

Consumer Intention toward Genetically Modified Food: A Moderated Mediation Model

M. Akbari¹, H. Maleksaeidi², Z. Fozouni Ardekani³, G. Pino⁴, H. Padash^{1*}, and S. Hosseini Mofrad³

ABSTRACT

Debate about Genetically Modified Food (GMF) has received much attention in concurrence with the development of biotechnology. This paper examines consumers' intentions towards GM food in Iran. Given the potential of Corporate Social Responsibility (CSR) in shaping consumers' behavior, relationships between CSR, trust, and health concerns with consumer intentions towards GM foods have been investigated rarely. This study used a moderated mediation analysis to understand how health concerns, trust in GM foods, and CSR perceptions affect consumer intentions towards GM foods. A survey study with 389 consumers indicates that health concerns reduce trust in GM foods, but trust exerts a positive influence on consumers' intentions toward these products, thus playing a mediating role between health concerns and consumers' intentions. More importantly, CSR perceptions magnify the positive effect of trust in GM foods on consumers' intentions, thus offering evidence for a moderating role of CSR perceptions.

Keywords: Consumer concerns, Corporate Social Responsibility, Health concern.

INTRODUCTION

Consumer concern for food health is one of the topics of research interest (Fozouni Ardekani *et al.*, 2020; Ghasemi *et al.*, 2013).

Recently, several studies have found the risks for human health resulting from GM foods consumption (Ghasemi *et al.*, 2019; Xu *et al.*, 2020). GM foods were introduced to the market in the 1990s as an alternative for improving food quality and availability (Gouse *et al.*, 2016).

Despite the expansion of the global area for cultivation of GM foods (Azadi and Ho, 2010), the potential ability of these foods to meet human and livestock nutritional needs (Saleh-Lakha and Glick, 2005), and the nutritional values of these foods (Cui and Shoemaker, 2018) is still a controversial

issue (Valente and Chaves, 2018). There are, in particular, serious doubts about the safety of these products among global consumers (Delmond *et al.*, 2018), therefore, acceptance of these foods are rare (Grimsrud *et al.*, 2004). GM foods companies' Corporate Social Responsibility (CSR) may play an important role in reducing such concerns. In this regard, "The Millennium poll on CSR in 1999 revealed that out of 25,000 interviewed people (from 23 countries on 6 continents) about half are paying attention to the social behavior of companies" (Simon, 2002), but the issue has received very little attention so far (Akbari *et al.*, 2019; Pino *et al.*, 2016).

Several studies have been conducted on attitudes concerning GM foods in developed and developing countries (McPhetres *et al.*, 2019; Valente and Chaves, 2018; Akbari *et*

¹ Faculty of Entrepreneurship, University of Tehran, Tehran, Islamic Republic of Iran.

² Faculty of Agriculture, University of Kurdistan, Sanandaj, Islamic Republic of Iran.

³ Department of Agricultural Extension and Education, Faculty of Agriculture, Tarbiat Modares University, Tehran, Islamic Republic of Iran.

⁴ Department of Marketing, University of Salento, Lecce, Italy.

*Corresponding author; e-mail: padash@ut.ac.ir



al., 2019; Ghanian *et al.*, 2016; Ghasemi *et al.*, 2013, 2019). The present research aimed to examine Iranian consumers' health-related concerns about GM foods and their trust in these foods. In particular, the study examined how these two factors affect consumers' intentions toward GM foods and whether their impact is affected by consumers' perceptions of GM foods companies CSR. This research contributes to the theory and practice in different ways. First, to the best of our knowledge, this is the first study on the GM food field that uses a moderated mediation analysis methodology to provide an insight into consumers' intentions toward GM foods. Second, even though there have been some studies on the influence of CSR on consumer behavior (Akbari *et al.*, 2019; Loose and Remaud, 2013; Tian *et al.*, 2011), empirical researches on the moderating influence of CSR on consumer buying behavior towards GM foods are still few in Iran, thus, the influence of CSR as a potential moderator of the relationship between health concern, trust, and consumers' intentions toward GM foods is considered.

Literature Review

Consumers have different viewpoints about GM foods in different parts of the world (Steur *et al.*, 2014). For instance, Delmond *et al.* (2018) found that Russian consumers are unwilling to consume GM foods because they care about the effects of these products on their health and doubt the naturalness of these foods. Lin *et al.* (2019) compared Chinese, Italian, and US consumers' willingness to consume GM animal products and found that, on average, consumers are unwilling to consume GM animal products. Among these three national groups, Italian consumers were less willing to these products. In Iran, Yazdanpanah *et al.* (2016) studied agricultural experts' intention towards GM crops and found that attitude towards GM crops, trust and

perception directly affected intention towards these crops. Whereas, the perceived benefits, perceived risks and knowledge indirectly had effects on intention. In another study in Iran, Mohammadi Ziarati (2011) investigated the intention of consumers to consume transgenic rice. Results of this study showed that more than 50% of people in the urban areas are willing to pay for transgenic rice, while in the rural areas people are not willing to pay for these products.

GM foods have entered the U.S. consumers' food chain without serious resistance, whereas in most EU countries, these products have not been welcomed. The EU allowed its member states to restrict the local production of GM foods (Bongoni, 2016; Pino *et al.*, 2016). Some member countries, such as Germany, Austria, Greece, and Luxembourg have prevented the cultivation of GM products, while Poland even limits the marketing of these foods (Bongoni, 2016). In Asia, due to the varied cultures and religious beliefs and high poverty and hunger rates, consumer attitudes concerning these products vary across countries (Teng, 2008).

Due to the rapidly growing world population, decreasing arable land, challenges of conventional breeding, and increasing malnutrition (Cabuk Ozer *et al.*, 2009; Dayani and Sabzalian, 2018; Zhang *et al.*, 2016), governments should make sensible decisions about production and trade of GM foods (Bongoni, 2016). The aforementioned problems are particularly relevant for developing countries where, in addition to the risk of food insecurity, there is a significant unbalance among production, importation, and utilization of GM foods (Akpalu *et al.*, 2018). In this regard, consumers' use of these products is a crucial issue that can significantly influence governments' commercial and economic decisions about these products (Chen and Li, 2007; Giles *et al.*, 2015).

"Intentions are the most immediate antecedents of any behavior that is under voluntary control and are assumed to capture

the motivational influences on behavior” (Kiriakidis, 2015). An intention reveals one’s decision to achieve a given behavior, such as the adoption of a new product (Fishbein and Ajzen, 1975). Intention to adopt GM foods may be significantly influenced by consumers’ perception of the possible adverse health effects of these products. Thus, the decision to accept or refuse these products is associated with some uncertainty (Dolling and Peterson, 2007; McFadden and Lusk, 2015).

The uncertainty about GM foods causes concerns about these products’ healthiness, which may substantially limit consumers’ intention towards these products. For instance, Delmond *et al.* (2018) found that health concerns and negative perceptions of GM foods’ naturalness reduce Russian consumers’ willingness to consume GM foods. Therefore, we proposed the following:

Hypothesis 1: Health concerns negatively influence consumers’ intentions concerning GM foods.

Trust may significantly affect food consumption behavior (Ricci *et al.*, 2018). In particular, the trust may significantly affect the perceived benefits and risks of GM foods (Amin *et al.*, 2014; Prati *et al.*, 2012) as well as consumers’ attitudes and intentions toward these products. Ricci *et al.* (2018) founded that trust positively influences consumers’ intention towards eco-friendly foods. Also, Gutteling *et al.* (2006) showed that Dutch peoples who have higher trust in the governance of GM foods are willing to consume GM foods. Hence, we propose that:

Hypothesis 2: Trust positively influences the intention to accept GM foods.

Trust in a target and concerns about it are closely related (Hong and Cha, 2013). Milne and Boza (1999) noted that concerns and trust are intertwined in a strong negative relationship and that both trust and concerns can influence future behaviors. Therefore, trust has a positive influence, and concerns have a negative influence on individuals’ behavior. Most existing studies have focused

on the influence of trust on consumers’ concerns regarding these products (Akbari *et al.*, 2019; Ricci *et al.*, 2018). However, the opposite effect is also important (Hong and Cha, 2013; Masi *et al.*, 2015; Olivero and Lunt, 2004), because a consumer who is concerned about the effects of GM foods on his/her health and family members is unlikely to trust and buy these products. Accordingly, we suggested the following:

Hypothesis 3: Health concerns negatively influence trust in GM foods.

Alternatively, regarding the relationship between trust and intention to consume these products (H2) along with the influence of health concerns on trust in GM foods (H3), we hypothesize that trust in GM foods can serve as a mediating variable that explains the relationship between health concerns and intention to use these products. Because consumers are concerned about the safety of GM foods (Deng and Hu, 2019; Huang *et al.*, 2017; Ricci *et al.*, 2018), they tend to trust those who are perceived as responsible or knowledgeable. Therefore, we argue that consumers who perceived GM foods as trustworthy and healthy to use have greater intentions to consume the foods, and propose the following:

Hypothesis 4: Trust mediates the relationship between health concerns and the intention to consume GM foods.

CSR as Moderator of Health Concern-Trust Relationship

CSR is now on the global agenda and there has been an increasing interest in theorizing CSR (Frynas and Yamahaki, 2016; Uhlig *et al.*, 2020). CSR refers to companies’ acceptance of responsibilities that go beyond their legal and economic duties (Akbari *et al.*, 2020; Parsa *et al.*, 2015) and “includes moral obligations that maximize the positive influence of the company on its social environment” (Lin *et al.*, 2011). Companies accept CSR as a part of their business to win the consumers’ trust and increase consumer intention to buy their

All variables were measured on five-point Likert scales ranging from 1 (strongly disagree) to 5 (strongly agree).

CSR was measured based on the Triple Bottom Line Model of sustainability (i.e. social, environmental, and ethical dimensions (Elkington, 2013); using 14 items, which were derived from previous studies (Alvarado-Herrera *et al.*, 2017; Pino *et al.*, 2016). Health concerns about GM foods were assessed using six items (Kikulwe *et al.*, 2011; Montuori *et al.*, 2012). Trust in GM foods was measured by a four-item scale derived from previous studies (Kikulwe *et al.*, 2011; Siegrist, 2000; Verdurme and Viaene, 2003). Intention to consume GM foods was measured with a six-item scale (Ghali-Zinoubi and Toukabri, 2019; Yazdanpanah *et al.*, 2015). Face validity of the questionnaire was confirmed by a panel of experts.

A confirmatory factor analysis (CFA) was primarily applied to evaluate the goodness of fit indices for the conceptual model (SRMR < 0.10, NFI > 0.90, and RMS_Theta < 0.12; (Hair *et al.*, 2014; Hair *et al.*, 2017). PLS software results showed that the model fits our data (SRMR = 0.078; NFI= 0.77; RMS_Theta= 0.167). Composite Reliability (CR), Average Variance Extracted (AVE) and Cronbach's Alpha (α) values were also

computed (Table 1). CR indicators for the whole variables were above 0.83, which reveals high reliability (Hair *et al.*, 2017). Also, the AVE for all variables was between 0.56 to 0.85, which is above 0.50 (Fornell and Larcker, 1981). To assess discriminant validity, we checked that the square root of the AVE for each construct was higher than the correlation values between this construct and all other constructs. Since according to Table 2, the estimated AVE square root ($-0.56 < AVE < 0.62$) was higher than the correlation values ($0.75 < r < 0.92$), the discriminant validity of the measurement model was confirmed.

RESULTS

According to the findings presented in Table 2, the mean values of some variables such as health concerns ($\bar{X} = 3.60$; $SD = 0.75$) and trust ($\bar{X} = 4.04$; $SD = 0.93$) are relatively high, whereas behavioral intention ($\bar{X} = 2.64$; $SD = 1.16$) and CSR ($\bar{X} = 2.99$; $SD = 0.88$) show medium level of mean values. About 86% of the respondents were informed about GM foods and only 14% of them did not have much information about it. Finally, 60% of consumers were not

Table 1. Validity and reliability Index.

	Cronbach's Alpha	rho_A	Composite reliability	AVE
CSR	0.938	0.945	0.947	0.567
Health Concern	0.823	0.840	0.893	0.736
Intention	0.914	0.916	0.946	0.853
Trust	0.611	0.620	0.836	0.719

Table 2. Descriptive statistics and correlation coefficients between research variables.^a

Variables	Mean (SD	1	2	3	4
CSR	2.9	0.88	0.753			
Health Concern	3.6	0.75	-0.477	0.858		
Intention	2.64	1.16	0.612	-0.566	0.924	
Trust	4.048	0.932	0.313	-0.244	0.391	0.84

^a $1 \leq \text{Mean} \leq 5$; AVE square roots= On-diagonal values, Correlation= Off-diagonal values.significance at <0.01



willing to consume GM foods.

Testing Hypotheses

To test whether health concerns exert an indirect effect on the respondents' intention to accept GM foods via respondents' trust in such products (H4), a linear regression analysis was implemented using Hayes' PROCESS macro (Model 4). Results indicated that health concerns had a negative and significant influence on intention to consume such products ($b = -0.67$, $P = 0.00$), thus confirming H₁. On the opposite, trust in GM foods had a positive and significant influence on intention to consume such products ($b = 0.37$, $P = 0.00$), thus confirming H₂, while health concerns had a negative and significant influence on trust in such products ($b = -0.29$, $P = 0.00$), thus confirming H₃. Generally, the analysis yielded both a direct ($b = -0.673$, $P = 0.00$) and indirect ($b = -0.11$, 95% Confidence interval: -0.18, -0.05) effect of health concerns on intention to consume GM foods. The latter effect confirmed H₄.

The second purpose of the research was to test a possible moderating effect of respondents' perception of GM foods companies' commitment to CSR principles. We hypothesized that this variable might reduce the negative influences of health concerns on the intention to consume such products (H₅) and trust in GM foods (H₆) and, instead, enhance the positive effect of trust in GM foods on consumers' intentions (H₇). Hayes' PROCESS MACRO (Model 1) was used again to test such possible moderating effects. First, we tested H₅ by regressing respondents' intention on health concerns and perceptions of GM foods companies' CSR, and the interaction between health concerns and perceptions of GM foods companies' CSR. The analysis yielded a negative effect of health concerns on respondents' intentions ($b = -0.53$, $P = 0.00$) and non-significant effect of CSR perceptions and the interaction between health concerns and CSR perceptions on

respondents' intentions ($P > 0.20$). Hence, H₅ was rejected.

We used the same analysis to test H₆, and hence investigated a possible moderation effect of CSR perceptions in the relationship between health concerns and trust in GM foods. We regressed respondents' trust in GM foods on both health concerns and CSR perceptions, and the interaction between health concerns and CSR perceptions. None of these variables had a significant effect on the respondents' trust. Therefore, H₆ was rejected.

Next, H₇ was tested to verify a possible moderating effect of CSR perceptions in the relationship between consumers' trust in GM foods and the intention to accept these foods. Therefore, we regressed respondents' intentions on both trusts in GM foods and CSR perceptions and the interaction between trust and CSR perceptions. The analysis demonstrated a positive effect of trust on respondents' intentions ($b = 0.42$, $P = 0.00$) and a positive interaction effect of trust and CSR perceptions on respondents' intentions ($b = 0.22$, $P = 0.00$). By looking at the conditional effects of trust on the respondents' intentions at low (M-1SD) and high (M+1SD) levels of CSR perceptions, we found that such an effect was stronger when respondents scored high ($b = 0.59$, $P = 0.00$) rather than low ($b = 0.26$, $P = 0.03$) on CSR perceptions, thus validating H₇. More specifically, the Johnson-Neyman analysis (Figure 2) revealed that the conditional effect of trust on respondents' intention was significant when (mean-centered) CSR perceptions were higher than -1.25, corresponding to 2 on the original seven-point scale. Thus, even a modest perception of CSR appears beneficial to increase the positive influence of trust on the intention to consume GM food.

Finally, we used again Hayes' PROCESS macro (Model 14) to test a moderated mediation model where the impact of health concerns on respondents' intentions was mediated by trust in GM foods and the effect of trust on respondents' intentions was moderated by CSR perceptions. The analysis

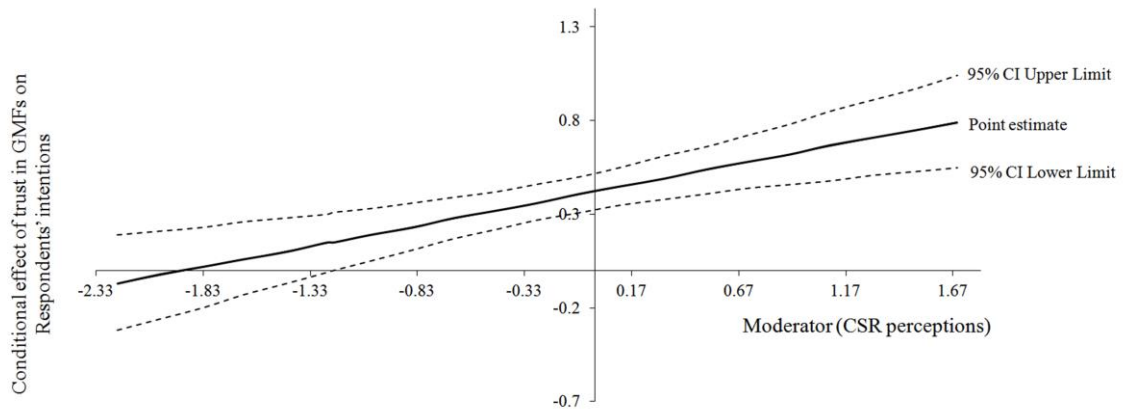


Figure 2. Conditional effect of trust in GM foods on consumption intentions at all levels of CSR perceptions.

returned a significant index of moderated mediation ($b = -0.06$, 95% Confidence interval = $-0.12, -0.02$), a negative impact of health concerns on trust in such products ($b = -0.29$, $P = 0.00$) and on respondents' intentions ($b = -0.46$, $P = 0.00$), a confident influence of trust on respondents' intentions ($b = 0.37$, $P = 0.00$), and a significant interaction effect of trust and CSR perceptions on respondents' intentions ($b = 0.21$, $P = 0.00$). The conditional indirect result of health concerns on respondents' intentions at low ($M-1SD$) and high ($M+1SD$) levels of CSR perceptions was significant for both low levels of CSR perceptions ($b = -0.06$, 95% Confidence interval = $-0.12, -0.02$) and high levels of CSR perceptions ($b = -0.15$, 95% Confidence interval = $-0.26, -0.07$). These findings

indicate that CSR reduced the negative impact of health concerns on respondents' intentions, and such a reduction was larger when respondents perceived the GM foods producers as highly responsible companies. The results of this analysis are illustrated in Figure 3.

DISCUSSION

Given the potential of GM foods to provide a solution to food security crises worldwide, extensive studies have been conducted on these foods (Cui and Shoemaker, 2018; Valente and Chaves, 2018). However, research on consumers' attitudes and intentions towards GM foods in developing countries, such as Iran, is still

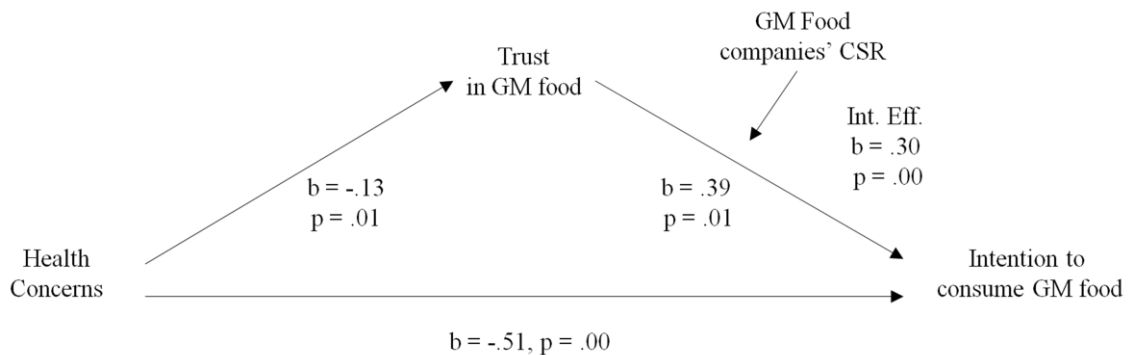


Figure 3. Moderated mediation effect of health concerns on GM foods consumption intention.



limited (Akbari *et al.*, 2019; Ghasemi *et al.*, 2013, 2019) and very few studies have attempted to investigate the impact of trust (Akbari *et al.*, 2019; Marques *et al.*, 2014) and CSR on consumers' attitudes and intention (Akbari *et al.*, 2019). To close this gap, this study considered Iranian consumers' intentions regarding GM foods and the impact of consumer trust and health concerns. The present research investigated whether trust in GM foods mediates the negative influence of health concerns on consumers' intentions toward GM foods and whether consumer perception of GM foods companies' CSR moderates this mediation effect.

The results revealed that 60% of our respondents are generally rather negative towards GM foods consumption. These results are in line with previous studies that found that consumers have negative attitudes and intentions towards GM foods (Koivisto Hursti *et al.*, 2002). In this regard, a study in Beijing, China, showed that more than 50 percent of the participants opposed to such foods (Deng and Hu, 2019).

About 86% of respondents were informed about GM foods and only 14% of them did not have much information about it. This result follows a study that found the majority of teachers (94%) and students (83.9%) had well understood the process of GM food production (Mohapatra *et al.*, 2010), but another study stated that knowledge of biotechnology among students was insignificant and found similarity between their answers with the general community (Lock and Miles, 1993).

The research model indicated that health concerns have the strongest effect on the intention to consume GM foods ($b = -0.67$), followed by trust ($b = 0.37$). Also, health concerns had a negative influence on trust in these foods ($b = -0.29$), thus H_1 and H_3 were confirmed. These findings are in agreement with the findings of previous researches that emphasized the critical role of health concerns in consumer acceptance of GM foods (Akbari *et al.*, 2019; Montuori *et al.*, 2012; Siegrist, 2000).

Iranian customers have a high level of trust in GM scientist reports, pharmaceutical and agriculture companies, and the government. This finding is along with the results of researches in developing and developed countries (Aerni and Bernauer, 2006; Huffman *et al.*, 2004), but different from the others (Deng and Hu, 2019). The most trusted actor in Iran is the government, while the trusted actors in China are government and non-GM scientists (Deng and Hu, 2019), universities, and scientists in the US and South Africa (Aerni and Bernauer, 2006; Huffman *et al.*, 2004).

Importantly, the results indicated that trust in GM foods has a significant impact on the intention to consume these products ($b = 0.37$). Therefore, H_2 was verified. This finding corroborates the conclusions of those scholars (Akbari *et al.*, 2019; Rodríguez-Entrena *et al.*, 2013) who found that trust in GM foods is a positive determinant of the intention to consume these foods. Assuming that some of the negative attitudes maybe as a result of a phobia, our study recommends that to evade this and offset any impact on people's attitudes toward GM food, it should develop the trust of researchers and regulating systems. (Marques *et al.*, 2014). Therefore, the government, researchers, and academics can develop GM foods by increasing awareness of the risks and benefits of such products. The result of a study found that when buyers have not sufficient knowledge, consumption of such products can be easily rejected by misinformation (Siegrist and Cvetkovich, 2000).

The present study confirmed the mediating role of trust between health concerns and intention to consume GM foods ($b = -0.11$). This finding clarifies how health concerns adversely influence consumers' intention toward GM foods by proving that health concerns weaken consumers' intentions towards GM foods, both directly and indirectly, and by diminishing consumers' trust in GM foods. Kwak *et al.* (2020) found that trust in eco-labels mediates between GM foods' environmental friendliness

information and intention to consume such products. Also, Frewer *et al.* (2003) found that the extent to which the public trusted the information sources seemed to be driven by the public's attitudes to GM foods

The results prove a moderating influence of CSR in the relationship between trust and intention to consume GM foods (H₇). This effect, which was not demonstrated before, suggests that CSR can compensate for the negative impact of health concerns on consumers' intentions toward GM foods. At the same time, our results do not support a moderating impact of CSR in the relationship between health concerns and intention to accept GM foods (H₅), and in the relationship between health concerns and trust in GM foods (H₆).

CONCLUSIONS

Acceptance of GM foods remains a controversial issue and very little is still known about consumers' dispositions and intentions towards these products in developing countries, such as Iran (Akbari *et al.*, 2019; Fozouni Ardekani *et al.*, 2020). This study has provided a broad analysis of intention toward GM food in Iran. Our research aimed to contribute to previous literature by investigating the relationship between health concerns, trust, and behavioral intention and consumers' perceptions of GM foods companies' CSR, which have received very little attention, so far. Our results showed that consumer intention toward GM food is generally low, but their information about these foods is high. The research found a strong and negative relationship between health concerns and the intention to use GM foods. More importantly, the research highlighted the significant influence of CSR in the relationship between trust in GM foods and consumers' intention towards such products. We believe that our results may be of practical relevance for food policymakers and managers who should recognize the important role that trust and CSR have in the

formation of consumers' intentions towards GM foods.

From a theoretical perspective, our research demonstrates that CSR perceptions influence consumer intention concerning GM foods. Previous studies in the food literature have focused on the impact of CSR on purchase intention (Butt *et al.*, 2019; Lee and Lee, 2015; Loose and Remaud, 2013). However, to our knowledge, this research is one of the first to demonstrate that CSR perceptions may enhance the impact of trust in GM foods on consumers' intentions toward such products. From this point of view, our research adds to the literature on GM foods by demonstrating that favorable perceptions of the CSR initiatives of GM foods companies can boost the significant impact of trust in GM foods on intention toward these products. At the same time, this research contributes to the literature on CSR by shedding light on consumer responses to CSR activities in the realm of GM foods consumption (Akbari *et al.*, 2019; Loose and Remaud, 2013; Pino *et al.*, 2016).

From policy implication viewpoint, GM researchers and the government should offer more scientific details and recent studies results to the public in an easily understandable format to help customers comprehension of GM foods (Deng and Hu, 2019). Marketing practitioners can create a sustainability strategy to strengthen their message about GM foods. Under new governmental law, GM food producers will indicate GM information. To ensure higher trust toward GM foods, companies could also include their electronic tags to provide independent information about their products' environmental impacts. While governments are responsible for regulating GM foods, they may want to promote the biotechnology industry as part of industrial and economic policies. When companies invest and promote environmentally-friendly GM foods to reap a competitive advantage, they should publicize positive environmental information about GM foods (Kwak *et al.*, 2020). The government should encourage the media to report on GM technology based



on scientific facts, avoid exaggerated reports, and avoid spreading false information. It often takes the media only days to release the reports or evoke a hot debate about GM technology, however, it can take months or years for scientists to respond to an issue or to correct the reports (Flipse and Osseweijer, 2012).

REFERENCES

1. Aerni, P. and Bernauer, T. 2006. Stakeholder Attitudes toward GMOs in the Philippines, Mexico, and South Africa: The Issue of Public Trust. *World Dev.*, **34(3)**: 557–575.
2. Aghaee, M., Olkowski, S. M., Shelomi, M., Klittich, D. S., Kwok, R., Maxwell, D. F. and Portilla, M. A. 2015. Waiting on the Gene Revolution: Challenges for Adopting GM Crops in the Developing World. *Trends Food Sci, Technol.*, **46(1)**: 132–136.
3. Akbari, M., Fozouni Ardekani, Z., Pino, G. and Maleksaeidi, H. 2019. An Extended Model of Theory of Planned Behavior to Investigate Highly-Educated Iranian Consumers' Intentions towards Consuming Genetically Modified Foods. *J. Clean. Prod.*, **227**: 784–793.
4. Akbari, M., Mehrali, M., SeyyedAmiri, N., Rezaei, N. and Pourjam, A. 2020. Corporate Social Responsibility, Customer Loyalty and Brand Positioning. *Soc. Responsib. J.*, **16(5)**: 671–689.
5. Akpalu, W., Christian, A. K., Nii, S. and Codjoe, A. 2018. Food Access and Subjective Welfare in a Developing Country. *J. Behav. Exp. Econ.*, **73(November)**: 34–39.
6. Al Jarah, A. and Emeagwali, O. L. 2017. Corporate Social Responsibility and Behavioral Intention: The Moderator Effect of Contextual Factors: A Meta-Analytic Examination. *Soc. Responsib. J.*, **13(4)**: 678–697.
7. Alvarado-Herrera, A., Bigne, E., Aldas-Manzano, J. and Curras-Perez, R. 2017. A Scale for Measuring Consumer Perceptions of Corporate Social Responsibility Following the Sustainable Development Paradigm. *J. Bus. Ethics.*, **140(2)**: 243–262. <https://doi.org/10.1007/s10551-015-2654-9>
8. Amin, L., Gausmian, M. H. and Zulkifli, F. 2014. Determinants of Public Attitudes to Genetically Modified. *PLoS ONE*, **9(1)**:
9. Azadi, H. and Ho, P. 2010. Genetically Modified and Organic Crops in Developing Countries: A Review of Options for Food Security. *Biotechnol. Adv.*, **28(1)**: 160–168.
10. Bongoni, R. 2016. East versus West: Acceptance of GM Foods by European and Asian Consumers. *Nutr. Food Sci.*, **46(5)**: 628–636.
11. Butt, I., Mukerji, B., and Uddin, M. H. 2019. The Effect of Corporate Social Responsibility in the Environment of High Religiosity: An Empirical Study of Young Consumers. *Soc. Responsib. J.*, **15(3)**: 333–346.
12. Cabuk Ozer, B., Duman, G. and Cabuk, B. 2009. Turkish Preschool Staff's Opinions about Hormones, Additives and Genetically Modified Foods. *Procedia - Soc. Behav. Sci.*, **1(1)**: 1734–1743.
13. Chen, M. F. and Li, H. L. 2007. The Consumer's Attitude toward Genetically Modified Foods in Taiwan. *Food Qual. Prefer.*, **18(4)**: 662–674.
14. Cui, K. and Shoemaker, S. P. 2018. Public Perception of Genetically-Modified (GM) Food: A Nationwide Chinese Consumer Study. *Npj Sci. Food.*, **2(1)**: 1–8.
15. Dayani, S. and Sabzalian, M. R. 2018. Genetically Modified Plants as Sustainable and Economic Sources for RUTFs. In: "Handbook of Food Bioengineering", (Eds.): Holban, A. M. and Grumezescu, A. M. B. T-G. E. F.). Academic Press, PP. 49–84.
16. Delmond, A. R., McCluskey, J. J., Yormirzoev, M. and Rogova, M. A. 2018. Russian Consumer Willingness to Pay for Genetically Modified Food. *Food Policy*, **78(March)**: 91–100.
17. Deng, H. and Hu, R. 2019. A Crisis of Consumers' Trust in Scientists and Its Influence on Consumer Attitude toward Genetically Modified Foods. *Br. Food J.*, **121(10)**: 2454–2476.
18. Dolling, A. and Peterson, D. 2007. Genetically Modified Products: A Consumer Choice Framework. In *Productivity Commission Staff Working Paper*, Melbourne. <https://www.pc.gov.au/research/supporting/genetically-modified-product-choice/genetically-modified-product-choice.pdf>

19. Elena, G. M., Ramona, B. E. and Holban, A. M. 2018. Approved Genetically Engineered Foods: Types, Properties, and Economic Concerns. In *Genetically Engineered Foods*, **6**: 85-107
20. Elkington, J. 2013. Enter the Triple Bottom Line. In: "*The Triple Bottom Line, Does It All Add up?: Assessing the Sustainability of Business and CSR*" (Eds.): Henriques, A., Richardson, J. and NetLibrary, I. Earthscan, PP. 1-16. <http://www.netlibrary.com/urlapi.asp?action=summaryandv=1andbookid=108859>
21. Fishbein, M. and Ajzen, I. 1975. Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Addison-Wesley, Reading, MA.
22. Flipse, S. M. and Osseweijer, P. 2012. Media Attention to GM Food Cases: An Innovation Perspective. *Public Underst. Sci.*, **22(2)**: 185-202.
23. Fornell, C. and Larcker, D. F. 1981. Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. SAGE Publications Sage CA, Los Angeles, CA.
24. Fozouni Ardekani, Z., Akbari, M., Pino, G., Zúñiga, M. Á. and Azadi, H. 2020. Consumers' Willingness to Adopt Genetically Modified Foods. *Br. Food J.*, **123(3)**: 1042-1059.
25. Frewer, L. J., Scholderer, J. and Bredahl, L. 2003. Communicating about the Risks and Benefits of Genetically Modified Foods: The Mediating Role of Trust. *Risk Anal. Off. Publ. Soc. Risk Anal.*, **23(6)**: 1117-1133.
26. Frynas, J. G. and Yamahaki, C. 2016. Corporate Social Responsibility: Review and Roadmap of Theoretical Perspectives. *Bus. Ethics: Eur. Rev.*, **25(3)**: 258-285.
27. Ghali-Zinoubi, Z. and Toukabri, M. 2019. The Antecedents of the Consumer Purchase Intention: Sensitivity to Price and Involvement in Organic Product: Moderating Role of Product Regional Identity. *Trends Food Sci. Technol.*, **90**: 175-179.
28. Ghanian, M., Ghoochani, O., Kitterlin, M., Jahangiry, S., Zarafshani, K., Van Passel, S. and Azadi, H. 2016. Attitudes of Agricultural Experts Toward Genetically Modified Crops: A Case Study in Southwest Iran. *Sci. Eng. Ethics.*, **22(2)**: 509-524.
29. Ghasemi, S., Ahmadvand, M., Karami, E. and Karami, A. 2019. Social Risk Perceptions of Genetically Modified Foods of Engineers in Training: Application of a Comprehensive Risk Model. *Sci. Eng. Ethics*, **26(2)**: 641-665.
30. Ghasemi, S., Karami, E. and Azadi, H. 2013. Knowledge, Attitudes and Behavioral Intentions of Agricultural Professionals Toward Genetically Modified (GM) Foods: A Case Study in Southwest Iran. *Sci. Eng. Ethics*, **19(3)**: 1201-1227.
31. Giles, E. L., Kuznesof, S., Clark, B., Hubbard, C. and Frewer, L. J. 2015. Consumer Acceptance of and Willingness to Pay for Food Nanotechnology: A Systematic Review. *J. Nanoparticle Res.*, **17(12)**: 1-26.
32. Gouse, M., Sengupta, D., Zambrano, P. and Zepeda, J. F. 2016. Genetically Modified Maize: Less Drudgery for Her, More Maize for Him? Evidence from Smallholder Maize Farmers in South Africa. *World Dev.*, **83**: 27-38.
33. Grimsrud, K. M., McCluskey, J. J., Loureiro, M. L. and Wahl, T. I. 2004. Consumer Attitudes to Genetically Modified Food in Norway. *J. Agric. Econ.*, **55(1)**: 75-90.
34. Gutteling, J., Hanssen, L., van der Veer, N. and Seydel, E. 2006. Trust in Governance and the Acceptance of Genetically Modified Food in the Netherlands. *Public Underst. Sci.*, **15(1)**: 103-112.
35. Hair, J. F. J. F., Hult, G. T. M. T. M., Ringle, C. M. and Sarstedt, M. 2017. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Sage Publications Sage CA, Thousand Oaks, CA.
36. Hair, J., Henseler, J., Dijkstra, T., Sarstedt, M., F. Hair, J., Henseler, J., Dijkstra, T. and Sarstedt, M. 2014. Common Beliefs and Reality about Partial Least Squares: Comments on Rönkkö and Evermann. *Organ. Res. Methods*, **17(2)**: 182-209.
37. Hong, I. B. and Cha, H. S. 2013. The Mediating Role of Consumer Trust in an Online Merchant in Predicting Purchase Intention. *Int. J. Inf. Manag.*, **33(6)**: 927-939.
38. Huang, J., Wang, X. and Dang, H. 2017. Impacts of and Attitudes toward GM Technology in China: Challenges, Policy and Research Implications. *China Agric. Econ. Rev.*, **9(3)**: 334-339
39. Huffman, W. E., Rousu, M., Shogren, J. F. and Tegene, A. 2004. Who Do Consumers Trust for Information: The Case of



- Genetically Modified Foods? *Am. J. Agric. Econ.*, **86(5)**: 1222–1229.
40. Kikulwe, E. M., Wesseler, J. and Falck-Zepeda, J. 2011. Attitudes, Perceptions, and Trust. Insights from a Consumer Survey Regarding Genetically Modified Banana in Uganda. *Appetite*, **57(2)**: 401–413.
 41. Kiriakidis, S. 2015. Theory of Planned Behaviour: the Intention-Behaviour Relationship and the Perceived Behavioural Control (PBC) Relationship with Intention and Behaviour. *Int. J. Strateg. Innov. Mark.*, **3**: 40–51.
 42. Koivisto Hursti, U., Magnusson, M. and Algers, A. 2002. Swedish Consumers' Opinions about Gene Technology. *Br. Food J.*, **104(11)**: 860–872.
 43. Kwak, L. E., Yoon, S. W. and Kim, Y. 2020. Genetically modified crops' environmental impact and trust in eco-labels. *Australas. Mark. J.*, **28(4)**: 361–373.
 44. Lee, J. and Lee, Y. 2015. The Interactions of CSR, Self-Congruity and Purchase Intention among Chinese Consumers. *Australas. Mark. J.*, **23(1)**: 19–26.
 45. Lin, C., Chen, S. -C., Chiu, C. -K. and Lee, W. -Y. 2011. Understanding Purchase Intention During Product-Harm Crises: Moderating Effects of Perceived Corporate Ability and Corporate Social Responsibility. *J. Bus. Ethics.*, **102(3)**: 455.
 46. Lin, W., Ortega, D. L., Caputo, V. and Lusk, J. L. 2019. Personality Traits and Consumer Acceptance of Controversial Food Technology: A Cross-country Investigation of Genetically Modified Animal Products. *Food Qual. Prefer.*, **76(November)**: 10–19.
 47. Lock, R. and Miles, C. 1993. Biotechnology and Genetic Engineering: Students' Knowledge and Attitudes. *J. Biol. Educ.*, **27(4)**: 267–272.
 48. Loose, S. M. and Remaud, H. 2013. Impact of Corporate Social Responsibility Claims on Consumer Food Choice: A Cross-Cultural Comparison. *Br. Food J.*, **115(1)**: 142–161.
 49. Lu, J., Ren, L., Zhang, C., Wang, C., Ahmed, R. R. and Streimikis, J. 2020. Corporate Social Responsibility and Employee Behavior: Evidence from Mediation and Moderation Analysis. *Corp. Soc. Responsib. Env. Manag.*, **27(4)**: 1719–1728.
 50. Marques, M. D., Critchley, C. R. and Walshe, J. 2014. Attitudes to Genetically Modified Food over Time: How Trust in Organizations and the Media Cycle Predict Support. *Public Underst. Sci.*, **24(5)**: 601–618.
 51. Masi, V., Karatu, H., Kamariah, N. and Mat, N. 2015. Modeling Green Purchase Intention in Nigeria: A Conceptual Proposition. *Management*, **3(7)**: 480–483.
 52. McFadden, B. R. and Lusk, J. L. 2015. Cognitive Biases in the Assimilation of Scientific Information on Global Warming and Genetically Modified Food. *Food Policy*, **54**: 35–43.
 53. McPhetres, J., Rutjens, B. T., Weinstein, N. and Brisson, J. A. 2019. Modifying Attitudes about Modified Foods: Increased Knowledge Leads to More Positive Attitudes. *J. Environ. Psychol.*, **64**: 21–29.
 54. Milne, G. R. and Boza, M. -E. 1999. Trust and Concern in Consumers' Perceptions of Marketing Information Management Practices. *J. Interact. Mark.*, **13(1)**: 5–24.
 55. Mohammadi Ziarati, A. 2011. Study of Intention to Pay for Consumption of Transgenic Food Products in Iran (Case study). Master Thesis, Gorgan Agricultural University.
 56. Mohapatra, A. K., Priyadarshini, D., and Biswas, A. 2010. Genetically Modified Food: Knowledge and Attitude of Teachers and Students. *J. Sci. Educ. Technol.*, **19(5)**: 489–497.
 57. Montuori, P., Triassi, M. and Sarnacchiaro, P. 2012. The Consumption of Genetically Modified Foods in Italian High School Students. *Food Qual. Prefer.*, **26(2)**: 246–251.
 58. Olivero, N. and Lunt, P. 2004. Privacy versus Willingness to Disclose in E-Commerce Exchanges: The Effect of Risk Awareness on the Relative Role of Trust and Control. *J. Econ. Psychol.*, **25(2)**: 243–262.
 59. Park, J., Lee, H. and Kim, C. 2014. Corporate Social Responsibilities, Consumer Trust and Corporate Reputation: South Korean Consumers' Perspectives. *J. Bus. Res.*, **67(3)**: 295–302.
 60. Parsa, H. G., Lord, K. R., Putrevu, S. and Kreeger, J. 2015. Corporate Social and Environmental Responsibility in Services: Will Consumers Pay for It? *J. Retail. Consum. Serv.*, **22**: 250–260.
 61. Pino, G., Amatulli, C., De Angelis, M. and Peluso, A. M. 2016. The Influence of Corporate Social Responsibility on

- Consumers' Attitudes and Intentions toward Genetically Modified Foods: Evidence from Italy. *J. Clean. Prod.*, **112(October)**: 2861–2869.
62. Prati, G., Pietrantoni, L. and Zani, B. 2012. The Prediction of Intention to Consume Genetically Modified Food: Test of an Integrated Psychosocial Model. *Food Qual. Prefer.*, **25(2)**: 163–170.
 63. Ricci, E. C., Banterle, A. and Stranieri, S. 2018. Trust to Go Green: An Exploration of Consumer Intentions for Eco-friendly Convenience Food. *Ecol. Econ.*, **148**: 54–65.
 64. Rodríguez-Entrena, M., Salazar-Ordóñez, M. and Sayadi, S. 2013. Applying Partial Least Squares to Model Genetically Modified Food Purchase Intentions in Southern Spain Consumers. *Food Policy*, **40**: 44–53.
 65. Saat, R. M. and Selamat, M. H. 2014. The Impact of Corporate Social Responsibility Information Richness on Trust. *Soc. Environ. Account. J.*, **8(2)**: 67-81.
 66. Saleh-Lakha, S. and Glick, B. R. 2005. Is the Battle over Genetically Modified Foods Finally over? *Biotechnol. Adv.*, **23(2)**: 93–96.
 67. Scheaffer, R. L., Mendenhall III, W., Ott, R. L., and Gerow, K. G., 2011. Elementary Survey Sampling. e-Book.
 68. Serrano Archimi, C., Reynaud, E., Yasin, H. M. and Bhatti, Z. A. 2018. How Perceived Corporate Social Responsibility Affects Employee Cynicism: The Mediating Role of Organizational Trust. *J. Bus. Ethics.*, **151(4)**: 907–921.
 69. Siegrist, M. 2000. The Influence of Trust and Perceptions of Risks and Benefits on the Acceptance of Gene Technology. *Risk Anal.*, **20(2)**: 195–203.
 70. Siegrist, M., and Cvetkovich, G. 2000. Perception of Hazards: The Role of Social Trust and Knowledge. *Risk Anal.*, **20(5)**: 713–720.
 71. Simon, A. 2002. Corporate Social Responsibility and Biotechnology: Identifying Social Aspects for European Biotechnology Companies. Master Theses, The International Institute for Industrial Environmental Economics, Lund University, Sweden.
 72. Singh, K. T. and Singh, M. S. 2013. Ethics in Corporate Social Responsibility. *IOSR J.*, **9(2)**: 16–21.
 73. Steur, H. De Blancquaert, D., Lambert, W., Van Der Straeten, D. and Gellynck, X. 2014. Conceptual Framework for Ex-Ante Evaluation at the Micro/Macro Level of GM Crops with Health Benefits. *Trends Food Sci. Technol.*, **39(2)**: 116–134.
 74. Teng, P. P. S. 2008. An Asian Perspective on GMO and Biotechnology Issues. *Asia Pacific J. Clin. Nutr.*, **17(Suppl. 1)**: 237–240.
 75. Tian, Z., Wang, R. and Yang, W. 2011. Consumer Responses to Corporate Social Responsibility (CSR) in China. *J. Bus. Ethics*, **101(2)**: 197–212.
 76. Tong, C. and Wong, A. 2014. The Influences of Corporate Social Responsibility to Customer Repurchases Intentions, Customer Word-of-Mouth Intentions and Customer Perceived Food Quality of Fast-Food Restaurants in Hong Kong and the Mediating Effects of Corporate Reputation. *Br. J. Econ. Manag. Trade*, **4**: 1655-1678.
 77. Uhlig, M. R. H., Mainardes, E. W. and Nossa, V. 2020. Corporate Social Responsibility and Consumer's Relationship Intention. *Corp. Soc. Responsib. Env. Manag.*, **27(1)**: 313–324.
 78. Valente, M. and Chaves, C. 2018. Perceptions and Valuation of GM Food: A Study on the Impact and Importance of Information Provision. *J. Clean. Prod.*, **172**: 4110–4118.
 79. Verdurme, A. and Viaene, J. 2003. Consumer Attitudes Towards GM Food. *J. Int. Food Agribus. Mark.*, **13(2–3)**: 77–98.
 80. Xu, R., Wu, Y. and Luan, J. 2020. Consumer-Perceived Risks of Genetically Modified Food in China. *Appetite*, **147(February)**: 104520.
 81. Yazdanpanah, M., Forouzani, M. and Hojjati, M. 2015. Willingness of Iranian Young Adults to Eat Organic Foods: Application of the Health Belief Model. *Food Qual. Prefer.*, **41**: 75–83.
 82. Yazdanpanah, M., Forouzani, M. and Bakhtiyari, Z. 2016. Investigating the Tendency of Khuzestan Province Organization of Agriculture Jihad Experts towards Genetically Modified Crops. *Iran. J. Agric. Educ. Ext.*, **12(1)**: 103-117.
 83. Zhang, C., Wohlhueter, R. and Zhang, H. 2016. Genetically Modified Foods: A Critical Review of Their Promise and



- Problems. *Food Sci. Hum. Wellness.*, 5(3): 116–123.
84. Zhang, L., Xu, Y., Oosterveer, P. and Mol, A. P. J. 2016. Consumer Trust in Different Food Provisioning Schemes: Evidence from Beijing, China. *J. Clean. Prod.*, 134: 269–279.

قصد مصرف کنندگان برای غذای اصلاح شده ی ژنتیکی: یک مدل میانجیگری تعدیل شده

م. اکبری، ح. ملک سعیدی، ز. فزونی اردکانی، گ. پینو، ح. پاداش، و س. حسینی مفرد

چکیده

بحث در مورد مواد غذایی اصلاح شده ژنتیکی همزمان با توسعه بیوتکنولوژی مورد توجه بسیاری قرار گرفته است. این مقاله به بررسی قصد مصرف کنندگان نسبت به مواد غذایی تراریخته در ایران پرداخته است. با توجه به پتانسیل مسئولیت اجتماعی شرکتی در شکل گیری رفتار مصرف کنندگان، روابط بین مسئولیت اجتماعی شرکتی، اعتماد و نگرانی های مربوط به سلامت افراد با قصد مصرف کنندگان نسبت به مواد غذایی تراریخته به ندرت بررسی شده است. این مطالعه برای بررسی اینکه نگرانی های مربوط به سلامت افراد، اعتماد به غذاهای تراریخته و ادراک از مسئولیت اجتماعی شرکتی بر اهداف مصرف کنندگان نسبت به غذاهای تراریخته تأثیر می گذارد، از یک مدل میانجی گری تعدیل شده استفاده کرده است. در این مطالعه 389 مصرف کننده بررسی شدند که نتایج نشان داد نگرانی های مربوط به سلامت افراد منجر به کاهش اعتماد به غذاهای تراریخته می شود، اما اعتماد تأثیر مثبتی بر قصد مصرف کنندگان نسبت به این محصولات دارد. بنابراین نقش میانجی بین نگرانی های مربوط به سلامت و قصد مصرف کنندگان دارد. از همه مهمتر، ادراک از مسئولیت اجتماعی شرکتی تأثیر مثبت اعتماد به غذاهای تراریخته را بر روی قصد مصرف کنندگان برجسته می کند، بنابراین این شواهد، نقش تعدیل کنندگی مسئولیت اجتماعی شرکتی مشخص می شود.