A Cross-Cultural Study of Consumer Attitudes Toward Genetically Modified Food in the Philippines and the United States

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ABSTRACT

Foods derived from genetically modified (GM) crops have been a part of the food chain in the United States and the Philippines for more than a decade while incurring little of the controversy exhibited in European countries. GM crops include fruits, vegetables and grains and are the result of a process by which foreign genes are spliced into a related or non-related species resulting in a genetically modified organism. This pilot study examines whether Filipino and American consumers hold different attitudes toward GM food from crops. Surveys of the literature regarding consumer attitudes toward GM foods in developing economies are presented together with an analysis of the political economy and cultural characteristics of the Philippines. The results of this initial study strongly suggest that Filipinos perceive food derived from GM crops to be more useful, more morally acceptable, less personally risky, more economically necessary, and should be more politically encouraged than their American counterparts. This study concludes with a discussion of the ways by which marketers may reduce consumer resistance to food derived from GM food.

INTRODUCTION

Genetically modified (GM) food is food produced from any plant or animal that has been genetically altered during its production using the modern techniques of gene technology. The first wave of GM food possessed enhanced input properties and is producer and environmentally friendly. For example, genes for herbicide resistance have been transplanted from bacterial cells into tobacco plants, demonstrating that these transgenic plants better tolerate the herbicides used for weed control. The second wave of GM foods has enhanced output properties and is designed to be more consumer-friendly. Some examples are fruits and vegetables with higher antioxidant contents to reduce the risk of heart disease, diabetes and cancer as well as rice with higher levels of iron. Other examples of second wave GM foods include milk and other animal products with
healthier fat content and lower levels of allergens and horticultural produce with enhanced flavor, texture, and shelf-life. On the horizon are bananas that produce human vaccines against infectious diseases such as hepatitis B, fish that mature more quickly, cows that are resistant to bovine spongiform encephalopathy (mad cow disease), fruit and nut trees that yield years earlier, and plants that produce new plastics with unique properties.

GM foods provide another market choice alongside conventional foods and organic products. In this current study, attitude and belief dimensions of university students in two different societies are examined from the context of second-generation, value-enhanced GM foods from crops. Specifically, this study attempts to assess the conjecture that Filipino and American consumers harbor different attitudes towards the willingness to purchase GM food.

LITERATURE REVIEW

Consumer Attitudes toward GM Foods

Speaking at the 2006 Agricultural Biotechnology International Conference in Melbourne, Craig Cormick, Manager of Public Awareness for Biotechnology Australia, said "consumer attitudes relating to GM foods are complex and studies that simply ask if people would or wouldn't eat GM foods don't do justice to the complexities of public attitudes." Some literature suggests that cultural determinants play an important role in the consumer's approval of a specific technology, and those beliefs about its benefits and risks are rooted in more general knowledge and attitudes toward nature and technology and are therefore difficult to change. Because these views are also culturally constrained, it is possible that international differences in opinion toward GM food are embedded in these cultural attitudes.

Many studies have focused on consumer attitudes in the United States (Ganiere, Wen, Chern & Hahn, 2006). Surveys by the Pew Initiative on Food and Biotechnology (2005) show American consumers are surprised and even outraged when they learn how pervasive GM foods are. On a scale of 1 to 10 with 10 indicating "very well informed on biotechnology", fifty-three percent rated their awareness at 3 points or below, indicating that they were relatively not well informed regarding biotechnology issues.

Several studies have compared consumer attitudes toward GM foods among developing countries. The University of Washington's IMPACT Center released the preliminary results of a consumer survey done in Mexico, Chile, and India focusing on attitudes toward GM crops (Curtis, McCluskey, & Wahl, 2004). The survey was conducted at grocery stores and in markets, and included both poor and more affluent demographics. In Chile and Mexico, 70% of respondents said they were willing to purchase GM food if it had more vitamins or other nutrients, or used fewer pesticides. In India, approximately 88% of consumers stated that they would buy GM foods. Although the majority of surveyed consumers in China reported that they had little or no knowledge of biotechnology, their attitudes toward (GM) foods were generally positive, especially for GM foods with product-enhancing attributes (Li, Curtis, McCluskey, & Wahi, 2002). These results imply that, unlike Europe and Japan, there is a potential market for GM foods in China and other developing economies. Korean consumers, who have proven to be strongly resistant to
GM products, do show signs of changing attitudes toward GM foods when the promise of its benefits is communicated (Hallman, Jang, Hebden, & Shin, 2005). Studies that have focused on the consumer acceptance of GM food in less developed countries indicate that technology has a role to play in addressing food insecurity in these nations (Nielsen, Robinson, & Thierfelder, 2001). Consumer surveys in supermarkets, kiosks, and maize mills in Kenya reported that 68% of respondents would purchase GM maize meal at the same price as their favorite brands, although many were concerned with the potential environmental and health risks as well as ethical and equity issues (Kimenju, De Groote, Karugia, Mbogoh & Poland, 2005). Curtis, McCluskey, and Wahl (2004) studied GM food acceptance among developing nations including the Columbia and China. These studies concluded that the generally positive perception towards GM foods in developing nations stems from more urgent needs in terms of food availability and nutritional content. Additionally, perceived levels of risk may be smaller due to somewhat greater trust in government, positive perceptions of science, and positive media influences.

**Economic Differences**

With a current estimated population of 97.9 million, the Philippines is the twelfth largest country in the world. The 7107 islands that make up the Philippines approximate the land mass of Arizona. The vast majority of the population live on the islands of Luzon, Cebu, Mindiniao, Leyte, and Negros. The history of the Philippines is largely characterized by their nearly 400 years of as a Spanish colony and their relationship with the United States. The Philippines were ceded to the United States in 1898 upon the conclusion of the Spanish-American War and became a self-governing commonwealth in 1935. Upon the conclusion of the Second World War, the Philippines became an independent Republic. It is unique in Asia in its religious composition: the predominate religion is Roman Catholic. For both imports and exports, the largest trading partner of the Philippines is the United States. Although the official language of the Philippines is Tagalog, English is widely spoken, especially among the college educated. The educational system is largely modeled on the American system and the literacy rate was recently estimated at 92.7%. Its University system is highly competitive on a global basis. The Philippines is characterized as a developing economy and the most recent estimates of its per capita income is $3300 on a purchasing power parity basis. By way of comparison, per capita income in the United States is $46,400. The GINI Index attempts to measure the distribution of income within a country and both the United States and the Philippines would be considered countries in which income and wealth is relatively concentrated. The GINI Index for the Philippines is 45.8 and for the United States it is 45.0 (CIA World Factbook, 2011).

**Hofstede’s Dimensions of National Character**
Geert Hofstede’s framework of the cultural dimensions of national character has been a mainstay of research in international marketing since its inception. As developed in his seminal work in the field: *Culture's Consequences, Comparing Values, Behaviors, Institutions, and Organizations Across Nations* (Hofstede, 2001), the five dimensions of national character include Power Distance Index (PDI), Individualism (IDV), Masculinity (MAS), Uncertainty Avoidance Index (UA), and Long-Term Orientation (LTO). Hofstede’s framework allows research in international marketing to compare and contrast country markets based upon their underlying cultural dimensions.

With regard to the introduction and assimilation of new products and new technologies such as GM foods, the two dimensions of Hofstede’s framework that might be of most interest for the study at hand are the Uncertainty Avoidance Index (UA) and the Power Distance Index (PDI). The Uncertainty Avoidance Index attempts to measure the degree of uncertainty and ambiguity that a society feels comfortable with and has often been employed as a proxy for the diffusion of innovation within a culture. Those cultures which are uncertainty avoiding cultures attempt to minimize the possibility of such situations by strict laws and rules as well as safety and security measures while cultures that are uncertainty accepting cultures are more tolerant of opinions different from what they are used to and typically have as few rules as possible. Both the United States (UA = 41) and the Philippines (UA = 40) have UA scores which would seem to indicate an openness to the possibility of GM foods. Previous research (Curtis, McCluskey, & Wahl, 2004) has noted the possibility of somewhat greater trust in government, positive perceptions of science, and positive media influences as playing a role in more positive perceptions of GM food. Such constructs may well be captured in Hofstede’s Power Distance Index. Formally defined, the Power Distance Index (PDI) holds that the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally. The PDI ratings for the Philippines – 95 – and the United States – 38 – are vastly different.

**Table 1: Hofstede’s Dimensions of National Character**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Philippines</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Distance</td>
<td>95</td>
<td>38</td>
</tr>
<tr>
<td>Individualism</td>
<td>35</td>
<td>88</td>
</tr>
<tr>
<td>Masculinity</td>
<td>70</td>
<td>68</td>
</tr>
<tr>
<td>Uncertainty Avoidance</td>
<td>40</td>
<td>41</td>
</tr>
<tr>
<td>Long-Term Orientation</td>
<td>25</td>
<td>32</td>
</tr>
</tbody>
</table>

**OBJECTIVES AND HYPOTHESES OF THE STUDY**

The central focus of this study is whether Filipino consumers view GM foods more positively than their American counterparts. Paralleling the research of Le Marre et
al., (2007) on American and French attitudes toward GM foods, this study incorporates the constructs of usefulness, moral acceptability, personal risk, economic necessity, and social imperative to examine attitudes toward GM crops and GM livestock. Consequently, the primary research objective can be expressed in the form of the following five hypotheses:

**H1:** Filipinos will have a more favorable attitude regarding the usefulness of GM food than Americans.

**H2:** Filipinos will have a more favorable attitude regarding the moral acceptability of GM food than Americans.

**H3:** Filipinos will have more positive perceptions of the personal riskiness of GM food than Americans.

**H4:** Filipinos will have a more favorable attitude regarding the economic necessity of GM food than Americans.

**H5:** Filipino perceptions that social and scientific policy toward GM foods should be more encouraged will be more positive than Americans.

**METHODOLOGY**

The research setting of our study focused on upper-level undergraduate students from the United States and the Philippines majoring in Biology. Students enrolled in Microbiology, Biotechnology and Genetics courses were offered a modest extra-credit incentive to participate in the study and participation was virtually 100%. This research setting was chosen because potential respondents would have been exposed to significant course material regarding genetic theory and bio-engineering issues. Of the 172 respondents, 94 were from the United States and 78 were from the Philippines. Our survey utilized a password-protected website in order to increase efficient data collection and control multiple submission issues. The survey questionnaire was largely based upon measures utilized in a cross-cultural analysis of French and American attitudes towards first and second-generation GM food published by Le Marre et al. (2007). These Likert measures were modified to reflect the purpose of our study comparing Filipino and American attitudes toward foods from GM crops (ex: *Food derived from GM crops is useful*). Respondents utilized a 5 point scale where 1 = strongly agree, 2 = mostly agree, 3 = neither agree nor disagree, 4 = mostly disagree, and 5 = strongly disagree. The survey as it appeared in both the American and Filipino versions is reproduced in the Appendix. The Filipino version of the survey was in English as all students were fluent in English. The data was analyzed using SPSS 14.0 for Windows.

**RESULTS**
Descriptive statistics from the study are presented in Table 2 and include the mean, sample size, standard deviation, and standard error of the mean.

### Table 2: Group Statistics Regarding GM Foods

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Belief in Usefulness</td>
<td>2.14</td>
<td>94</td>
<td>0.833</td>
<td>0.089</td>
</tr>
<tr>
<td>Filipino Belief in Usefulness</td>
<td>1.43</td>
<td>78</td>
<td>0.499</td>
<td>0.061</td>
</tr>
<tr>
<td>American Belief in Moral Acceptability</td>
<td>2.56</td>
<td>94</td>
<td>0.882</td>
<td>0.094</td>
</tr>
<tr>
<td>Filipino Belief in Moral Acceptability</td>
<td>1.69</td>
<td>78</td>
<td>0.656</td>
<td>0.080</td>
</tr>
<tr>
<td>American Belief in Riskiness</td>
<td>2.68</td>
<td>94</td>
<td>0.977</td>
<td>0.104</td>
</tr>
<tr>
<td>Filipino Belief in Riskiness</td>
<td>3.45</td>
<td>78</td>
<td>1.063</td>
<td>0.130</td>
</tr>
<tr>
<td>American Belief in Necessity</td>
<td>2.62</td>
<td>94</td>
<td>0.951</td>
<td>0.101</td>
</tr>
<tr>
<td>Filipino Belief in Necessity</td>
<td>1.87</td>
<td>78</td>
<td>0.919</td>
<td>0.112</td>
</tr>
<tr>
<td>American Belief in Encouragement</td>
<td>2.63</td>
<td>94</td>
<td>0.938</td>
<td>0.100</td>
</tr>
<tr>
<td>Filipino Belief in Encouragement</td>
<td>1.72</td>
<td>78</td>
<td>0.714</td>
<td>0.087</td>
</tr>
</tbody>
</table>

Further analysis of the data was performed utilizing paired t-tests to measure the differences between Filipino and American attitudes toward food derived from GM crops. These results are presented in Table 3. Statistically significant differences were reported across all five variables: Usefulness, Moral Acceptability, Risk, Necessity, and Encouragement. As can be seen, all 5 sub-hypotheses were confirmed at the 95% confidence level. For H1, Filipinos were found to perceive food from GM crops to be more useful than Americans (t = -6.124, p = 0.000). For H2, food derived from GM crops was found to be more morally acceptable for Filipinos than Americans (t = -6.771, p = 0.000). For H3, Filipinos perceived food derived from GM crops to pose less risk than did Americans (t = 4.654, p = 0.000). For H4, food derived from GM crops was found to be more necessary by Filipinos over Americans (t = -4.996, p = 0.000). For H5, Filipinos believed food derived
from GM crops should be more socially and scientifically encouraged than did their American counterparts \( t = -6.602, p = 0.000 \). Based upon the findings from our set of five hypotheses, we can accept our central hypothesis that Filipino undergraduate biology students possess a more positive attitude than American undergraduate biology students toward food derived from GM crops.

**Table 3: Paired Samples t-tests of American Attitudes toward Foods vs. Filipino Attitudes toward GM Foods**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean Difference</th>
<th>t-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness</td>
<td>-0.704</td>
<td>-6.124</td>
<td>0.000</td>
</tr>
<tr>
<td>Moral Acceptability</td>
<td>-0.870</td>
<td>-6.771</td>
<td>0.000</td>
</tr>
<tr>
<td>Riskiness</td>
<td>0.766</td>
<td>4.654</td>
<td>0.000</td>
</tr>
<tr>
<td>Necessity</td>
<td>-0.759</td>
<td>-4.996</td>
<td>0.000</td>
</tr>
<tr>
<td>Encouragement</td>
<td>-0.909</td>
<td>-6.602</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**LIMITATIONS OF THE STUDY**

The limitations to this study mirror those of survey-based studies in general. The first of these limitations is that the data is based upon the self-reported responses of survey participants. While the reporting of attitudes toward GM food is not as controversial as some topics, there remains an element of social bias that cannot be discounted. Nevertheless, the research methodology and the instructions in the survey offered the promise of confidentiality as well as anonymity to respondents thus helping to minimize the social bias problem. A second area of limitations to our study lies in the choice of our sample frame. The conclusions offered in this study are limited to undergraduate Biology majors who have been exposed to a significant amount of training in microbiology, genetic theory and biotechnology issues and may not apply to the general population. As was discussed earlier, this population was specifically targeted in
order to minimize the problem encountered in earlier studies of surveying respondents who had little or no educational background in genetics or biotechnology.

CONCLUSIONS

The diffusion of GM food technology has been underway for the better part of two decades. This study confirms and extends the research stream which demonstrates that developing economies have more positive attitudes toward GM foods. In this study, consumers in the Philippines have been shown to have more positive attitudes to these foods based upon the grounds of moral acceptability, risk to human health, and the usefulness and necessity of the innovation.

RECOMMENDATIONS FOR FUTURE RESEARCH

The diffusion of innovations is an area of research whose boundaries are constantly expanding. This is particularly the case regarding GM foods in cross-cultural studies in general and from developing countries in particular. Directions for further research in this area include studies on the attitudes of the general public rather than the sample of biology majors utilized in this study. Other potential research in this area might be directed at cross-cultural consumer attitudes toward food derived from GM livestock. The definition of GM livestock includes livestock which have been fed with GM feed, livestock which have been injected with GM additives, and livestock which have been genetically modified themselves. Future research projects might attempt to determine if public attitudes towards these three categories of GM livestock differ. In addition, further international marketing research utilizing the Philippines as a research setting is highly recommended given the substantial population, strategic location, and historical ties with the United States.

REFERENCES


