

## CONSUMERS AWARENESS TOWARDS GENETICALLY MODIFIED (GM) FOODS

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### ABSTRACT

*The production of the genetically modified (GM) food is getting the attention from the whole world. The debates on the topics of GM food in terms of ingredients, functions, benefits, awareness, attitudes and acceptances are increasing dramatically. The sample of this research is a total of 100 food's consumers from Klang Valley that are selected randomly from the market by using questionnaire. It used to obtain information from consumers about their level of awareness towards GM foods and their attitudes, perception and acceptance towards GM foods, as well to identify if there is any differences of perception among gender, age, education level, and occupation on attitude, perception and acceptance on GM foods. The result shows that the respondents have a low awareness level towards GM foods. Majority of the consumers' attitude, perception and acceptance towards the GM foods were negative. The study also found out that there is a significance in mean difference between, age, gender and race their attitude and perception toward GM foods. The study recommends the consumers' awareness towards GM foods should be increased by the government through promotion, establish voluntary GM food labeling system, and increase the media coverage about GM. It is due to the future development of the agriculture.*

Keywords: GM foods, awareness, perception, attitudes, consumers.

### Introduction

Due to the innovation of the latest technology and the techniques used, the gene technology in agriculture is dramatically increasing in the world (Bashir Ibrahim, Golnaz Rezal, Zainalabidin Mohamed and Juwaidah Sharifuddin, 2013). The gene technology is used to exclusively change the genes of one organism to another one, resulting to benefit the world's fastest growing population by ensuring sustainable food production. GM foods consist of food producing plants and animals which has experienced gene manipulation. The overall concept behind genetic modified food is changing of the traits of genes in animals and plants in a way that results more production. This has enables GM food becomes an emerging market segment and most popular in the food product development (Latifah Amin, Jamal Othman, Goh & Kamaruzaman Jusoff, 2011).

Some of the food that we consumed daily might also have been genetically modified. For example, cotton, rice, soybean, tomatoes, corn, potatoes, papaya, meat, and many more are been genetically modified. International service for the acquisition of Agri-biotech Application (ISAAA) report 2012, the planting of GM crops in the world is increasing over the years, from 134 million hectares in 2009 to 170.3 million hectares in 2012. In Malaysia, the government is forecasted to be an active venture in the biotechnology industry by 2020 to solving the global crisis. In fact, Malaysia is undergo a huge of GM food imported from United States, which is the market leader of GM foods that has 69.5 million hectares of areas planted with GM crops.

This paper discuss the effect of labeling of the products, consumers' past purchasing experience, or exposure of mass media on GM foods; to the consumers' awareness towards the GM foods in Malaysia market. This enables us have a closer look on the areas of improvement for the policy makers to increase the consumers' awareness towards the GM food in Malaysia. This focus is important so that the GM crops can develop in Malaysia and bring more successful benefit to society. This issue is critical for the future development of biotechnology field in Malaysia. If the awareness of toward the existing GM food is low, it is predicted that the developing of GM crops for the benefit of society will become more difficult to success. In short, in order to facilitate to solving this issue, the purpose of this study is to conduct investigate to evaluate the consumers' awareness toward the existing of the GM foods in Malaysia's market.

The objectives of this study are: 1. To identify the level of consumers' awareness towards genetically modified foods; 2. To determine the consumers' attitude, perception and acceptance towards the genetically modified food; and 3. To identify if there is a mean difference between background of respondent and their perception and attitude on GM foods. Therefore, the finding of this study can be served as a basic for future research to better understanding about genetically modified crops and foods in Malaysia. In turn, it creates a chance for us to exploit this industry to its full potential and give benefit to the society. The next, we will discuss on literature review, methodology, finding as well discussion and recommendation for application and future study.

## **2. Literature Review**

### **2.1 Genetically modified (GM) foods**

GM foods are the plants and animals that have already gene manipulated. The method of alteration the trait of the animals or plants was aimed to make it more productive (Kamariah Ismail, Khairiah Sechod, Saravathi Vivishana, Wafa Khurram & Syed Khurram Ali Jafri, 2012). For example, cotton, rice, soybean, tomatoes, corn, potatoes, papaya, meat, and many more are been genetically modified. The international environment groups like Greenpeace do not supported that GM technology to be safe for the humans or environment. Malaysia underwent the genetic modification of plants since early 1990's, with support from international bodies such as the Australian Centre for International Agriculture Research (ACIAR), International Service for the Acquisition of Agri-biotech Applications (ISAAA) and the Rockefeller Institute. It focuses on the disease resistance ability and post harvest quality. The latest efforts including identifying a set of molecular markers to differentiate the weedy and cultured rice (Latifah Amin, Jamal Othman, Goh & Kamaruzaman Jusoff, 2011). In the future, it is estimated that the foods derived from GM microorganisms or GM animals are likely to be introduced on the market.

In Malaysia, base on the research done by T. Nguye et al. (2008), on 60 food and feed samples that contained soybean and maize found out that most of the soybean and maize contain GM components. This indicated that GM crops are existed in Malaysia even though Malaysia does not produce genetically modified crops for these products. Malaysia was the first country in Southeast Asian that approved a plant biotechnology product for import, Roundup Ready soybean. There are five approved transgenic crops available in Malaysia which are Roundup Ready soybean, MON 810 maize, MON 863 maize and NK 603 maize for food, feeding and processing purpose (Latifah Amin, Jamal Othman, Goh & Kamaruzaman Jusoff, 2011). They also stated that genetically modified (GM) product interfered into the market without labeling. 85 food samples such as tofu, fucuk and tempe were found positive with the GM content testing.

### **2.2 Awareness toward genetically modified (GM) food**

Even though GM foods exist in Malaysia but products are entering the country gradually without it being declared as genetically modified (GM) food in the previous time. Companies such as DuPont and Monsanto control 90% GM foods in the United States. They supplied the soybeans and the corn seeds to the whole world (Netto, 2000). This scenario has made Malaysian consumers have low awareness towards the existence of GM food in Malaysia. But, with the technology advancement and education, some consumers have aware about the existence of the GM foods. They try to increase the awareness of the others towards the same issues. This shows the need to understand Malaysian consumer awareness towards GM food products, since there are growing concerns locally and globally related to their health, finance and environmental safety (Bashir Ibrahim, Golnaz Rezal, Zainal Abidin Mohamed & Juwaidah Sharifuddin, 2013).

The risk of GM food still debatable, there is huge discrepancy from EU and Japan consumers concerning the foods produced by GM method after they are aware and understood about the concept of GM organisms. In Europe, the debate on the genetic modification issue has been vigorous and European consumers are unwilling to assume the risks associated with genetically GM food. Many retailers in Europe have promised that they will not sell food products that contain GM organisms. In the U.S., consumer reaction to GMOs has been more muted. While some surveys have shown that a majority of Americans support the use of biotechnology (Grunert, Bredahl, & Scholderer, 2003).

There are many ways of getting consumer awareness on GM foods, through labelling, mass media, and government information. Malaysia understanding level about GM foods are still low. There are a lots of GM foods available in market, but consumers failed to detect it appearance due to the lack of labeling in packaging. Consumers' awareness and availability of information are interrelated and affect the acceptance of GM foods. It should be provided on the labeling or packaging of the products. Normally, consumers who have enough information about GM foods, are

more concerned to consider the side effects from the genetic change, rather than food benefit. European Union, Japan, and New Zealand are the examples of developed countries that have implemented mandatory labeling policy. The Chinese government also established a mandatory labeling regulation in 2002, stipulating that all products containing GM ingredients should be labeled after March 2002. The labeling regulation is more lax in the United States. The currently announced international labeling policies are relatively strict except in US and Canada, which coincides with the consumer acceptance in the two countries (Chen & Harris, 2006). Malaysia's Ministry of Health (MOH) recently posted new biotech labeling requirements. Those products content not more than three percent of genetically modified organisms will not require to labeling it on the packaging (Cottrell & Chang, 2010).

Mass media is another key factor that influencing the awareness of the consumers toward GM foods. Kimenju et al. (2005), studied 640 consumers in Kenya, 38% of it were aware or know about GM crops, and majority were from television, radio and newspaper. Some of them were learnt it on school finally 34% said from newspaper. In China, television is the major information source concerning GM food (Zhang et al., 2002).

### 2.3 Consumer attitude towards GM food

Consumer attitude toward GM foods differed from one country to another. Mainly consumer in Europe Union (EU) and Japan has negative attitude compare to United States, where the population willingly accept GM products. In Malaysia study done by Bashir Ibrahim, Golnaz Rezal, Zainal Abidin Mohamed & Juwaidah Sharifuddin, (2013) found out that Chinese consumers have positive attitude towards the GM food even though they only have low knowledge about it. Mean while Kamariah Ismail et al. (2012) studied 190 respondents have showed that consumers in Johor Bharu had negative attitude and they were concerned about the risk attached with the GM food.

It is similar to study by McCluskey et al. On (2003) on 400 respondents, which found out that only 3% of them said that they would be willing to purchase the GM noodles at the same price with non-GM noodles. Another 17% said that they would be willing to purchase the GM noodles if they were less expensive than the non-GM noodles. Finally, the remaining 80% of respondents are totally opposed with GM noodles and would not purchase it even with discount.

It is opposed with study done by Kimenju et al. (2005) on 640 of Kenya consumers (2005) The result showed that 68% of the respondents attitude toward GM food more positive, they were accept and willing to by GM maize at the same price as their favorite maize brand. This can show that the Kenya consumer's acceptance level towards the genetically GM food was high.

### 2.4 Consumer Perception towards genetically modified (GM) food

The GM food products in other countries have slowly been declared as GM food. This brought up an issue that the origin of the products that we used in daily life. As a result, there is a need to identify Malaysian consumers' perception towards GM food, because there are issues related to it such as health, finance and environmental safety (Bashir Ibrahim, Golnaz Rezal, Zainal Abidin Mohamed & Juwaidah Sharifuddin, 2013).

The perception and acceptance level of the consumers towards GM food is different in every country. European consumers place a much higher value on beef from cattle that have not been fed by GM corn compared to the consumers in the United States. From a survey in 2000, 97% of Japanese consumers showed a significant familiarity towards the term of "biotechnology". This showed that the awareness level of Japanese consumers has increased. The respondents in Hoban's (Boccaletti and Moro, 2000) perceived GM foods are risky to human health, they were viewed as a risky to human health, but only 57% of them were totally rejected it. Boccaletti and Moro (2000) conducted a survey on a sample of 384 people in Italy, found out that 51.5% of the respondents knew that existence GM food in the market. 46% were positively accept it and 27.5% were opposed with it. It is interesting the result also showed that 21% of the respondents were willing to pay at a higher price for the GM food.

In Malaysia, a survey has conducted by Latifah Amin et al. (2011) in Klang Valley to determine the acceptance level of the consumers towards genetically modified (GM) food. From the data collect from 1227 respondents, 56% of them had negative perception and totally reluctant towards the genetically modified (GM) food and they would avoid to purchase the GM food.

## 3. Methodology

This study used data collected from a survey which was carried out in Klang Valley. A systematic random sampling method was used and the survey was carried out to 100 respondents by using a well-structured questionnaire

that consists of four parts. The first part seeks to determine the personal information of the respondents. The second part of the questionnaire seeks to evaluate the consumers' awareness towards GM food in Malaysia.

The third part of the questionnaire consists of a series of questions that evaluate the consumers' attitude toward GM foods and finally perception towards GM foods in Malaysia. A likert scale of 1 to 5 (1 represent strongly disagree and 5 represent strongly agree) was employed to measure the consumers attitude and perception toward GM foods. The data collected for the study were analysed by using SPSS version 16.0. Descriptive statistics, cross-tabulation, T-test, ANOVA and Post Hoc test were employed to analyse the respondents' data. The reliability is tested by using Cronbach's alpha.

#### 4. Finding

##### 4.1 Reliability analysis

The reliability analysis was used in this study to measure the reliability of 15 variables on consumer attitude and perception toward GM foods by using the Cronbach's Alpha score on 10 respondents. The result shows reliability coefficient of 0.752, therefore the questionnaire consider reliable.

##### 4.2. Background of Respondents

The result shows the number of female respondent is 51% meanwhile male is 49%. Chinese respondent contributed 44%, Malay (39%) and Indian (17%). Mainly their were fall into the age of 21 – 30 years old (80%), age of 26 to 30 years old (54%) and 21 to 25 years old (26%). Almost 2/3 of respondents are single (66%), another 34% married. In terms of education, 50% hold a degree, 24% diploma and only 23 % respondents have secondary education level. Finally, 26% of respondents are academicians, 13% operation, marketing and administration contribute 12%, and the rest contribute 10% or less. The details shows in Table 1.

Table 1: Background of Respondents

Variable	Category	Total	
		Number (N)	Percent (%)
Gender	Male	49	49.0
	Female	51	51.0
Race	Malay	39	39.0
	India	17	17.0
	Chinese	44	44.0
Age	15-20 years old	1	1.0
	21-25 years old	26	26.0
	26-30 years old	54	54.0
	31-35 years old	8	8.0
	36-40 years old	8	8.0
Marital status	41 years old and above	3	3.0
	Single	66	66.0
Education level	Married	34	34.0
	Secondary	23	23.0
	Diploma	24	24.0
	Degree	50	50.0
	Master	1	1.0
	Ph. D	2	2.0
Occupation	Human Resources	5	5.0
	Marketing	12	12.0
	Operation	13	13.0
	Administration	12	12.0
	Finance	8	8.0
	Customer Services	3	3.0
	IT	2	2.0
	Engineering	3	3.0
	Fashion	6	6.0
	Academic	26	26.0
	Others	10	10.0
	Total	100	100.0

#### 4.3. Awareness towards genetically modified (GM) foods

As shown in table 2, two-thirds of respondents (70%) said they do not know about Genetically Modified (GM) food, only 30% said yes.

Table 2: Awareness toward GM foods

No.	Question	Yes (%)	No (%)	Total (%)
1.	Do you know what is Genetically Modified (GM) food?	30	70	100

#### 4.4. - Knowledge on GM foods

Based on awareness results, respondents were asked about their knowledge of GM foods. Results show that 60% of respondents said soybean contains GM component, corn 56.7% and 50% said that GM foods are resistant to pests and herbicides. It is interesting that the results show only 16.7% said rice contains GM component, 83.3% said no. Details are shown in table 3.

Table 3 - Knowledge on GM foods (30 respondents)

No.	Questions	Yes (%)	No (%)
1.	Do you know that rice contains GM component?	16.7	83.3
2.	Do you know that potatoes contain GM component?	20	80
3.	Do you know that tomatoes contain GM component?	20	80
4.	Do you know that corns contain GM component?	56.7	43.3
5.	Do you know that soybean contains GM component?	60	40
6.	Do you know that GM foods are resistant to pests?	50	50
7.	Do you know that GM foods are resistant to diseases?	43.3	56.7
8.	Do you know that GM foods are resistant to herbicides?	50	50

Respondents were also asked how they obtain information on GM foods, all (100%) respondents said they never hear from TV programs and government but they hear it from someone else and internet (76.6%), as well as from magazine (46.7%). Regarding the label system, 76.6% said Malaysia does not have the voluntary GM food labeling system or see any product labeled GM food or "Does not contain GM" or "GM free". Only 36.3% said that they pay attention to check whether the food is GM food or not before they buy. Details in table 4.

Table 4 - Information on GM Foods (30 respondents)

No.	Questions	Yes (%)	No (%)
1.	Have you ever seen any product labeled that it is GM food?	23.4	76.6
2.	Have you ever seen any labeled "Does not contain GM" or "GM free"?	23.4	76.6
3.	Will you pay attention to check the food is GM food before you buy?	36.3	63.3
4.	In the past 12 months, do you hear about GM food from medias	22.7	77.3
5.	Have you ever heard about GM from any TV program?	0	100
6.	Have you ever heard about GM from someone else?	76.6	23.4
7.	Have you ever heard about GM from government information?	0	100
8.	Have you ever read about GM from the Internet?	76.6	23.4
9.	Have you ever read about GM from the newspaper?	23.4	76.6
10.	Have you ever read about GM from the magazine?	46.7	53.3
11.	Do Malaysia have the voluntary GM food labeling system?	23.4	76.6

#### 4.5. Knowledge of non-aware respondent on GM foods

Almost all (98.6%) respondent said they never seen any product labelled as GM foods and labeled as “Does not contain GM” or “GM free”. All (100%) claimed never hear from TV program and government information, from internet, newspaper and someone else (98.6%). All of them said in-sufficient of government promotion (100%) and 98.6% said due to unpopular trend of GM food, lack of media coverage and lack of labeling on product are the reasons for them for not knowing GM products. 98.6% said they will seek more information on GM food after this survey.

Table 5 - Knowledge for non-awareness respondents (70 respondents)

No	Questions	Yes (%)	No (%)
1.	Have you ever seen any product labeled that it is GM food?	1.4	98.6
2.	Have you ever seen any labeled “Does not contain GM” or “GM free”?	1.4	98.6
3.	In the past 12 months, do you hear about GM food from medias?	2.8	97.2
4.	Have you ever heard about GM from any TV program?	0	100
5.	Have you ever heard about GM from someone else?	1.4	98.6
6.	Have you ever heard about GM from government information?	0	100
7.	Have you ever read about GM from the Internet?	1.4	98.6
8.	Have you ever read about GM from the newspaper?	1.4	98.6
9.	Have you ever read about GM from the magazine?	2	68
10.	Insufficient of government promotion reason for don’t know GM food?	100	0
11.	The unpopular trend of GM food is the reason that you don’t know about GM food?	98.6	1.4
12.	The lack of media coverage on GM food is the reason that you don’t know about GM food?	98.6	1.4
13.	The lack of labeling on product is the reason that you don’t know about GM food?	98.6	1.4
14.	After completing this survey, will you seek more information on GM food?	98.6	1.4

#### 4.6 - Awareness among different backgrounds

As shown in table 6, cross-tabulation analysis shows that respondent that more awareness base on gender is similar (50%), race is Chinese (80%), single (73.3%), and degree holder (60%).

Table 6 - Background perception toward awareness on GM foods

Items	Aware (%)	Unaware (%)
Male	50	48.5
Female	50	51.5
Race	Aware (%)	Unaware (%)
Malay	0	55.7
Indian	20	15.7
Chinese	80	28.6
Others	0	0
Marital status	Aware (%)	Unaware (%)
Single	73.3	62.9
Married	26.7	37.1
Education level	Aware (%)	Unaware (%)
Secondary	10	28.6
Diploma	26.7	22.9
Degree	60	45.7
Master	0	1.4
Ph. D	0.3	1.4
Total (%)	30	70

#### 4.7 -Attitude toward GM Foods

The finding shows that, responded attitude toward GM is negative; all respondent said that strongly disagree (50%) and disagree (50%) GM foods are worth a premium price and all again indicated strongly disagree (45%) and disagree (55%) that they would purchase GM food even though the price is higher than non-GM food. Again some respondent attitude on GM food quite positive; 29% strongly disagree (5%) and disagree (24%) that they would choose non-GM food even though the price of GM food is cheaper. Another 29% strongly disagree (11%) and disagree (17%) that they were reluctant of GM food and finally 27% said it would be wise for me to buy GM food agree (25%) and strongly agree (2%) that they would be wise for me to buy GM food. The details in table 7.

Table 7 - Attitude toward GM foods (100 respondents)

1- Strongly Disagree; 2 – Disagree; 3 - No Idea; 4 – Agree; 5 - Strongly Agree

	Questions	Percent (%)				
		1	2	3	4	5
1.	It would be wise for me to buy GM food.	41	32	0	25	2
2.	I do not mind to pay a bit more to for non-GM food.	6	23	3	43	25
3.	I am reluctant to GM food.	11	17	2	39	31
4.	I would avoid from eating GM food.	7	19	0	42	32
5.	I would choose non-GM food even though GM food is cheaper.	5	24	0	36	35
6.	I would choose GM food even though is higher than non-GM food.	45	55	0	0	0
7.	GM foods are worth a premium price.	50	50	0	0	0

#### 4.8. Perception toward GM food

The result shows in table 8, shows that most of the respondent had a negative perception on GM food, all respondent agree and strongly agree that Government must introduce voluntary GM food labeling system in Malaysia (76% agree and 24% strongly agree); they have the right to know the ingredients used in GM food production (69% agree and 39% strongly agree) and respondent strongly agreed that media should inform about GM food (64% agree and 36% strongly agree). The study shows interesting finding that some respondents look at GM food at a positive side. 29% of respondents strongly disagree (5%) or disagree (24%) that GM foods have unexpected side effects. Another 26% strongly disagree (5%) or disagree (21%) development of GM food is more about making money than making better food. Finally 23% said they strongly disagree (7%) or disagree (16%) GM food should forbidden in Malaysia. The finding also found out that 18% said they were no idea that GM food is unnatural.

Table 8 - Perception toward GM foods

1- Strongly Disagree; 2 – Disagree; 3 - No Idea; 4 – Agree; 5 - Strongly Agree

	Questions	Percent (%)				
		1	2	3	4	5
1.	Genetically Modified (GM) food is unnatural.	0	0	18	41	41
2.	The development of GM food is more about making money than making better food.	5	21	1	51	22
3.	I belief that GM foods have unexpected side effects.	5	24	0	32	39
4.	Government must introduce voluntary GM food labeling system in Malaysia.	0	0	0	76	24
5.	I have the right to full labeling of all GM food.	0	0	5	56	39
6.	I have the right to know the ingredients used in GM food production.	0	0	0	69	31
7.	The media should inform about GM food.	0	0	0	64	36
8.	GM food should forbidden in Malaysia.	7	16	2	41	34

**4.9. Difference Perception between age, gender, marital status and education level with consumer perception and attitude toward GM food.**

In order to identify if there is a significant mean difference, the following hypotheses are used:

H1: There is a significance mean difference between age with attitude and perception of consumer on GM foods in Klang Valley, Malaysia

T-test analysis shows that there is no significance mean difference between age with attitude and perception of consumer on GM foods in Klang Valley, Malaysia, age and attitude -  $p\text{-value} = 0.495 > \alpha = 0.05$ , meanwhile age and perception -  $p\text{-value} = 0.132 > \alpha = 0.05$  therefore H1 is rejected.

H2: There is a significance mean difference between gender with attitude and perception of consumer on GM foods in Klang Valley, Malaysia

T-test analysis shows that there is no significance mean difference between gender with attitude and perception of consumer on GM foods in Klang Valley, Malaysia, Gender and attitude -  $p\text{-value} = 0.529 > \alpha = 0.05$ , meanwhile gender and perception -  $p\text{-value} = 0.610 > \alpha = 0.05$  therefore H1 is rejected.

H3: There is a significance mean difference between race with attitude and perception of consumer on GM foods in Klang Valley, Malaysia

The analysis of variance (ANOVA) showed that there is a significant mean difference in attitude towards GM food between Malay and Indian,  $p\text{-value} = 0.001 < \alpha = 0.05$  and between Malay and Chinese,  $p\text{-value} = 0.001 < \alpha = 0.05$ . Therefore Ho reject and H1 accept. The result also shows that there is no significant mean difference on attitude towards GM food between Indian and Chinese respondents,  $p\text{-value} = 0.093 > \alpha = 0.05$ .

Since there is a significant difference between race and attitude, further analysis is done by using Post Hoc test to identify which attitude is the most among the races. In terms of race respondent perception toward GM food, study shows that mean attitude for Malay is the highest = 3.2051, followed by India = 2.7479 and the lowest is Chinese = 2.5422. It means that Malay attitude toward GM food more stronger compare to Indian and Chinese. Detail in table 9.

Table 8 - Post Hoc Test -Multiple Comparisons

LSD

Dependent Variable	(I) Race	(J) Race	Mean Difference (I-J)	Std. Error	Sig.	Mean	Std. Deviation
avatt	Malay	India	.45723*	.13033	.001	3.2051	.19052
	India	Chinese	.20569	.12806	.111	2.7479	.59661
	Chinese	Malay	-.66292*	.09862	.000	2.5422	.53769
avperception	Malay	India	.26301*	.12596	.039	4.3365	.20907
	India	Chinese	.20989	.12377	.093	4.0735	.48424
	Chinese	Malay	-.47290*	.09532	.000	3.8636	.54574

\*. The mean difference is significant at the 0.05 level.

**5. Discussion**

The finding from objective one found out that the awareness level of the consumers towards GM food concept was still low. It showed that there was 70% of the respondents did not know what GM food is. The study also showed that the consumers were not aware which products contain GM component even though they were aware the existence of the GM food.

For the objective two, result indicated that the respondent have a negative attitude towards GM food, it should forbidden because unnatural and they felt that GM foods can bring unexpected side effects. Even though, most of the respondents were not aware what GM food but they were reluctant to try and avoid buying and consuming it. For those who are aware about GM foods were not support the purchasing and consuming it. They also said that they are willing to pay a premium for get a non-GM food.



In this study the consumers were concerned about the labeling of the product. They said that food labeling system is very important and did not exist in Malaysia. They added that they should have the right of full labeling of all GM food and they want to know the ingredients used in GM food production. It is interesting to show that level of awareness towards GM food is similar in term of gender and age but different in term of race, where the attitude towards GM foods is higher for Malay, followed Indian and finally Chinese. The result conclude that Malaysian in this study prefer non-GM food even the price of GM food was cheaper. This indicated they were not willing to accept the GM food. Besides, they have a negative attitude and perception towards the GM food and were not willing to accept, consume or buy the GM food.

Since GM foods important for future biotechnological industry and study found out that most of Malaysia still not aware, therefore government should promote more about knowledge about biotechnology to the public. This can increase the public awareness about the existence of the GM foods. The government can promote it by giving speeches, having campaigns, and also post the information on the government websites and advertisements. Finally, the government must introduce the voluntary GM food labeling system. This can enable the consumers to differentiate the foods into GM and non-GM. The voluntary GM labeling system should be imposed so that the companies who used the imported GM ingredients need to inform the particular product contain GM ingredients. This can help the consumers who want to avoid from consuming GM foods to select the right products. Unclear food products' labeling can create uncertainty and distrust of the consumers towards the particular products.

### Bibliography

Bashir Ibrahim, Golnaz Rezal, Zainal Abidin Mohamed & Juwaidah Sharifuddin (2013). Determinants of consumer perception towards genetically modified (GM) foods: Malaysian case study. *3th International Conference on Management Proceeding* , 488-499.

Bashir Ibrahim, Golnaz Rezal, Zainal Abidin Mohamed & Juwaidah Sharifuddin (2013). Malaysian consumers' awareness and GM food: What are the factors influencing? *4th International Conference on Business and Economic Research Proceeding.*, (pp. 549-561). Bandung, Indonesia.

Boccaletti, S. & Mor, D. (2000). Consumer willingness to pay for GM food products in Italy. *AgBioForum Vol 3* , 259-267.

Cottrell, D. W. & Cheng, J. (2010). *Food and agricultural import regulations and standards- Narrative*. Malaysia: Global Agricultural Information Network.

Cottrell, D. W. & Cheng, J. (2010). *New regulations on the gardening packaging and labeling*. Kuala Lumpur: Global Agricultural Information Network.

Grunert, K. G., Bredahl, L. & Scholderer, J. (2003). Four questions on European consumers' attitudes toward the use of genetic modification in food production. *Innovative Food Science and Emerging Technologies, Vol 4* , 435-445.

Kamariah Ismail, Khairiah Soehad, Sarasvathi Vivishna, Wafa Khurram & Mohammad Khairudin Ramily (2012). Genetically modified food and consumer purchase intentions: A study in Johor Bahru. *International Journal of Business and Social Science, Vol 5(3)* , 197-207.

Kamariah Ismail, Sarasvathi Vivishna, Wafa Khurram & Syed Khurram Ali Jafri (2012). Evaluating consumer purchase intentions for genetically modified food in Malaysia: A comparative study of muslim and non-muslim consumers. *Research Journal of Applied Sciences, Engineering and Technology, 4(5)* , 446-474.

Kimenju, S. C., Groote, H. D., Karugla, J., Mbogoh, S. & Poland, D. (2005). Consumer awareness and attitudes toward GM foods in Kenya. *African Journal of Biotechnology, Vol 4* , 1066-1075.

Latifah Amin, Jamal Othman, Goh, H. L. & Kamaruzaman Jusoff (2011). Consumer Information and agro-biotechnology: The experience of Malaysia. *American-Eurasian Journal of Agriculture and Sciences* , 1006-1017.

Latifah Amin, Jamal Othman, Goh, H. L. & Kamaruzaman Jusoff (2011). Consumer preference for genetically modified (GM) food: The case of less saturated fat palm oil in Malaysia. *African Journal of Agricultural Research, Vol. 6(23)* , 5212-5220.

McCluskey, J. J., Grimsrud, K. M., Ouchi, H. & Wahl, T. I. (2003). Consumer response to genetically modified food products in Japan. *Agricultural and Resource Economic Review, Vol 2* , 222-231.

Tung, N. Y., C. T., Son, R., Raha, A. R., Lai, O. M. & Clemente Michael Wong, V. L. (2008). Detection of genetically modified organisms (GMOs) using molecular techniques in food and seed samples from Malaysia and Vietnam. *International Food Research Journal*, 15(2) , 155-166.

Zhang, X. Y., Huang, J. K., Qiu, H. G. & Huang, Z. R. (2010). A consumer segmentation study with regards to genetically modified food in urban China. *Chinese Agricultural*, 1-7.