

**A COMPARATIVE STUDY OF CONSUMER PERCEPTIONS OF  
GENETICALLY MODIFIED FOODS IN AUSTRALIA AND INDONESIA**

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### ***ABSTRACT***

*This paper presents a study of consumer perceptions of Genetically Modified (GM) foods based on a survey conducted in Australia and Indonesia. The results indicate that in general the Indonesian consumers are more favourable to GM foods than their Australian counterparts. A key finding of the current study is that the level of consumer opposition to GM foods from both within Australia and Indonesia is reduced when respondents are made aware of the perceived benefits of GM foods. This suggests that GM foods have the potential to become more popular provided adequate information on the positive aspects of GM foods is made available to consumers. Likewise, reduced use of pesticides and improved nutritional qualities are perceived as more important potential benefits than reduced price. This suggests that the issue of price is not an important consideration in the minds of consumers. Indonesian consumers perceived reduced pesticides use as having more important potential benefits than did Australian consumers. Ethical and religious concerns are apparently more important in Indonesia than in Australia in explaining the attitude towards GM foods. The support for mandatory labelling is very high in both countries even if labelling may result in an increase in price of GM foods.*

**Keywords:** *Consumer perception, Genetically Modified Foods, Labelling*

## **A COMPARATIVE STUDY OF CONSUMER PERCEPTIONS OF GENETICALLY MODIFIED FOODS IN AUSTRALIA AND INDONESIA**

GM foods have been the brunt of human controversy for a long period of time. It has been observed that the technology behind this is plagued by the rhetoric of their benefits on one extreme and their detriment on the other. A more objective approach suggests that it stands ground to the 'dangers and ethical dilemmas' (Johnson, 2003). In 2005, consumers moved to stop the use of GM foods. They insisted on a right to information, a right to choice, a right to safety and that GM foods be required to be labelled, tested independently and for alternatives to remain open (Madeley, 2005). How ethical are genetically modified food producers in revealing information and in producing these products? To identify this we have to first consider what perceptions consumers have about genetically modified foods.

Consumer perception of GM foods is driven by a number of inter-related factors. First, there needs to be a demonstrable benefit from the application, as well as an acceptable level of risk. It is important that the applications are viewed as morally acceptable to society and safe. If a low level of public understanding exists, more education will be required as more new products become available. The ethics of feeding the world, while protecting the environment is also another dimension that requires attention but will not be discussed in detail.

This paper reports a study of consumer's knowledge, attitudes and perceptions of GM foods based on a student survey conducted in Australia and Indonesia. The aim of this paper is to identify the differences of consumer perceptions within two cultures. Secondly, it will attempt to understand how these foods are perceived by consumers and what ethical considerations are raised, as more and more biotechnological firms are moving into commercial markets.

### **BACKGROUND ON GM FOOD STUDIES IN THE WORLD, AUSTRALIA AND INDONESIA**

Many consumer studies have been conducted globally to provide a broad understanding of public acceptance of GM foods (Biotechnology Australia, 2005; Ho and Vermeer, 2004; Chern and Rickertsen, 2001; AFEC, 2002; Frewer *et al.*, 1997; Gaskell *et al.*, 2003). The controversy over these foods is great, and in most countries, public awareness and acceptance have been shaped primarily by mixed messages from action groups and the industry. (Ho and Vermeer, 2004). It is clear now that the debate emerges on one extreme from the concerned biologist, organic farmers, and environmental non-governmental organisations (NGOs) who have linked up with concerned consumers. The other extreme supports the benefits of GM crops to farmers and consumers, which has been sustained by agricultural specialists and biotech industry representatives. (Wansink and Kim, 2002).

The research that supports the benefits of GM foods has been provided by an extensive international study of consumer attitudes towards biotechnology, which was conducted by Environics International (2000, 2001). In their survey, which examined more than 35,000 respondents from 35 different countries, they were asked whether

they agreed that the benefits of biotechnology outweighed the risks. The cultural differences of varying countries provided varying responses. In the United States, Columbia, Cuba, Dominican Republic, China, India, Indonesia, and Thailand, it was found that over two-third of respondents in those countries agreed that the benefits of GM crops are greater than the risks. On the other hand, fewer than 40 per cent of consumers in the following countries saw the benefits as greater than risks, France, Greek, Italy, Spain, and Japan. Furthermore, it was found that a majority of European and Australia consumers would tend to reject GM foods even if they were more nutritious. (Environics, 2001). Other issues on GM foods were examined and it was found that when some consumer learnt how widespread GM foods are, they were more likely to believe the foods were safe. Consumers were also frustrated when they realised that they had not been informed about the widespread presence of GM ingredients (Pew, 2001).

### **PERCEPTIONS OF AUSTRALIAN CONSUMERS**

Genetically modified risks appeared to be the problem when consumers in Australia were surveyed. For instance, a study by Biotechnology Australia (2001) indicated that 49 per cent of Australians would eat GM foods, 60 percent would eat GM foods if the genetic modification had made the food healthier, and 43 per cent would eat such food if the food only tasted better. Overall, there have been varying issues within this area as in general, Australians insist on more information about GM food issues. For instance, Cormick (2002) indicated that 73 per cent of Australian consumers required further information about gene technology. Consumers did not highly regard benefits although GM crops have agronomic benefits but when asked to weigh the risks and benefits of eating GM foods, even if the consumer perceived the risks to be quite small, these risks are still larger than the perceived benefits (Biotechnology Australia 2001; 2005).

On evaluating risks and benefits, although risks can be certain, they can be quite vague as well, whereas benefits are more specific. Risks present a formidable experience and are often perceived to be higher than they actually are, but benefits need to be supported by credible evidence. Very often, risks will be accepted without any acknowledgement of benefits, but benefits are best accepted with an acknowledgement of risks.

Since the catastrophic events particularly after September 11 and the Bali bombing, there have also been some critical changes in consumer perceptions and attitudes in recent years. Australians' concept of risks has transformed due to the recent occurrences resulting in a tendency to view risks as extreme and go to a greater measure to avoid risks. This may suggest that consumers may be more likely to be susceptible to scare stories, such as, are often disseminated by anti-gene technology activists, and less likely to be influenced by the *over-promising* of the pro-gene technology activists (Biotechnology, 2001, 2005).

Perception and attitudes towards GM foods in Australia are driven more by attitudes towards food in general and food safety, than attitudes towards the technology. (Cormick, 2002). This suggests that a healthy food buyer, who is very concerned about what his food contains, will also tend to be more concerned about GM foods.

Biotechnology Australia (2001, 2005) came up with the types of GM crops and foods that are likely to be accepted in Australia including, having direct consumer benefits, having a gene modification from an organism that is closely related (with plants being preferred over animals), having direct societal benefits or align with social values, and being perceived as being not harmful to people or the environment.

### **PERCEPTIONS OF INDONESIAN CONSUMERS**

There is a dearth of literature in this area in Indonesia. Yet, contrary to popular opinions that are associated with widespread negative attitudes or public concern about the risks of biotechnology, survey results conducted by (AFIC, 2002) show that in general, Indonesian stakeholders do not really see biotechnology as posing high risks to public health and food safety. The majority of Indonesia's stakeholders view agricultural biotechnology as having moderate to high benefits. This view is particularly evident among consumers, farm leaders, policy makers, extension workers and scientists. However, the majority of stakeholders consider moral and ethical issues of biotechnology as having influence on their judgements of biotechnology followed by cultural considerations.

### **PERCEPTIONS OF GENERAL CONSUMERS**

Studies have indicated that consumers on the whole indicate a positive view of genetic modification techniques as applied to the health care industry, (Frewer *et al.*, 1995) contrary to the situation for agricultural and food production, which is quite different (Biotechnology Australia, 2005). As far as the marketing potential of GM foods goes, it was found that although, consumer attitudes towards the concept of GM foods have been widely reported to be negative, it is possible that these attitudes will not translate directly into negative purchasing behaviour towards GM foods by consumers (Gaskell *et al.*, 2003). For example, in the UK, where the negative perception against GM foods has been intense, several millions tins of clearly labelled GM tomato paste have been sold since the introduction of this product in 1996 (Knight *et al.*, 2005).

With regards to purchasing decision of GM foods, it has been reported that the level of risk aversion, knowledge about genetic modification and opinion about genetic modification were highly significant in explaining this purchasing decision (Baker and Burnham, 2001). Whilst some studies on education and income that examined the relationship between consumer characteristics and food safety concerns generally found that demographic variables (like education and income) performed poorly as explanatory variables for purchasing decisions regarding GM foods.

It can be advocated that controversy about GM foods arise because of the fact that the benefits of biotechnology have not been widely recognised, even though the potential risks have been emphasised. A better understanding of the complexity of consumer attitudes should result in a closer alignment in policy and public attitudes and also result in the development of GM products that better meet consumer needs as well as minimise public concerns.

### **METHODOLOGY**

The research instrument used in this study was structured similar to questionnaire developed by Chern and Rikcertsen (2001). The questionnaire was grouped into three

main sections. The first section investigated respondents' knowledge, attitude, and perception with regard to GM organisms and GM foods in general and their preference for the type of regulation related to GM organism. The next section consisted of a series of contingent valuation (CV) questions involving vegetable oil, cornflakes and salmon. The final section was concerned with the demographic information including the respondent's income. For the purpose of this paper, only sections one and three of the questionnaire were used in the analysis.

The questionnaire, initially written in English, was translated into Indonesian. The surveys were conducted with university students in the two countries. The Australian student survey was conducted at La Trobe University, while the same questionnaire used in the survey in Indonesia was conducted at Bogor Agricultural University (IPB). All of these student surveys were undertaken during October 2005 to February 2006. There were 635 respondents in this pilot survey, of which 505 and 130 were from Indonesia and Australia, respectively. The Indonesian students' samples were derived from the agricultural discipline and the Australian students' were derived from the business discipline.

The age of the Indonesian and Australian respondents ranged from 18 to 21 and 18 to 52 respectively. The distribution of gender was approximately equal for both countries, in which around 46% of Australian and 50% of Indonesian were males. The Chi-square analysis was employed to test the null hypotheses of no significant differences between respondents in the two countries, Australia and Indonesia at the 5% and 10% level of significance.

## **SURVEY RESULTS**

### **CONSUMER KNOWLEDGE ABOUT GM ORGANISMS AND GM FOODS**

Table 1 shows that a slightly higher percentage of Australian respondents were informed about GMOs and/or GM foods, when asked, "Before the survey, how well were you informed about GM Foods or organisms?" The "very well and somewhat informed" figures from Indonesia are not substantially different from those in Australia. Hoban (1998) found that increased levels of awareness are not direct reflections of increased level of knowledge about biotechnology.

**TABLE 1. DIFFERENCES IN KNOWLEDGE OF INDONESIAN AND AUSTRALIAN ABOUT GM FOODS**

Questions	Options	Indonesia	Australia	$\chi^2 p$ value
Before the survey, how well were you informed about GM foods or organisms?	Very well	7.1	8.5	0.809
	Somewhat	67.7	68.2	
	Not informed	25.1	23.3	
Non-GM soybeans do not contain genes while GM soybeans do	True	30.3	12.5	0.000
	False	23.6	34.4	
	Don't know	46.1	53.1	
By eating GM foods, a person's genes could be altered	True	14.9	6.3	0.011
	False	45.3	57	
	Don't know	46.1	36.7	

In addition, two true-false questions were asked to explore consumer knowledge about GM Organisms and/or GM Foods. They are “Non-genetically modified soybeans do not contain genes while genetically modified soybeans do” and “By eating GM Foods, a person's genes could be altered”, respectively. Respondents can be identified as knowledgeable consumers if they answer both true-false questions correctly. Results indicated that Indonesian students underperformed Australian students in the two true-false questions related to specific knowledge on GM organisms. These being dichotomous scales, it can be acknowledged that the two true-false questions are very limited to represent consumer knowledge. However, these questions at least give an indication of some knowledge of GM foods. In general, the results imply that Australian students were relatively more knowledgeable about GM organisms or GM foods than those of Indonesian students were.

### PERCEPTION OF HEALTH RISK

When confronted with risk, people seem to behave differently. Each individual attaches their own degree of importance to food product attributes and each consumer exercises a product attribute trade-off with respect to risk (Wansink and Kim, 2002). It is understood that the higher the risk the greater will be the purchase time lag. A range of risk triggers, such as uncertainty, trust in institutions, and benefits, can also deter acceptance of food products.

The consumer attitude toward GM organisms and/or GM Foods in Australia and Indonesia in 2005 and 2006 respectively is presented in Table 2. Perception of the health risk of GM foods varied significantly between both countries. Although almost the same proportion of Australian and Indonesian students ranked GM foods as “very risky”, the percentages that ranked GM foods as “very safe” and “don't know” were higher in Australia. This is not consistent with a slightly higher percentage of unawareness about GM organisms and/or GM foods in Indonesia. This may be due to the fact that respondents in Indonesia may not have expressed their true knowledge of GM organisms and/or GM foods.

## WILLINGNESS TO PURCHASE GM FOODS

The acceptance level of GM foods barely varied between Indonesia and Australia. Approximately 36% of Indonesian and a third of Australian respondents claimed that they were willing to consume foods produced with GM ingredients.

Despite the relatively high awareness of biotechnology in Indonesia and Australia (74.8% and 76.7% respectively), only less than 37% of students in both countries were at least “somewhat willing” and “very willing” to consume GM foods. Almost 5% and 11% of Indonesian and Australian students respectively would avoid consuming GM foods (Table 2).

**TABLE 2. DIFFERENCES IN ATTITUDES OF INDONESIAN AND AUSTRALIAN ABOUT GM FOODS**

Questions	Options	Indonesia	Australia	$\chi^2 p$ value
How safe or risky are GM foods to human health?	Very risky	32.6	34.1	0.001
	Neither	38.4	19.4	
	Very safe	19.3	28.7	
	Don't know	9.7	17.8	
How willing are you to consume foods with GM ingredients?	Very willing	4	5.4	0.108
	Somewhat	32.3	27.1	
	Not very	17.4	20.2	
	Would avoid	4.8	10.9	
How willing are you to consume GM foods if they reduced the amount of pesticides applied to crops?	Very willing	29.5	12.4	0.000
	Somewhat	41.4	43.4	
	Not very	3.8	9.3	
	Would avoid	3.2	7.8	
How willing are you to consume GM foods if they were more nutritious than similar foods that are not GM?	Very willing	41.6	14.8	0.000
	Somewhat	39.4	53.9	
	Not very	3.4	5.5	
	Would avoid	1.8	7	
How willing are you to consume GM foods if it posed a risk of causing allergic reactions for some people?	Very willing	1.4	1.6	0.077
	Somewhat	5.5	5.5	
	Not very	23.2	34.4	
	Would avoid	50.3	43	
How important is the price factor when you decide whether or not to buy GM foods?	Very	40.6	19.5	0.000
	Somewhat	42.6	39.1	
	Not very	3	5.5	
How important are ethical and religious concerns when you decide whether or not to buy GM foods?	Very	53.9	10.2	0.000
	Somewhat	17.2	18	
	Not very	1.6	28.1	
How important is it to label GM foods?	Very	58.2	31.5	0.000
	Somewhat	27.1	23.6	
	Not very	0.6	0.8	
What type of labelling would you support?	Mandatory	96.2	91.3	0.000
	Voluntary	3.8	4.7	
	Don't support any	0	3.9	

It is interesting to note that the opposition against GM foods was reduced when some benefits associated with them were explicitly mentioned in the questions suggesting that GM foods can grow in popularity when consumers become aware of the potential benefits. Benefits offered in our research included reduced use of pesticides, improved nutritional qualities and lower prices. For example, around 70% of Indonesians and 56% of Australians were willing to consume GM foods if these foods reduced pesticide use. Moreover, around 80% of Indonesian and close to 70% of Australians were willing to consume GM foods if these foods were more nutritious than similar foods that are not GM. This is supported by the research conducted by Biotechnology Australia (2001 & 2005). Less than 10 percent of respondents from both countries were extremely unwilling to take such a risk. Notably, a study in Italy by Boccaletti and Moro (2000) indicated that 'lower pesticide use', 'products with improved nutritional characteristics' and 'products with improved organoleptic characteristics' all increased the willingness of consumers to pay a premium for GM foods.

Table 3 shows that when we asked which of these potential benefits was the most important, close to 70% of Indonesian and 36% of Australian answered reduced use of pesticides, and only below 12% answered reduced price. This is quite surprising for Indonesians as almost half of them found reduced price to be "very important" for their decision to buy or not to buy GM foods (Table 2). This also raises the sensitivity of pricing issues. It is also interesting to note that close to 30% of Australians and around 6% of Indonesians answered reduced saturated fats in foods. Understandably, the importance of reduced saturated fats in foods would well be associated with the recent obesity problems in Australia.

**TABLE 3. DIFFERENCES IN POTENTIAL BENEFITS OF GM FOODS OF THE RESPONDENTS IN INDONESIA AND AUSTRALIA**

Questions	Options	Indonesia	Australia	$\chi^2 p$ value
What is the most important potential benefit of GM foods?	Reduce the use of pesticides	69.1	36.2	0.000
	Reduce saturated fats in foods	5.9	27.6	
	Reduce food prices	7.7	11.8	
	Other	11.9	9.4	
	I don't know	5.3	15	

Some potential sources of concern were also asked in the questionnaire. More than 40% of Australian and half of Indonesian would avoid purchasing GM foods if it posed a risk of causing allergic reaction for some people. Only around 7% of Australians and Indonesians were willing to take such a risk (Table 2). This may imply that allergic reaction for some people caused by GM food is a big concern for both countries.

## **ETHICAL AND RELIGIOUS CONCERNS**

Ethical and religious concerns in consumption are well evident in the contemporary literature (Subrahmanyam and Cheng, 2000; Hirschman, 1983). As the inhabitants of the largest Muslim country in the world, Indonesians are likely to attach more importance to ethical consideration in their choice to consume GM food than their Australian counterpart. As similar to the findings by AFIC (2002), ethical and religious concerns were important for around 71% of Indonesians and close to 30% of Australians while such concerns were very unimportant for as much as around 2% of Indonesians and close to 30% of Australians. This may suggest that ethical and religious concerns are not so much an issue in Australia as they are in Indonesia, which is the largest Muslim country in the world with a diverse cultural make up. In a different vein, however, Quazi (2003) found that religious metaphor is still relevant in Australia in terms of managers' perception of their social and ethical issues.

## **GM LABELLING ISSUE**

The majority of Indonesian (85.3%) and Australian (55.1%) consumers demand labelling (Table 2). In both countries, respondents viewed GM food labelling as important, with a large margin, would support a mandatory labelling system. The fact that almost all respondents thought that GM foods should be labelled irrespective of their willingness to accept products for marketing or to buy them is quite interesting. This may imply that consumers want to be able to make informed choices and they can only do that if they are provided with sufficient information.

Table 4 shows that support for labelling was reduced when respondents were reminded that labelling may increase food prices. However, close to 30% of Australians and close to 40% of Indonesians supported labelling even if this caused prices to increase by 5% or more. The insensitivity to price may be partly due to the hypothetical nature of the question.

**TABLE 4. DIFFERENCES IN ATTITUDES OF INDONESIAN AND AUSTRALIAN ABOUT GM FOODS ON LABELLING AND GOVERNMENT'S PERFORMANCE IN FOOD SAFETY AREA**

Questions	Options	Indonesia	Australia	$\chi^2$ p value
Any labelling will impose an extra cost on the food manufacturers, and the extra cost may result in higher food prices. How would you feel?	Would not support if prices were higher	6.3	18.9	0.000
	Would support if prices were higher no more than 5%	54.4	51.2	
	Would support even if prices were higher than 5%	38.2	29.9	
How would you grade the government's performance in food safety area?	Excellent	1.4	11.8	0.000
	Good	17	28.3	
	Fair	34.9	29.9	
	Poor	37.2	3.9	
	Very poor	7.5	3.1	
	Don't know	2	22.8	

Finally, when asked "how would you rate the government's performance in the area of food safety?" 40% (18%) of Australians (Indonesians) rated as "good", 7% (45%) of Australians (Indonesians) rated as "poor", and 22.8% (2%) rated as "don't know". This shows that the government's performance in food safety area was better rated in Australia than that in Indonesia.

### SUMMARY AND CONCLUSIONS

This paper presents survey results of consumer perceptions towards GM foods in Australia and Indonesia. The results indicate that generally the Indonesian consumers were more favourable to GM foods than the Australian consumers were. The opposition against GM foods is reduced when some benefits associated with them are introduced into the questions suggesting that GM foods have a potential to become more popular. Reduced use of pesticides and improved nutritional qualities are perceived as more important potential benefits than reduced price. Ethical and religious concerns are apparently more important in Indonesia than in Australia in explaining the attitude and perception towards GM foods. The support for mandatory labelling is very high even when labelling may increase food prices. The pilot surveys reported in this paper can be used as a basis to design a larger scale public survey in the future. D'Souza and Quazi (2005) suggest that in order to solve the controversial issues in GM food, both consumers and manufacturers have to come up with practical agenda. Customers need to look at the potential benefits of GM food and the possible harm it can cause and determine whether the net benefits exceed the costs. On the other hand,

manufacturers and marketers have to address the issues raised by consumer activists and researchers on the harmful aspects of GM foods. For example, an effective safety and information labelling disclosing the nature of a particular GM food can help customers make informed choice in the market place. An effective marketing communication strategy is to be devised toward addressing negative campaign against GM foods. The communication campaign must include statements admitting any positive claim about GM food so consumers can base their decision on facts. Finally, sincere efforts are to be made by both parties towards resolution of controversial issues in GM food in order to increase acceptability of GM food in the future.

### **LIMITATIONS**

This paper has a number of limitations that are to be considered while generalising about the results across the two countries surveyed. Firstly, results based on student sample may not represent the consumers in general. Secondly, the Chi square test that has been used is essentially vulnerable to sample size, which may have affected the results of the study. Thirdly, the results of the study need to be interpreted with caution as the study was not based on actual purchases. Therefore, future research should be based on actual purchase using a larger sample size representing a large spectrum of consumers from both countries.

## REFERENCES

- AFIC (Asian Food Information Centre). (2002). Consumer perceptions of food biotechnology in Asia. Public report on the Asian Food Information Centre. 2002 Consumer Survey.
- Baker G.A. and Burnham, T.A. (2001). Consumer response to genetically modified foods: market segment analysis and implications for producers and policy makers. *Journal of Agricultural and Resource Economics*, 26:387-403.
- Barling, D. (2000). GM Crops, biodiversity and the European agri-environment: regulatory regime lacunae and revision. *European Environment*, 10: 167-177.
- Baumgardt, B.R. and Martin, M.A. (Eds) (1991). Agricultural Biotechnology. Issues and Choices. Purdue University *Agricultural Experiment Station*, West Lafayette, IN.
- Biotechnology Australia. (2005). What you really need to know about what the public really thinks about GM foods. <http://www.biotechnology.gov.au>. Assessed August 2006.
- Biotechnology Australia. (2001). Biotechnology Australia public awareness survey: final report. <http://www.biotechnology.gov.au>. Assessed August 2006.
- Boccaletti, S. and Moro, D. (2000). Consumer willingness-to-pay for GM food products in Italy. *AgBioForum*, 3:259-267.
- Chern, Wen S. and Rickertsen, K. (2001). Consumer acceptance of GMO: Survey Results from Japan, Norway, Taiwan and the United States. *Taiwanese Agricultural Economic Review*, 7:1-28.
- Cormick, C. (2002). What do Australians think about GM foods and crops? *Biotechnology Australia Media Release*.
- Doyle, M. (2000). The consumer research report. Philadelphia P.A: vol.31 (1).
- D'Souza, C. and Quazi, A. (2005). The dynamics of exploring future market potential of genetically modified foods. *Nutrition and Food Science*, 35(2): 95-105.
- Ellahi, Basma. (1996). Genetic Modification for the Production of Food: The Food Industry's Response. *British Food Journal*, 98(4,5): 53-72.
- Envionics International. (2000). International Environmental Monitor 2000. Toronto, Canada.
- Envionics International. (2001). Food Issues Monitor 2001. Toronto, Canada.
- Falvey, J.L. (2000). GMOs and GFN: genetically modified organisms and global food needs. *Australian Academy of Technological Sciences and Engineering (ATSE) Focus*, 114, Nov/Dec.
- Frewer, L.J. and Shepherd, R. (1996). Ethical concerns and risk perceptions associated with different applications of genetic engineering: interrelationships

- with the perceived need for regulation of the technology. *Agriculture and Human Values*, 12: 48-57.
- Frewer, L.J., Howard, C. and Shepher, R. (1997). Public concerns in the United Kingdom about general and specific applications of genetic engineering: risk, benefit and ethics, *Science, Technology and Human Values*, 22: 98-124.
- Frewer, L.J., Howard, C. and Shepher, R. (1995). Genetic engineering and food: what determines consumer acceptance? *British Food Journal*, 97(8): 31-36.
- Gaskell, G., Allum, N and Stares, S. (2003). European and Biotechnology in 2002: Eurobarometer 58.0
- Gaskell, G., Bauer, M.W. and Durant, J. (1998). Public perceptions of biotechnology in 1996: Eurobarometer 46.1, in Durant, J., Bauer, M.W and Gaskell, G. (Eds), *Biotechnology in the Public Sphere. A European Sourcebook*, Cromwell Press., London.
- Frikcer, A. (2002). The conscious purpose of science is control of nature; its unconscious effects is disruption and chaos. *Futures*, 34: 535-546.
- Grunert, K.G. (2002). Current issues in the understanding of consumer food choice. *Trends in Food Science and Technology*, 13: 275-285.
- Hirschman, C. (1983). America's Melting Pot Reconsidered. *Annual Review of Sociology* 9 : 397-423.
- Ho, P. and Vermeer, E.B. (2004). Food safety concerns and biotechnology: consumers' attitudes to Genetically Modified Products in Urban China.
- Hoban, T.J. (2004). Public attitudes towards Agricultural Biotechnology. ESA Working paper No. 04-09. Agricultural and Development Economics Division. The Food and Agriculture Organisation of the United Nations.
- Hoban, T.J. (1998). Trends in consumer attitudes about agricultural biotechnology. *AgBioForum*, Vol.1 (1): 3-7.
- Hursti, U-K. K., Magnusson, M. and Algers, A. (2002). Swedish consumers' opinions about gene technology. *British Food Journal*, 104(11): 860-872.
- James, C. (2005). Global status of commercialised biotech/GM crops: 2004. [http://www.isaaa.org/kc/CBTNews/press\\_release/briefs32/ESummary/Executive%20Summary%20\(English\).pdf](http://www.isaaa.org/kc/CBTNews/press_release/briefs32/ESummary/Executive%20Summary%20(English).pdf) [last accessed 15 August 2006].
- Johnson, B. (2003). Genetic modification – where now for Europe? *European Business Review*, 15 (1): 61-65.
- Knight, J.G., Mather, D.W., and Holdsworth, D.K. (2005). Consumer benefits and acceptance of genetically modified food. *Journal of Public Affairs*, 5: 226-235. August-November.

- Laros, F.J.M and Steenkamp, J-B.EM. (2004). Importance of fear in the case of GMF. *Psychology and Marketing*, 2(11): 889-908.
- Madeley, J. (2005). Consumers reject GM foods, *Appropriate Technology*. Hemel Hempstead, 32 (2): 68-70.
- Marshall, Stewart. (1994). Genetically Modified Organisms and Food. *Nutrition and Food Science*, 1 January/February: 4-7.
- Pew, Initiative of Food and Biotechnology. (2001). Public sentiment about GM Food. Available at <http://www.pewagbiotech.org>
- Quazi, A. (2003), "Identifying the determinants of corporate managers' perceived social obligations", *Management Decision*, 41, 822-83.
- Spetsidis, N.M. and Schamel, G. (2002). A Consumer-based approach towards new product development through biotechnology in the Agro-food sector, Market development for GM Foods, Faculty of Agriculture and Horticulture, Institute of Economic and Social Sciences, University of Berlin, Berlin, Germany.
- Subrahmanyam, S. and Cheng, P.S.(2000), Perceptions and attitudes of Singaporeans towards genetically modified foods, *The Journal of Consumer Affairs*, 34(2), 269-290.
- Wales, C. and Mythen, G. (2002). Risky discourses: The politics of GM foods. *Environmental Politics*, 11: 121-144.
- Wansik, B., and Kim. J. (2002). The marketing battle over genetically modified foods: False assumptions about consumer behavior. *American Behavioral Scientist*, 44(8): 1405-1417.
- Woodside, F., Ogunmokun, G., and Brown, L.R. (2005). Measuring the attitudes of Australian food manufacturers towards genetically modified (GM) foods: a pilot study. ANZMAC 2005 Conference: Entrepreneurship, Innovation and New Product Development.