

Investigating Consumers Attitudes toward Using Agricultural Transgenic Products (Case Study: Qazvin City)

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ABSTRACT

The present study examines the factors that have influences upon perceptions of applying gene technology to food production, perceptions that may in turn determine the consumer's attitude toward genetically modified (GM) foods in Iran. This study was quantitative and applied research that conducted through descriptive -survey method. Research instrument was questionnaire (that developed by researchers base on literature rearview). Questionnaire validity confirmed by content validity method with a panel of experts and its reliability confirmed by implication of pilot test and calculation of Cronbach's alpha coefficient (0.92). A multi-stage cluster sampling method was used as sampling method. Based on Morgan table 384 person were calculated that after refining returned questionnaires 239 questionnaires were analysed. After collecting data, data were analyzed with SPSS software. The result of Multivariate regression analysis of showed indicates that 84.6% ($R^2 = 0.846$) of variance of respondent attitudes towards GM products can be explained by buying organic foods, knowledge about GM, trust to institutions, income, age, and read food label variables.

KEYWORDS: Genetically modified crops, Attitudes, consumer, Agricultural GM food.

INTRODUCTION

Since the first introduction of herbicide-resistant soybeans, a major genetically-modified food (GM food), which arrived on the market in the mid-1990s, there has been increasing concern about such foods among politicians, activists and consumers.

One of the main problems in the developing world is provide food for a growing population with limited natural resources. While biotechnology development increasingly affects everyone, not all individuals view this trend as positive. Some individuals perceive risks from general concerns to specific fears on the use of biotechnology in crop/food production. The general concerns include environmental pollution, unintentional gene transfer to wild plants, the possible creation of new viruses and toxins, limited access to seeds due to patenting of GM food plants, the threat to crop genetic diversity, religious, cultural and ethical concerns, not to mention fear of the unknown. Specific dark thoughts that haunt one's mind include the alteration in the nutritional quality of foods, potential toxicity, possible antibiotic resistance from GM crops, and potential allergenicity and carcinogenicity from consuming GM foods. Critics also raise the possibility of gene transfer between GM and non-GM crops, a process that could have unpredictable results (Uzogara, 2000).

GM food is an outcome of scientific efforts, which involve deliberate modifications of the genetic material of plants or animals. Advocates of the use of genetic engineering techniques in food contend that this new biotechnology promises increased yields, lower prices for food, and reduced need for pesticides and herbicides. Such benefits would boost farming productivity and hence increase food supplies for the rapidly growing world population. Increased efficiency would also reduce the costs for farmers as well as the prices for consumers (Uzogara, 2000).

Benefits of GM products can cause resistance to pests, disease, cold, salinity, drought, and increased nutritional value and medicinal use include (Rastgoo, Alemzadeh, 2008). The overall benefits of GM products are;

- Positive Role of Transgenic Plants in food security, livestock feed, food products, textiles and cheap;
- Conservation of biodiversity, reduction of environmental pollutants in agriculture, helping to cheap bio-fuel production, contribute to mitigating climate change and reducing greenhouse gas emissions;
- These products are positive role in poverty and hunger, and more importantly, contribute to sustainable economic growth with more than \$ 44 billion in profits between 1996 and 2007 (Ghareyazie, 2009).

Due to the benefits of GM crops in the last ten years of GM crops in worldwide has risen dramatically. In 2009, about 134 million acres devoted to GM crops that 46 percent is owned by developing countries (James, 2009). Indeed, there is little evidence that eating today's GM foods is unhealthy, except in rare cases of allergenicity. Scientific panels sponsored by the National Academy of Sciences, the British Royal Society, the World Health Organization, and other reputable institutions have concluded that biotech crops are safe for both humans and the environment; however, they emphasized the need for careful research and oversight (Appell, 2003). With these evolution, some experts predict that

by 2050 GM products are cheaper than other crops, so that in particular the potential for increased performance and stability of GM products (FAO, 2009).

Prior studies:

There were several studies on consumer attitude towards GM food products; the results of these studies suggest that there are different attitudes and views towards GM food products among consumers. For example Vlachos, et al (2005) mention to importance of information, Huang et al (2006) mention to knowledge about GM products and price of foods, Chen et al (2007) indicate knowledge about GM food production and education level and read the foods lable, Kikulwe et al (2011) hint to individual, social, economic character of consumers and trust to GM institutions, Rollin et al (2011) mention knowledge and information about GM products and individual – social character of consumer as the most important factor on attitudes of consumer about GM food products.

Results of Chen et al (2007) study showed that general attitude toward and trust in institutes and scientists performing gene manipulation have positive impacts on the perceived benefits, but knowledge has negative impacts on the perceived risks of applying gene technology to produce food products. The consumer's attitude toward GM foods is mainly determined by the consumer's benefit perception. (Chen et al, 2007).

It further confirms that providing information about risks and benefits of GM foods is not a sufficient condition for consumers to change their attitude toward GM foods (Frewer et al, 2003) because whether the information sources are trusted by consumers is more important. In fact in Taiwan give the government and the GM food marketers an opportunity to make extra efforts for the public to understand the benefits or usefulness from applying gene technology to produce food productions (Chen et al, 2007). We can be seen in these entire studies examined consumer attitudes toward GM food products are abroad and in the country there is a not coherent study about consumer's attitudes. The main purpose of this study was investigating Qazvin household's attitudes to Genetically Modified (GM) crops. To determines the key variables that influence on this attitude the specific goals are:

- Identify personal and professional characteristics of consumers GM products;
- Describe the willingness to buy GM crops by citizens.
- Analysis of consumer attitudes towards GM products based on personal and professional characteristics
- To identify factors affecting consumers' attitudes towards GM products

METHODOLOGY

This study was quantitative and applied research that conducted through descriptive -survey method. Descriptive because of description the existing situation and Qazvin household's attitudes and casual because of investigating Causal relationship between the adoption and the factors affecting it. Questionnaire (that developed by researchers base on literature rearview) and interview consisted the means for data gathering. Questionnaire validity confirmed by content validity method with a panel of experts and its reliability confirmed by implication of pilot test and calculation of Cronbach's alpha coefficient (0.92). The population of the study included 381509 Qazvin city. A multi-stage cluster sampling method was used as sampling method. And the sample was selected randomly from the East, West, South, East and downtown neighborhoods. Based on Morgan table 384 person wre calculated that after refining returned Questionnaires 239 questionnaires were analysed. Data were gathering in two sections: the first section consists of Socio-economic characteristics of households and second is about hoseholds attitudes toward GM products. After collecting data, data were analyzed with SPSS software.

RESULTS

The result of study showed that the average age of respondent was 35 years and 60.9 percent were male, also about 69 pesrcentage of respondent were married. The result showed that about half percent of respondent have university educated. Base on research result 92 person (39.7%) have public job and 12 persons (5%) have were unemployed. Only 28 percent of respondent state that they always read the food lables and 8.4 % of them never read the food lables. 28% of respondent seldom buy the transjenic food and 10% in most of time buy the transjenic foods.

The priority of respondent attitude to GM plants was displayed in table 1. This result showed that "Organic foods are useful because of less chemical materials" (CV: 32.53), Transjenic foods are harmful for allergic people" (CV: 32.71) and "Organic foods have harmful and unexpected effects on human halth" (CV: 33) are the most important social welfare variables. And also the most important environmental are:" GM crops will lead to the development of farming systems that improve air and water quality"(CV: 25.62), "Transgenic crops have increase access to wildlife habitat and vegetation"(CV: 30.86) and "Organic products by pollination with non organic plants exposure the environment to danger" (CV: 31.02).

Table1: Priority of respondent attitude to transjenic plants

Variable	Mean	S. D	C.V
Social welfare			
Organic foods are useful because of less chemical materials	3.26	1.06	32.52
Transgenic foods are harmful for allergic people	3.21	1.05	32.71
Organic foods have harmful and unexpected effects on human health	3.00*	0.99	33
Transgenic plants are harmful for human health because of unknown characters	3.22	1.07	32.23
Organic foods can help to reduce health disease and cancer	3.10	1.03	32.33
Transgenic foods reduce the cost of customer	3.06*	1.03	33.66
Transgenic plants resolve the shortage of foods in the society	3.26	1.11	34.05
Transgenic plants increase the resistance genes to antibiotics	3.24*	1.11	34.26
Transgenic foods are healthy than other foods	3.30*	1.16	35.15
Transgenic plants are useful for the society with reduce agricultural production costs	3.17	1.14	35.96
Environment			
GM crops will lead to the development of farming systems that improve air and water quality.	3.20*	0.82	25.62
Transgenic crops have increase access to wildlife habitat and vegetation.	3.24*	1.00	30.86
Organic products by pollination with non organic plants exposure the environment to danger	3.03	0.94	31.02
Organic products by using less herbicides are useful for environment	3.18*	1.01	31.76
Transgenic crops are destroy the beneficial microorganisms found in the soil	3.05	1.03	33.77
Organic products by competing for food with non organic plants are dangerous for environment	2.98*	1.04	34.9
GM crops can increase soil moisture retention, reduced soil erosion and reduce runoff of pesticides	3.17	1.14	35.96
Acceptance of GM products to be environmentally friendly farming systems	3.22	1.20	37.27
GM products with using Some herbicides are destroy plants that are useful to wildlife	2.97	1.21	40.74
GM crops are harmful to domestic plants and animals*	2.88	1.25	43.40

*Scoring was reversed for negative statements

This result of comparison of respondents' attitudes towards GM products based on employment status and residence indicates that the respondent attitudes towards GM food products based on employment status and location variables significant at the 99% level (Table2).

Table 2: Comparison of respondents' attitudes towards GM products based on employment status and residence

Independent variable	Status	Frequency	Mean Rank	Kruskal-Wallis	Sig
Employment status	Employee	92	153.16	66.742**	0.000
	Student	22	133.02		
	Self employment	71	84.33		
	Housekeeper	35	66.16		
	Unemployed	12	142.26		
Location	Rural area	81	69.91	71.809**	0.000
	Countryside	30	113.30		
	City	127	152.59		

**significant at 99%

The result of relationship between variables with respondents' attitudes towards GM products showed there is negative and significance relationship between "Age" and "number of household" and dependent variable. Also there is positive and significant relationship between "education", "income", "read food labels", buying organic foods", trust in institutions" and "knowledge about GM products" and respondents' attitudes towards GM products (Table3).

Table3: Relationship between variables with respondents' attitudes towards GM products

Variable	Coefficient	Attitudes towards GM products	
		The relation ship coefficient	Sig
Age	Pearson	-0.570**	0.000
Education	Kendall -tau	0.706**	0.000
Income	Pearson	0.741**	0.000
Number of households	Pearson	-0.594**	0.000
Read food labels	Kendall -tau	0.729**	0.000
Buying organic food	Kendall -tau	0.739**	0.000
Trust in institutions	Pearson	0.657**	0.000
Knowledge about GM products	Spearman	0.675**	0.000

**significant at 99%

Multivariate regression analysis (stepwise method), was used to predict the factor affecting on respondent attitudes towards GM products. Independent variables (variable that have significant relationship in this research) with a dependent variable (respondent attitudes towards GM products) were used for a multivariate regression analysis (Table

4). The result indicates that 84.6% ($R^2 = 0.846$) of variance of respondent attitudes towards GM products can be explained by Buying organic foods, Knowledge about GM, Trust to institutions, Income, Age, and Read food label variables.

Table 4: Multivariate Regression Analysis of respondent attitude toward GM products

Variable	B	Beta	T	Sig.
Constant	1.406	---	7.560**	0.000
Buying organic foods(x_1)	0.133	0.223	4.957**	0.000
Trust to institutions(x_2)	0.227	0.280	7.865**	0.000
Knowledge about GM(x_3)	0.042	0.148	3.565**	0.000
Read food label(x_4)	0.126	0.209	4.919*	0.010
Income(x_5)	2.928	0.202	4.779**	0.000
Age (x_6)	-0.007	-0.087	-2.330*	0.021

** And *significant at 99% and 95%

The result of F significance and R^2 are reported in table 5.

Table 5: F and Ad R^2 significance

Step	Independent variable	R	R^2	Ad R^2	F	Sig
1	Buying organic foods	0.782	0.611	0.690	319.087**	0.000
2	Trust to institutions	0.865	0.732	0.729	275.783**	0.000
3	Knowledge	0.894	0.799	0.796	266.247**	0.000
4	Read food label	0.908	0.824	0.821	234.757**	0.000
5	Income	0.917	0.842	0.838	211.7**	0.000
6	Age	0.920	0.864	0.841	181.248**	0.000

The prediction Equation is defined as:

$$Y = 1.406 + 0.133 X_1 + 0.227 X_2 + 0.042 X_3 + 0.126 X_4 + 2.928 X_5 - 0.007 X_6$$

DISCUSSION AND SUGGESTION

Public perceptions and attitudes to the introduction of emerging technologies have long been recognized as important factors in determining the likelihood of consumer support and prospective success in product development. Genetic engineering is described as a science that involves deliberate modification and transformation of certain genetic materials in plants or animals to create new variations of products. However, perception and acceptance of gene technology varies according to the type of its application. Previous studies have revealed that consumers hold more positive attitudes toward the use of gene technology for medical purposes than for food production purposes (e.g., Frewer & Shepherd, 1995; Gaskell et al., 1999; Hoban, 1999). A better understanding of the antecedents that lead to the perceived benefits and perceived risks of applying gene technology to produce food products should substantially help researchers explain a greater proportion of the variance in the consumer's attitude toward GM foods.

Trust in regulatory institutions or in information sources about the risks and the benefits of applying gene technology to produce food production is very important in figuring out public acceptance of GM foods. Unfortunately, though consumers trust in the institutions and scientists performing genetic modifications activities in foods, their prior perceived risks of applying gene technology to produce GM foods would not be reduced. In other words, consumers' prior negative attitudes toward GM foods would not be changed easily even though they trust regulatory institutions of gene technology application to produce food production. Based on the discussions given above, one can conclude that consumers in Iran depend on their positive general attitude and their trust in regulatory institutions and scientists performing gene manipulation to increase their benefit perceptions from GM foods.

Since general attitude is an important antecedent of the consumer's perceived benefits and knowledge has a negative influence on perceived risks, consumer education not only is a good way to give consumers correct knowledge but also change the consumer's previously adopted attitudes. Moreover, consumer education is also a good way to make the consumer form a more positive general attitude toward science and technology, toward nature, and so on. This is because genetic engineering is a relatively new science and is unfamiliar to many people. The public and private sectors related to the GM food industry should increase public awareness of this technology through consumer education. Because trust in the regulatory institutions and scientists performing genetic engineering exerts a strong effect on the benefit perceptions, the government should take the responsibility of monitoring the proper functioning of the safety mechanism in producing GM foods so as to gain trust from the consuming public.

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