ir nevyriausybinės organizacijos (NGs) inicijavo anti-GM produktų kampanijas. Paaiškėjo, kad Pietų Korėjos vartotojai yra labiau susirūpinę dėl potencialios rizikos, susijusios su GM produktais, nei JAV ir Europos vartotojai (KFDA, 2009). Daugelis Pietų Korėjos maisto gamintojų ir pardavėjų yra neabejingi vartotojų susirūpinimui, kad būtų pagal reikalavimus pažymėtos produktuose esančios sudėtinės GM dalys. Pietų Korėjos vartotojai reikalauja vyriausybės, kad būtų griežtinama GM žymėjimo politika ir taip būtų galima išvengti tų GM produktų grupių, kurios nėra tinkamai pažymėtos (Han, 2009). Aiškiai matyti, kad tarp Pietų Korėjos maisto tiekimo grandinės, susietos su GM produktų valdymu ir pačiais Pietų Korėjos vartotojais nesutariama dėl GM produktų žymėjimo. Pietų Korėjos maisto tiekėjai vengia žymėti GM produktus. Taigi, nors ir teigiama, kad GM produktai teikia naudos, tačiau jie rinkoje nebus vertinami, jei vartotojai manys šiuos produktus esant nepatikimais ir nesaugiais. Todėl, norint kad sėkmingai į rinką būtų įdiegtos naujos technologijos: pvz.,

biotechnologija, reikėtų ne nagrinėti kas skatina visuomenės nepasitikėjimą šiomis technologijomis, bet geriau panagrinėti, kaip visuomenės požiūris veikia technologijos įdiegimą ir šio požiūrio įtaką institucinei reformai (Frewer, 2003).

Kol bus pripažinta biotechnologijos svarba maisto tiekimui ir maisto kokybės gerinimui, praeis daug laiko. Nors ir akcentuojama daug naujų šių produktų galimybių, vartotojai įsitikinę, kad GM produktai kelia abejonių ir yra nesaugūs vartoti. Išlieka baimė, kad jie gali kelti nenumatytą riziką. Tai lemia vartotojų nepasitikėjimą ir abejones šiais produktais. (Phillips and Corkindale, 2002). Be minėtų priežasčių vartotojams kelia nerimą ir galima netikėta žala aplinkai, biologinei įvairovei. Neatmetama prielaida, kad tai gali turėti įtaką ir religinėms bei etinėms problemoms. Slovic (1999) tvirtina, kad vartotojų susirūpinimas maisto saugumu padidėja, kai vartotojams tarsi „primetamas" keliantis riziką maistas, kai pastebima, kad tai yra nekontroliuojama, trūksta mokslinio pagrįstumo šiais klausimais. Vartotojai, kurių požiūris į GM produktus yra neigiamas, nori, kad jie, vienaip arba kitaip būtų informuoti ar produktai yra gaminami naudojant biotechnologiją, ar ne (jie biotechnologiją laiko rizikingu procesu.) Šie asmenys paprastai labiau domisi GM produktais, su šiais produktais susijusio maisto saugumu ir kokybe, nei kiti vartotojai (Han and Harrison, 2007). Taigi GM produktų tinkamumas yra susijęs su vartotojų nuomone apie riziką/naudą biotechnologijos. Vartotojai, kurie suvokia GM produktų teikiamą naudą, bus labiau linkę pirkti GM produktus, o vartotojai, kurie vertina GM produktus kaip riziką sveikatai, aplinkai nebus linkę pirkti GM produktus.

Šio *darbo tikslas* yra įvertinti suvokiamos GM produktų teikiamos rizikos/naudos įtaką Pietų Korėjos vartotojų elgesiui renkantis GM produktus. Šiame tyrime analizuotas Pietų Korėjos vartotojų elgesio socialinis - pažintinis modelis, panaudojant *Fishbein* sistemą, kuri turi du požiūrio konstruktus: *suvokiama nauda ir suvokiama rizika* ir vieną konstruktą, kuris apima įtaką atskiro respondento socioekonominius neatitikimus (*socioekonominis statusas* (SES). Iškelta hipotezė, kad vartotojų nuomonės ir požiūriai į GM produktų keliamą riziką ir naudą ir vartotojų individualus sociodemografinis statusas yra susiję su vartotojų elgesiu pasirenkant GM produktus. Tyrimas atliktas sostinėje Seule, remiantis 36 vartotojų pavyzdžiu. Norint ištirti atitikimus tarp hipotetinio modelio ir tyrimo duomenų, buvo panaudotas *Struktūrinės lygties modeliavimas* (*plg. angl* - Structural equation modeling (SEM)).

Tyrimų rezultatai parodė, kad socioekonominio statuso (SES) konstruktas darė didesnę įtaką *tikimybės pirkti* (*plg. angl*.- Likelihood to buy (LTB)) konstruktui. Visi trys konstruktai statistikai darė žymią įtaką Pietų Korėjos vartotojų *tikimybei pirkti* GN produktus. Suvoktos *naudos konstruktas* darė teigiamą įtaką vartotojų elgesiui, o *suvoktos rizikos* konstruktas vartotojų elgesiui darė neigiamą įtaką. Taigi *suvokta rizika* turėjo mažiausią įtaką vartotojų elgesiui nusprendžiant ar pirkti GM produktus. Tarp pasirinktų penkių, *suvoktos rizikos* aspektų, susijusių su GM produktais, Pietų Korėjos vartotojai labiausiai buvo susirūpinę galima žala aplinkai ir supratimo trūkumu bei neužtikrintumu dėl GM produktų (*žr. 5 lent*.). *Suvoktos naudos* požiūriu, medicinos ir mitybos aspektai teigiamai paveikė vartotojų požiūrį į GM produktus. Vartotojų pajamos, tarnybinė padėtis ir lytis stipriai veikė jų elgesį renkantis ar pirkti GM produktus (*žr. 5 lent*.).

Didžiausias *socioekonominio statuso* konstrukto indėlis į vartotojų norą pirkti GM produktus reiškia, kad Pietų Korėjos vartotojų *socioekonominio statuso* nevienalytiškumas labai veikia jų požiūrį ir elgesį susijusį su GM produktais. Tarp kelių socioekonominių kintamųjų yra išskirti tokie kintamieji: pajamos, darbas ir lytis. Taigi galima teigti, kad vartotojų padėtis ir įvairovė Pietų Korėjoje gali turėti didelę įtaką nustatant jų elgesį, kai nusprendžiama ar pirkti GM produktus. Tai rodo, kad reikia atlikti išsamesnį Pietų Korėjos vartotojų rinkos tyrimą, kad būtų visiškai galima nustatyti ir suprasti skirtumus tarp įvairių Pietų Korėjos vartotojų rinkos segmentų, jų reakcijos į GM produktus požiūriu. Tokios informacijos turėjimas ir supratimas gali suteikti vertingų rekomendacijų GM produktų pardavėjams kaip efektyviai įsiskverbti į Pietų Korėjos rinką.

Kitas svarbus tyrimų rezultatas yra toks: *suvoktos naudos* konstruktas darė didesnę įtaką vartotojų elgesiui renkantis produktus nei *suvoktos rizikos* konstruktas. Tai svarbus momentas, nes jis rodo, kad gali atsirasti poreikis GM produktams Pietų Korėjoje, jei vartotojų nuomonė ir požiūris į GM produktus pagerės. Frewer (2003) paaiškina, kad žmonės toleruos riziką, jei jie suvoks tiesioginę naudą sau. Jis teigia, kad kol rizika nėra tokia didelė, asmuo teigiamai žiūrės ir priims tam tikras technologijas, nes matys asmeninę naudą. Taigi iš to matyti, kad bet kokios pastangos didinti poreikį GM produktams, pirmiausia susiduria su pažinimo veiksniais (t.y. GM produktų suvokiama rizika/nauda). Su šiais veiksniais susidurs ir pardavėjai, kurie domisi patekimu į Pietų Korėjos rinką realizuojant GM produktus.

Strateginiuose dokumentuose (Europos Komisija, 2000; OECD, 1994), taip pat ekspertų konsultacijose (Europos biotechnologijos federacija, 1997, 1998; Scholderer irk., 1999) nurodoma, kad du *naudos tipai*, (kaip mano dauguma ekspertų), turi didžiausias galimybes pagerinti vartotojų nuomonę siekiant pripažinti GM produktus. Šie tipai yra susiję su išlaikymo reikalavimais ir sveikatos reikalavimais (t.y. kad būtų funkcinės sudėtinės dalys arba nebūtų disfunkcinių sudedamųjų dalių). Tyrimo rezultatai patvirtina teiginį, kad du GM produktų aspektai, tokie kaip medicininė nauda ir maitinimo sustiprinimas, lėmė teigiamą vartotojų nuomonę apie GM produktus. Rezultatai rodo, kad jei šių produktų nauda, išskirtinumas bus efektyviai pateiktas ir pareklamuotas Pietų Korėjos vartotojams, GM produktų galimybės patekti į rinką Pietų Korėjoje padidės ir bus noriai priimamos. GM produktų nauda, kai naudą iš GM javų gauna gamintojai (nes mažesnė produkcijos kaina dėl gaunamo didesnio derliaus, kurį lemia didesnis atsparumas kenkėjams ir herbicidams) nebus efektyvi skatinant vartotojus pripažinti GM produktus. Vartotojai gali suvokti šią naudą kaip neaiškią arba nukreiptą tik į gamintoją. Iš GM produktų „antrosios kartos" reikalaujama galimybė sustiprinti gamybos apimtis arba realią vartotojų gaunamą naudą. Šie „antrosios kartos" GM produktai gali turėti potencialą Pietų Korėjos rinkoje, nes Pietų Korėjos vartotojai rodo teigiamą reakciją į tam tikrus GM produktus naudingus vartotojui.

Aptariant GM produktų *suvoktą riziką* (neužtikrintumas/supratimas apie GM produktų trūkumus ir galima GM produktų keliama žala aplinkai), matyti, kad šie aspektai neigiamai veikia vartotojų požiūrį į GM produktus. Taigi vartotojų švietimas apie juos gali būti perspektyvi strategija norint sušvelninti vartotojų susirūpinimą dėl nežinomos rizikos sveikatai ir neigiamos įtakos aplinkai. Moksliškai nepatvirtinta informacija tik padidina neigiamą vartotojų požiūrį į GM produktus, todėl reikalingas visapusiškas, moksliniais tyrimais pagrįstas informacijos skleidimas visuomenei, nes tik tada jis turės didesnę įtaką požiūrio pasikeitimui (Miles & Frewer, 2001). Pietų Korėjos vyriausybės GM produktų žymėjimo politikos pokyčius gali paremti toks teiginys, kad Pietų Korėjos vyriausybė reaguoja į vartotojų poreikį „teisę žinoti" apie GM produktų panaudojimą maisto gaminiuose, priversdama maisto gamintojus atskleisti visą informaciją apie GM produktų naudojimą jų gamybos procese. Tačiau vartotojų žinios ir supratimas apie GM produktus gali keistis lėtai, nor ir bus pateikta informacija apie juos (Han, Harrison, 2007). Taigi gali būti netgi taip, kad poreikis GM produktams gali net sumažėti dėl neatskleistos visos informacijos apie GM produktus (t.y. GM produktų susekamumo ir žymėjimo), o padidėti poreikis kitiems produktams: pvz., organiniam maistui. Nepaisant to, reikia nuolat šviesti visuomenę apie GM produktų teikiamą naudą, kad ateityje GM produktai būtų labiau pripažįstami ir jais daugiau pasitikima. Politikai ir pardavėjai turėtų suprasti, kad sėkmingas GM produktų patekimas į rinką Pietų Korėjoje gali pareikalauti laiko ir nemažai pastangų, taip pat visapusiško vartotojų rinkos tyrimo, efektyvios rizikos komunikacijos ir tinkamo žymėjimo politikos valdymo.

Raktažodžiai: *Genetiškai modifikuotų (GM) maisto produktų komercializavimas, GM ženklinimo politika, Pietų Korėja, genetiškai modifikuotų maisto produktų rizika/nauda.*

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