

**Modeling Consumer Acceptance of and Willingness to Pay for  
Genetically-Modified Foods in the United States and the European Union**

Authors:

Lisa House,  
Bert Morrow,  
Jayson Lusk,  
and  
Melissa Moore\*

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\*Authors are Associate Professor, Department of Food and Resource Economics, University of Florida, Assistant Professor, Department of Management and Information Sciences, Mississippi State University, Assistant Professor, Department of Agricultural Economics, Mississippi State University, and Assistant Professor, Department of Marketing, Quantitative Analysis and Business Law, Mississippi State University, respectively.

Contact: Lisa House, McCarty Hall, P.O. Box 110240, University of Florida, Gainesville, FL 32611-0240, USA, phone: (662) 325-2044, e-mail: [house@agecon.msstate.edu](mailto:house@agecon.msstate.edu).

# **Modeling Consumer Acceptance of and Willingness to Pay for Genetically-Modified Foods in the United States and the European Union**

## **Abstract**

In an effort to understand consumer acceptance of and willingness to pay for genetically modified food products, we propose a model of consumer acceptance of GM foods. The model is synthesized from literature on consumer acceptance reviewed in the paper. The paper suggests that consumer acceptance mediates the relationship between three key antecedent variables and a consumer's willingness to pay for GM foods. This model treats consumer acceptance and a consumer's willingness to purchase as two distinct constructs. As noted in the model, we expect consumer acceptance to be impacted by three key antecedents: trust, benefits, and social norms.

## **Modeling Consumer Acceptance of and Willingness to Pay for Genetically-Modified Foods in the United States and the European Union**

After years of research by private companies and public institutions, products derived from agricultural biotechnology are reaching consumers, and becoming an increasing subject of potential concern. The debate surrounding agricultural biotechnology has covered various concerns including food safety, the environment, trade, business and economic practices, product labeling, etc. The debate over the costs and benefits of biotechnology is complicated by the fact that cultural differences among nations seem to fuel controversy.

Consumers appear to react differently to foods created with genetically modified inputs. In the United States, consumers and company stockholders have recently voted against proposals that would prohibit the use of genetically modified inputs (i.e. ninety-seven percent of the Kellogg Company's shareholders rejected a proposal to prevent the company from using GM ingredients). However, consumers in the European Union have expressed a desire to have products without genetically modified inputs.

Policy makers and managers need to fully understand the multifaceted process by which consumers accept or reject a GM food product. Further, if there is acceptance, then the problem is one of understanding how acceptance translates into a market decision to purchase the food. The objective of this study is to develop a model that will aid in understanding this process. Figure 1 shows a proposed conceptual model of this process.

Using this model, one should be able to measure the influence of the antecedents on consumer acceptance of and willingness to pay for GM foods. This model would also capture the affect of cultural differences in consumer acceptance and willingness to pay for GM and non-GM Foods. The goals for this project are to verify the hypothesized antecedents on consumer acceptance of and willingness to pay for GM foods in the United States and the European Union by developing of a consumer acceptance model for GM foods

### **Review of Literature**

There has been limited research on consumer attitudes towards genetically modified foods. The majority of the research performed to date has been from one of two sources: analysis of European views on biotechnology and surveys and focus groups performed by private organizations. The following is a brief review of existing literature that examine consumer attitudes. Much of the following discussion on European attitudes comes from a report by Bredahl, Grunert, and Frewer (1998).

Hamstra investigated consumer acceptance of genetically engineered food products in three studies of Dutch consumers. In these studies, Hamstra included two determinants of consumer acceptance: consumer characteristics and product characteristics. Consumer characteristics included demographic characteristics and knowledge of and attitudes towards modern food biotechnology. Product characteristics included consumer perceptions of individual products and their characteristics. In the first study, consumers were interviewed about their attitudes and willingness to buy and consume nine different genetically engineered food products (Hamstra, 1991). The second study used means-end chain theory to further investigate these aspects in a number of focus group discussions (Hamstra, 1993). The third study used a sample of consumers to empirically test the model developed in the previous studies (Hamstra, 1995). Generally, these studies indicated that consumer acceptance of modern biotechnology in food production was determined by the consumers' subjective perceptions of the actual product characteristics. Demographic variables had little explanatory power. Perceived benefits were

found to have a greater impact than perceived risks on consumer attitudes and acceptance. No link was found between knowledge of the technology and attitudes.

Kutzniesof and Ritson (1996) used focus group discussions to explore British and Irish consumer attitudes. These results pointed to the existence of three different consumer types in relation to the acceptability of genetically engineered food products: 'refusers', 'undecided' consumers and 'triers', with the large majority of the consumers classified into the middle group, and the rest equally split between refusing and accepting the products. The authors concluded from the research that the acceptability of genetically engineered food products is likely to increase with use of products, perceived consumer-related benefits (as opposed to producer-related benefits), price consciousness, perceived increased product quality (primarily taste and naturalness), perceived purity of products (reduced use of chemicals) and perceived wholesomeness of the products. The acceptability was also found to depend on the type of product (more favorable attitudes in connection with fruits, vegetables and dairy products than meat and eggs).

A number of studies have investigated consumer attitudes towards genetic engineering at a more general level. Consumers have been shown to be significantly more positive towards applying the technology to plants and microorganisms than to animals or human genetic material (eg, Frewer, Hedderley, Howard & Shepherd, 1997).

Finally, Eurobarometer surveys have looked specifically at cross-national differences and have continuously found Danish, German and Dutch consumers to be the ones least supportive of genetic engineering in Europe (INRA, 1993; Marlier, 1992).

Barling et al. add to this work by specifying some of the factors as "...perceptions of trust, choice, (and) need." Zechendorf further theorizes that national, religious and cultural differences among nations in Europe may explain the differing degrees of acceptance between U.S. and European consumers. Bredahl applies means-end theory and the laddering technique to investigate consumers' cognitions with regards to GM beer and yogurt in four countries. His conclusions were that "...associations made with regard to the application of gene technology were generally found to focus more on perceived risks than benefits." In addition, he identified "... a number of cross-national differences in cognitions..."

Hoban reported that American consumers had consistently reported positive attitudes towards biotechnology in the mid-80's through mid-90's. Additionally, these consumers had not increased their awareness of biotechnology during a time at which growth in development of products using biotechnology occurred. Outside the United States, however, Hoban noted that awareness levels differ, with Germany, Austria, Denmark, and Japan leading the world in awareness. This, combined with the finding of the Eurobarometer surveys that have found German and Dutch consumers to be the least accepting of products, might lead one to infer a possible link between knowledge and acceptance. This implication would seem to contradict Hamstra's findings that knowledge did not affect acceptance levels. Hoban also suggests that consumer acceptance of biotechnology may be most strongly correlated with efforts of activist groups to oppose it. Hoban continues to suggest that "the best way to reach consumers is by educating opinion leaders, ..., government officials, the media, and food industry officials. Key messages should include the benefits and uses of biotechnology, as well as the government regulations that are in place to ensure safety."

The International Food Information Council (IFIC) has surveyed U.S. consumer attitudes towards biotechnology five times, starting in March 1997 and ending with the most recent survey in January, 2001. These surveys have showed where consumers have changed, or not changed,

their opinions over the past four years. The IFIC surveys have included questions regarding labeling of genetically modified foods, as well as knowledge of use of biotechnology in food production. For example, when U.S. consumers were asked if there are any foods produced through biotechnology in the supermarket now, only 36% of the respondents replied yes in 2001 (compared to 43% in 2000, 33% in 1999, and 40% in 1997). Two questions were used to gather data about the affect of benefits of biotechnology on acceptance. The first asked consumers “all things being equal, how likely would you be to buy a variety of produce, like tomatoes or potatoes, if it had been modified by biotechnology to taste better or fresher?” In 2001, 58% of the consumers indicated they would be somewhat or very likely to purchase the food (55% in 1997, 62% in early 1999, 51% in late 1999, and 54% in 2000). The next questions substituted the phrase “protected from insect damage and required fewer pesticide applications” for “taste better or fresher.” In this question, 70% of the 2001 consumers indicated that they were somewhat or very likely to try (77% in 1997 and early 1999, 67% in late 1999, and 69% in 2000).

A report published by the Pew Charitable Trusts Foundation in 2001 found that U.S. public opinion about genetically modified foods was “up for grabs.” This survey found that 44% of U.S. consumers had heard either a “great deal” or “some” about either genetically modified foods or biotechnology in the production of foods. In a report summarizing the findings of this survey, a link was indicated between knowledge and socioeconomic status. Sixty percent of the consumers indicated that they believed less than half of the food in grocery stores contains genetically modified ingredients. However, only 19% believed they had eaten genetically modified foods. The majority of consumers opposed introduction of genetically modified foods, with a larger percentage of women opposing than men. Nearly half (46%) of consumers indicated they were unsure about the safety of GM foods, while 29% believed they were safe and 25% believed they were unsafe. Consumers indicated a higher level of concern for food freshness, food poisoning, salmonella, can chemicals than for GM foods or biotechnology.

### **Modeling Consumer Acceptance and Willingness to Pay**

We propose to test a model of consumer acceptance of GM foods (Figure 1). The model is synthesized from the literature on consumer acceptance reviewed above. The model suggests that consumer acceptance mediates the relationship between three key antecedent variables (trust, benefits, and social norms) and a consumer’s willingness to pay for GM foods. A brief description of the model and how the model will be tested is provided below.

Consumer acceptance is hypothesized as a unidimensional or multidimensional construct defined as a positive predisposition toward buying and using the product. Consumer acceptance is similar to the constructs of commitment and/or loyalty that have been researched within the marketing domain (see Morgan and Hunt; Moorman et al.; and Oliver). However, this model treats consumer acceptance and a consumer’s willingness to purchase as two distinct constructs. For example, consider an individual’s attitude toward a particular product, such as asparagus. A consumer may consider this vegetable an acceptable food option; however it may be the case that a consumer chooses not to buy the item given its high cost. As noted in the model, we expect consumer acceptance to be impacted by three key antecedents: trust, benefits, and social norms.

Trust.

Barling et al. note that trust is a factor in consumer attitude toward GM foods. Additionally, Frewer notes that “ethical concerns, trust and distrust (in scientific institutions, risk regulators, and information providers)... should be incorporated into theoretical models used to

explain the evolution of public resistance to emerging technologies.” A common thread running through nearly all the conceptualizations of trust is that both cognitive processes and affective influences play roles in its development. In his recent review of the trust literature, Kramer noted that scholars have begun to move beyond a view of trustworthiness as grounded solely in rational choice as too narrowly cognitive. Instead the field seems to have acknowledged that trust is a more complex psychological state that is dependent on cognitive processes and emotional and social influences as suggested by the various conceptualizations of trust. Consistent with this reasoning, we argue that trust evolves from a pattern of careful, rational thinking (cognitive-based) coupled with an examination of one’s feelings, instincts and intuition (affect-based) (Morrow, Hansen and Pearson). Simply put, “trust in everyday life is a mix of feeling and rational thinking” (Lewis and Weigert, p972). This suggests that trust develops from a process, or a pattern of thinking and feeling, on the part of the trustor regarding the trustee.

*Cognitive-based trust.* McAllister argued that trust is cognition-based because individuals choose who they will trust and base this decision on what they believe are “good reasons” (Lewis and Weigert). The choice to trust and the search for “good reasons” suggest that cognitive-based trust is the result of a *process* by which one determines that an individual, group, organization or product is trustworthy. Therefore, a key to understanding cognitive-based trust is understanding the process by which individuals arrive at some assessment of the trustworthiness of another object (e.g., an individual, group, organization or product) (Morrow, Hansen and Batista). In other words, cognitive-based trust refers to *how* one develops “good reasons” that others are trustworthy. Thus, we define *cognitive-based trust* as trust that is grounded in a careful, methodical thought process used to determine whether an object is trustworthy. This careful, methodical process involves the consideration of “empirical evidence” (Jones and George). As such, cognitive-based trust is not instantaneous, it develops only after an individual is able to cognitively process and assess the available evidence.

*Affect-based trust.* Lewis and Weigert argued that trust also consists of an emotional base that is distinct from, but complementary to, its cognitive base. Thus, we define *affective-based trust* as trust that is grounded in one’s instincts, intuitions or feelings concerning whether an object is trustworthy. While a cognitive-based process refers to *how* one develops “good reasons” that others may be trusted, affective-based trust refers to the “emotional bonds” of trust that may exist between parties. Affect-based trust arises out of the emotional bonds that exist between individuals, in that these emotional bonds may eventually provide the basis for trust (Lewis & Weigert; McAllister).

### Benefits.

In addition to understanding how trust affects consumer acceptance, the model suggests that the perceived *benefit* accrued by the customer will affect subsequent levels of consumer acceptance. Based on the studies by Hamstra and Bredahl, consumer perceptions of both benefits and risks should be included in the model. In the previous studies, contradictory results have been found as to which factor (risks or benefits) has the dominant effect. Additionally, Kutznesof and Ritson have found the type of benefit to be significant in determining consumer attitudes.

Adapting the work conducted by Moore and Ratneshwar on understanding a consumers psychological attachment to a firm, we suggest that there are four consumer benefits that can affect acceptance of GM foods: utilitarian benefit, affective benefit, symbolic benefit, and obligatory benefit. We assume that these different benefits may coexist within the same individual and may be found to varying degrees. In brief, utilitarian benefit is conceptualized as

the customer's benefit based on the rational costs and gains associated with using the product. This conceptualization is based on Kelman's idea of compliance or exchange which occurs when attitudes and behaviors are adopted simply to gain specific rewards. Affective benefit is conceptualized as a customer's benefit based on the level of positive and favorable emotion associated with using the product. Influenced by the work of Allen and Meyer regarding employee-employer relations, this conceptualization is similar to their definition of affective attachment as an emotional attachment where the employee enjoys being involved with the firm. Symbolic benefit is conceptualized as a customer's benefit based on the ability to express one's self-concept through using the product. This conceptualization is premised on Katz's value-expressive function of attitudes. The value-expressive function is served when an individual expresses attitudes relevant to his/her self-concept and personal values. Last, obligatory benefit is conceptualized as a customer's benefit based on the level of obligation associated with using the product. This conceptualization is similar to Allen and Meyer's conceptualization of obligation as one's beliefs about or responsibility to the organization.

#### Social Norms.

Lastly, the model predicts that *social norms* will affect consumer acceptance of GM foods. Zechendorf indicated culture differences might explain differing levels of acceptance between the U.S. and Europe. Additionally, many studies reviewed above found consumers from different countries to have differing levels of knowledge, as well as attitudes towards GM foods. This variable provides a global assessment of a consumer's belief regarding what behaviors, goals, and policies are important or unimportant, appropriate or inappropriate or right or wrong (Dwyer et al.; Morgan and Hunt). One well known taxonomy that will be used to understand how different cultural values influence social norms (and subsequent consumer behavior) is Hofstede's Value Dimensions.

#### **Implications**

In different studies, we have found that the cognitive and affective components of trust can predict the level of trust individuals have toward a group, an organization and toward a product. Additionally, our research has shown that an individual's level of cognitive and affective trust can be manipulated based on the type of information they are given. This finding holds promise for eventually changing the public's attitudes toward genetically enhanced food ingredients.

In addition to understanding how trust affects consumer acceptance, our model suggests that the perceived *benefit* accrued by the customer will affect subsequent levels of consumer acceptance. In particular, we will investigate consumer acceptance differences when the GM food of interest offers consumer benefits (i.e., longer lasting tomatoes) versus producer benefits (i.e., production efficiency). Lastly, our model predicts that *social norms* will affect consumer acceptance of GM foods, providing a global assessment of a consumer's belief regarding what behaviors, goals, and policies are important or unimportant, appropriate or inappropriate or right or wrong. Only by developing a better understanding of *how or why* consumers come to accept GM food products can food suppliers and processors begin to respond to growing public concerns regarding the safety of GM food products.

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**Figure 1.** Conceptual Model for the Process of Building Consumer Acceptance and Willingness to Pay

