

Factors Influencing Consumers' Willingness to Purchase Genetically Modified Organism (GMO) Food Products in Klang Valley, Malaysia

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Article History

Received: 10.12.2018

Accepted: 19.12.2018

Published: 30.12.2018

DOI:

10.21276/sjbms.2018.3.12.6



Abstract: The results of the survey showed that consumers generally know (53.3%) what genetically modified organisms (GMOs) are, but they do not have enough information about the genetic modification process. The main concerns of consumers about GMO foods are their carcinogenic effects to human. The usage of GMOs in health sector and in preventing environmental pollution were the most approved areas by the consumers, whereas the majority of consumers disapproved the use of genetic modifications in food applications. This study shows that knowledge, perceived risks, attitude, labeling have a significant relationship with willingness to purchase GMO food products based on the survey conducted in Klang Valley, Malaysia. The study showed importance of willingness to purchase GMO food products to determine the success of the business with human needs. So, this study will help the GMO food products entrepreneur to plan and run their business accordingly to achieve success. In addition to that, the survey data will be helpful to the GMO authority, to understand the behavior intention of the consumers of Malaysia, which will help them for further research as well as to take adequate measures for the better managerial implications of the GMO food products company in Malaysia.

Keywords: Genetically modified organism's food, Consumer, Klang Valley.

INTRODUCTION

Genetically modified organisms (GMOs) can be defined as organisms (i.e. plants, animals or microorganisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination. The technology is often called "modern biotechnology" or "gene technology", sometimes also "recombinant DNA technology" or "genetic engineering". It allows selected individual genes to be transferred from one organism into another, also between nonrelated species. Foods produced from or using GM organisms are often referred to as GM foods (WHO). Professor Liam, and Sir [1] have defined GMO food based on a definition in EC novel food regulation as "a food which is or which is made from, a genetically modified organism" and which contains genetic material or protein resulting from the modification. This controversy application was discovered in means to feed the world's hunger, eliminates starvation in the third world, and for better quality and quantity of food. Regardless of its hopeful and optimistic goals some gaps, questions, and concerns have to be highlighted and raised regarding its effect on

health and environment, its risks, and ethicality of such technology.

Genetically modified Organism (GMO) crops occupied our markets and made accessible in the mid-1990s, according to Anderson *et al.* [2] 124 million acres of biotech crops were grown in the United State alone in 2005 and in 2006 an estimate of 61 percent of all corn and 89 percent of all soybeans planted the United State were GMO corps.

GMO food is a global observable fact that can't be denied as the production of GMO crops are greater than ever, but this will never stop the criticism and row of using such technology and the acceptance of GMO food differs among region. Conforming to Quan *et al.* [3] in contrast of Europeans and Japanese consumers who have pushed many processors and retailers not to accept GMO ingredient to guarantee their consumers confident, as the Chinese consumers prefer to grow GMO corps which requires less chemicals. Simon *et al.* [4] are in agreement with the statement before, as they have points out GMO crops

are better received in several developed countries, where they are not that well appreciated by Europe and Japan.

As stated by Anderson, Wachenheim, and Lesch [2] quarter of United State residents thought they have never consumed food containing GMO components which are impossible but possible to explain. The unconscious GMO food consumption is possible as food product labels in the United States of America do not indicate either presence or lack of GMO content. More than 160 countries such as Japan, Russia, South Korea, and the European Union as indicated by Conforming to Quan *et al.* [3] have signed the 2000 Cartagena Protocol on Bio-safety, which oblige labeling GMO products. Labeling is obliged as a result of the worries and fright of risks that people had regarding this technology that has been broadly used as it includes our daily products like GMO milk and what's known today by the golden rice. Though labeling has taken place in year 2000 but still people in the United State when they were ask in year 2006 have no knowledge about their own GMO food consumption, this indicates one fact labeling is not enough.

The golden rice was introduced as a solution to food that lacks enough nutrients and hunger poor people suffer, as its explained by Kym, Lee and Chantal [5] "GMO food research is focusing also on breeding for attributes of interest to consumers, beginning with 'golden rice', which has been genetically engineered to contain a higher level of vitamin A and thereby boost the health of poor people in developing countries." Many heroic aims for a better world are set to achieve by GMO food but the biggest obstacle that stands in the way of this achievement is the acceptance with factors influencing consumers' willingness to purchase of such technology.

Problems that are investigated throughout this research are based on how far GMO food products is influencing consumers' willingness to purchase in Klang Valley of Malaysia and how its health and environment effects, its risks, and ethicality will affect the factors influencing consumers' willingness to purchase of such technology. Based on this obstacle the main purpose of this research is raised which is how well is GMO food products and attribute among the consumers in Klang Valley of Malaysia under the influence of its effect on health and environment, its risks, and ethicality, and so is the research question which studies on how does the issues surrounding GMO food effect their choice of those consumers whether to accept GMO food or not.

The objectives of this study are to identify the information on the level of influence of, knowledge

about, and attitudes and potential behaviours toward foods containing GMO ingredients. The study was conducted among consumers in Klang Valley of Malaysia; Specific goals of this study are as follows:

- To understand the knowledge has a significant influence on consumer's willingness to purchase GMO food products,
- To determine the perceived risk has a significant influence consumer's willingness to purchase GMO food products,
- To examine the attitude has a significant influence on consumer's willingness to purchase GMO food products,
- To identify the labelling has a significant influence consumer's willingness to purchase GMO food products.

This study developed questions to accomplish the objectives of the research, is the following questions are:

- Does the knowledge has a significant influence on consumer's willingness to purchase GMO food products?
- Does the perceived risk has a significant influence on consumer's willingness to purchase GMO food products?
- Does the attitude to technology has a significant influence on consumer's willingness to purchase GMO food products?
- Does labeling have a significant influence on willingness to purchase GMO food products?

SIGNIFICANCE OF STUDY

This research aims to explore the factors influencing toward genetically modified organism food products, for the reason that these are higher yielding crops with more efficient use of land, Longer shelf life, less waste: instance: Tomatoes as of genetically modified seeds stay fresh longer, better taste and quality, Increased and improved nutrients and stress tolerance, A single gene genetically engineered keen on cauliflower can increase production of beta-carotene 100 times, A gene be able to be implanted into a soybean upgrading the soy protein to a quality equal toward that of milk, Corn be able to be modified to contain its two limiting amino acids, lysine otherwise tryptophan as well as finally Improved resistance to disease or illness foods can be enhanced with photochemical that help maintain health with reduce the risks of chronic disease [6].

The finding of the study is expected to explain of GMO food and corps production still the concerns pointed out earlier worries the consumers and affect their factors influencing consumers' willingness to purchase, which is our main concern in this research.

DEFINITION OF TERMS

Table-1: Dependent Variable

Series	Dependent Variable	Definition
1	Willingness to Purchase GMO Food Products	It directly linked to an individual’s factors influencing consumers’ willingness to purchase towards genetically modified organism (GMO) food products [7].

Table-2: Independent Variables

Series	Independent Variable	Definition
1	Knowledge	This study was to review consumers' knowledge of current fiber recommendations and their factors influencing, and understanding of GMO food products [7].
2	Perceived Risks	Perceived risks are the uncertainty a consumer has when buying GMO food, mostly those that are particularly expensive. Every time a consumer considers buying GMO food, he or she has certain doubts about the food, especially if the GMO food products in question is highly priced [7].
3	Attitude towards technology	Determinants of consumer attitudes and purchase intentions with regard to genetically modified food technology process [7].
4	Labeling	The Fair Packaging and Labeling Act (FPLA or Act), enacted in 1967, directs the Federal Trade Commission and the Food and Drug Administration to issue regulations requiring that all “consumer commodities” be labeled [7].

UNDERPINNING THEORY

The Theory of Planned Behavior was originally developed to explain social behaviors, but has in recent years been successfully applied to explain aspects of consumer behavior as well [8, 9]. It has also been demonstrated to the theory, or modified versions of the theory, is valid to explain consumers’ food choice

[10-12]. The low experience of consumers through genetically modified organism food products to date together with the general complexity of the subject warrant a number of modifications to the Theory of Planned Behavior in its current application. These modifications are elaborated below.

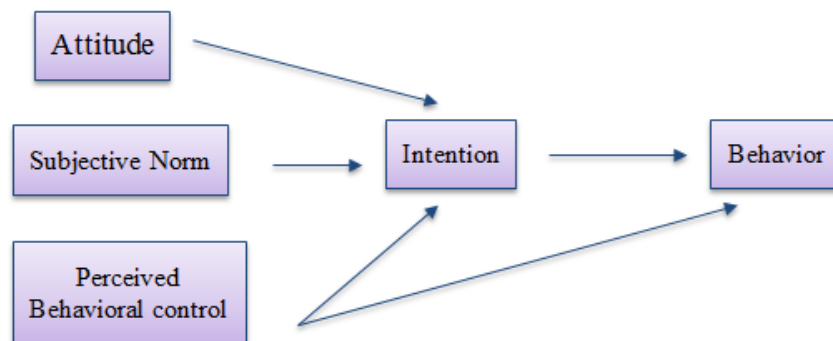


Fig-1: Theory of Planned Behavior [13]

Firstly, the reality that consumers are not familiar with genetically modified organism food products implies to facilitate they will find it difficult to imagine the types of products discussed as well as more to generalize in stating with explaining their purchase intentions. We consider the predictive validity of studies on consumers' purchase decisions with regard to genetically modified organism food products can be greatly strengthened through focusing on specific products rather than investigating purchase decisions with regard to genetically modified organism food products in general.

The attitude is a person holds towards buying a GMO food product is likely to be determined both through the perceived attributes and consequences of buying and consuming the product as well as by the attitude that the person has towards GMO in food production in general. The relationship between the attributes and consequences of purchasing the actual product and the GMO attitudes held towards GMO is hypothesized to be compensatory. This means that the model should allow a possibly negative attitude towards GMO in food production to be offset through specific consequences of purchasing and consuming the product which the consumer regards as attractive.

INDEPENDENT VARIABLES

Knowledge

The previous analysis given that the educational level is statistically significant for all items of this factor and also the lower the educational level, the lower the knowledge regarding GMOs. By the way, the most consumers' at all educational levels know that some crops may become resistant to certain pests through genetic modification. College or higher education indicates the group with a higher level of knowledge, this noted that the higher the educational level, the greater the knowledge regarding GMOs [7].

Perceived Risks

Font and Gil [14], in their study on consumer acceptance of GMO foods, revealed that perceived risks are a having to do with an important construct of underlying attitudes and buy intentions towards GMO foods. Furthermore, these perceived risks within one area differ between cultures or disparate cultural groups in the similar country. Hover and Macinnis [15] demonstrated six types of perceived risks; performance risks, financial risks, physical/safety risks, social risks, psychological risks and time risks. While studies have been restrained to regard the nature of perceived risks on the consumers' buy intentions, producers have ignored the violence of these consumers' perceived risks for GMO foods somehow. It has been argued that government should engage in recreation an important nature to standardize this problem as well as steadfast testing about GMO food products should be implied once up on a time bringing them to the market [16].

Poveda *et al.* [17] shed stumble on the increasing concerns of the consumers regarding GMO foods and its applied force pros as well as cons. The role of information truthfulness and health concerns has been found to play a noteworthy role on level of perceived risks among the consumers. It has been argued to consumers by all of more knowledge roughly GMO foods as well as technology are liable to perceived less risks in terms of health hazards associated through its consumption [18, 19].

Attitude toward Technology

This reported by Aerni [20], where most Mexican consumer believe GE is a useful tool to address the problems of agriculture and nutrition but are concerned about the possible environmental risks of transgenic crops, for example, transgenic pollination of local landraces. The technology is an important factor for human development, and specifically for Mexican society and its economy. Likewise, most consumers agree that science and technology are important for producing and processing healthier products; however, the significant is concern about the environmental effects of transgenic.

Labeling

These are consistent with reports from studies conducted in Mexico by Aerni [20] and in Turkey by Tas *et al.* [21], which found that consumers are in favor of mandatory labeling of transgenic products. Labeling toward willingness to purchase GMO food, the labels of products they consume which is consistent with the fact that consumers believe that transgenic products must carry warning labels about their transgenic content. Also, consumers believe that the Mexican government must legislate the labeling of GMOs.

DEPENDENT VARIABLE

Willingness to Purchase for GMO food Products

Consumer attitude toward GMO food 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 GMO food products. Within Malaysia study done by Bashir *et al.* [22] found out that Chinese consumers have positive attitude towards the GMO food even though they only have low knowledge concerning it. Meanwhile, Kamariah *et al.* [23] studied 190 respondents have showed to consumers in Johor Bharu had negative attitude furthermore they were concerned about the risks attached with the GMO food.

It is similar to study by McCluskey *et al.* On [24] on 400 respondents, which found out to only 3% of them said that they would be willingness to purchase the GMO food at the same price with non- GMO noodles. Another 17% said that they would be willingness to purchase the GMO noodles if they were

less expensive than the non-GMO noodles. Lastly, the remaining 80% of respondents are totally opposed through GMO noodles as well as would not purchase it even with discount.

It is different with study done by Kimenju *et al.* [25] on 640 of Kenya consumers. The result showed that 68% of the respondents' attitude toward GMO food further positive, they were accepting as well as

willingness to purchase GMO maize at the same price as their preferred maize brand. This can show that the Kenya consumer's acceptance level towards the genetically GM food was high.

PROPOSED RESEARCH FRAMEWORK

The figure below the theoretical framework on my conduct the study.

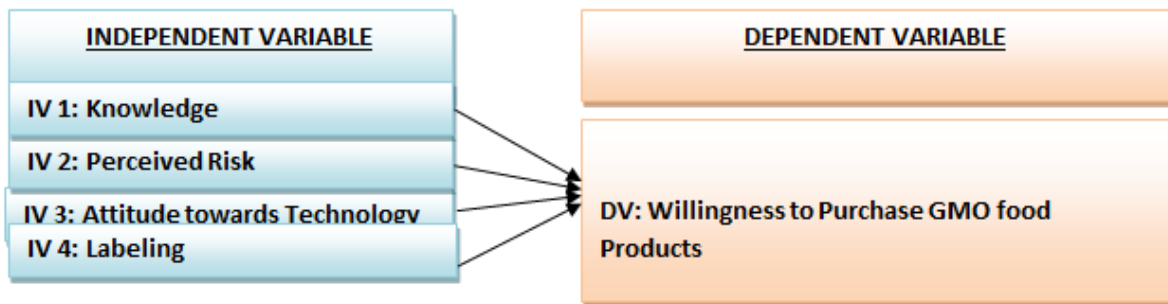


Fig-2: The Theoretical Framework

RESEARCH METHODS

This research adopted a quantitative approach using a questionnaire as the instrument. Quantitative research is concerned with how frequently a variable is concerning and the use of numerical data. A non-random method was used in the selection of respondents, in which not all potential respondents have an equal chance of being selected. However, the research was conducted using a convenience sampling technique, which is a non-probability sampling technique. On the other hand, bias in gathering and presenting data by the researcher can be prevented using a quantitative approach. The data for this research was gathered through the distribution of a survey questionnaire. In order to get a significant amount of relevant information within a large population, a questionnaire survey is appropriate because it is easy to administer and less expensive in terms of time and resources. It is important that all aspects, including the objective and purpose of the study, are clearly explained by the researcher. Moreover, the researcher designs a survey questionnaire which includes an investigation of numerical information. Insights obtained from the sample help to produce a dependable result that can be generalized to the broader population. This research was conducted using primary data, whereas it was collected from the respondents of the survey. With respect to handling the data, the Statistical Package for the Social Science (SPSS) software version 22 was used to transform and analyze the data.

Nominal Scale

The nominal scale allows researchers to allocate subjects to certain categorizes or organized group. It also used to obtain individual data. In this research, nominal scales were used to obtain data on ethic, household monthly income, gender, age, highest

education, heard, harmful, contain components, brought and checking about GMO food products.

Interval Scale

Data collected from the respondents will allow researchers to perform certain statistical functions such as interval scale. Interval scales usually measure certain order or categories of group or individual. The degree of difference in preferences among individuals can be measured by interval scales. For this research, a numerical scale of “strongly disagree”, “disagree”, “slightly agree”, “agree”, and “strongly agree” were used for both independent and dependent variables.

RESEARCH DESIGN

Polit & Hungler [26] describe the research design as a blueprint, or outline, for conducting the study in such a way that maximum control will be exercised over factors that could interfere with the validity of the research results. Quantitative data can be transposed into numbers, in a formal, objective, systematic process to obtain information and describe variables and their relationships [27]. This study used the quantitative exploratory descriptive research design to identify, analyze, and describe factors influencing consumers' willingness to purchase genetically modified organism (GMO) food products. It was attempted to quantify factors identified as consumers' willingness to purchase GMO food products in Klang Valley, Malaysia.

In selecting the research design, a descriptive survey method was used to compile relevant information and data through specific questionnaire. Survey is based on primary data collection technique. The data collected were compiled through specific questionnaire. This is useful in describing

individualities of students in Klang Valley, Malaysia. Other than that, the advantages of using descriptive survey are the high accuracy of the results, the flexibility of it as well as it enables a large amount of information. Survey questionnaires also offers reasonably quick, inexpensive, and efficient and accuracy in the means of discovering the willingness to purchase GMO food products, knowledge, perceived risks, attitudes towards technology and labeling of almost any consumers'' targeted for researches. In this research, a cross-sectional survey was adopted as the research design because using questionnaire instrument and the data collection by limiting investigation to a static analysis.

POPULATION AND UNIT OF ANALYSIS

This research has employed the quantitative research methodology. The instrument used to collect the data was a questionnaire containing questions. The questions developed are based on a questionnaire used previously by another study by Anderson, Wachenheim, and Lesch [2]. The questionnaire was passed to 60 respondents fixed among in Klang Valley areas of Malaysia randomly, where its scope of distribution and study did not limit its focus on a certain areas, level of position, age, or a gender. Therefore, to assure that the questions are fully understood the respondents were urged to read the brief introduction on GMO food concept which is stated at the top in each questionnaire.

SAMPLING TECHNIQUE AND PROCEDURE

The main purpose of sampling is to choose a subset of individuals from a population in organize to estimate characteristics of the entire population. When choosing a quantitative research method such as questionnaires, using a sampling generates finding that are representative of the entire population. Within non-probability sampling techniques, generalization is made about theory not about the population; therefore, a sample size will depend on the study objectives as well as research questions. Different methods of non-probability sampling can be used. They include quota sampling, snowball sampling, purposive or convenience sampling. A convenient sampling method was used for this research, which means that individuals who were easiest to include in the research were chosen. Since, the basic method of predicting about population is the

use of sampling due to which we can easily find out results about population without any difficulty. Within this research we use heterogeneity of population with 4 pages survey was distributed to 60 respondents for this study. We were selected general consumers those were buying the GMO food products in the particular shopping mall.

DATA COLLECTION AND PROCEDURE

To analyze the data, a total of four independent variables are taken in consideration including Knowledge, Perceived Risk, and Attitude towards technology as well as Labeling that affect with environment, health concerns, risks, and ethicality. Under each variable there are five questions and four questions with labeling to have a total of nineteenth questions. The Data obtained were answers to Yes/No questions, once obtained they are inserted into computer software called Social Science (SPSS). To make the subsequently evolutions of the answers obtained easy and straightforward when comparing between the four criteria of GMO food acceptance with willingness to purchase, the questions have been designed to take yes as indicator of GMO food rejection and no as indicator of acceptance with willingness to purchase. Results obtained were presented based on how frequency they take place in each variable of the four variables and other statistical method for Social Science (SPSS) software version 20.0 for validity, reliability, and relationship testing analyses and to reach a clear conclusion.

SUMMARY OF MEASUREMENT ITEMS

In this research, there will be six sections followed by variables, number of items, cronbach's alpha and sources. The variables column are concerning on demography of respondents with 8 questions based on basic questions related to influencing consumers' willingness to purchase of GMO food products. Next the dependent variable (DV) which is willingness to purchase for GMO food products with 5 questions and independent variables (IV) are firstly knowledge, perceived risks and attitude towards technology with 5questions, and secondly labeling with consisted 4 questions. With total 32 questions in this instrument was the Cronbach's Alpha more than 0.7.

Table-3: Summary of Measurement Item

Sections	Variables	Number of items	Cronbach's alpha	Sources
A	Willingness to purchase for GMO food Products.	2	0.911	Kamariah <i>et al.</i> [23]
B	Knowledge	8	0.752	Erni & Sam [28]
C	Perceived Risks	2	0.911	Kamariah <i>et al.</i> [23]
D	Attitude towards Technology	7	0.961	Kamariah <i>et al.</i> [23]
E	Labeling	6	0.816	Anna <i>et al.</i> [29]

Table-4

Variables (iv 1)	Original	Adapt
Knowledge	1. I know what the genetically modified organism food is.	1. I have knowledge about GMO food products.
	2. I know the difference between “genetically modified organisms” and “conventionally modified organisms”.	2. I have knowledge with deference between GMO and CMO.
	3. I know which GMO food products I eat in our country.	3. I am eating GMO food products that are existing in my country.
	4. I know a GMO food product for human consumption that is imported into Malaysia.	4. I know the GMO food product is imported into Malaysia for human consumption.
	5. I know if there are laws or regulations that regulate the production and consumption of genetically modified products in Malaysia.	5. I think government has laws or regulations that regulate the production and consumption of GMO product in Malaysia.
Perceived risks	1. I think the consumption of genetically modified products is a risks to the health of Malaysia.	1. I think GMO food products have risks to the healthy like conventional foods.
	2. I think the cultivation of genetically modified crops will cause severe environmental damage in Malaysia.	2. I think the cultivation of genetically modified crops is cause severe environmental damage in Malaysia.
	3. I think the consumption of genetically modified products could have negative effects on our descendants.	3. I think the consumption of GMO food products could have negative effects on our next generations.
	4. I think the production and consumption of GMO food products threaten human nature.	4. I think the production and consumption of GMO food products is threaten for human nature.
	5. I think that GM products can cause diseases in my family.	5. I think the GMO food product is cause diseases in my family.
Attitude towards technology	1. I think the science and technology are important for social development.	1. I think Science and Technology is the main concern nowadays world.
	2. I think the science and technology are fundamental to the development of Malaysian society.	2. I think science and technology are fundamental for developing of Malaysian society.
	3. I think the science and technology are essential for generating healthy products for Malaysia.	3. I think science and technology are necessary for generating healthy food products in Malaysia.
	4. I think the new technological developments will affect the ecological equilibrium in Malaysia.	4. I think new technological development equipments are consideration for effectiveness for ecological equilibrium in Malaysia.
	5. I think the science and technology can contribute to improving the Malaysian economy.	5. I think Malaysian economy contributions come out with based on science and technology.
Labeling	1. I have the habit of reading the labels of the products that my family consumes before buying them.	1. I have tendency to read the label of products that consumes my family before buying them.
	2. I think the labels on GMO food products must indicate and contain genetically modified ingredients.	2. I think GMO food products indicate and its ingredients contain with the labeling.
	3. I think the advertisements of genetically modified products should inform the consumer of the content of the product in Question.	3. I think it’s better for advertisements with the information content of the product in question towards consumers of GMO food products.
	4. I think the Malaysian government should create laws to regulate the labeling of GMO food products.	4. I think Malaysian government has the laws to regulate the labeling of GMO food products.

Source: Osval *et al.* [7]

DEMOGRAPHIC PROFILE OF RESPONDENTS

The study initially gathers the information on the respondents which is the demographics information

including ethnicity, gender, age, highest level of education, and monthly income. The findings are shown in table 5 below.

Table-5: Demographic profile of the study

Item	Frequency	Percentage (%)
Ethnicity		
Malaysian	47	78.3
Others	13	21.7
Gender		
Male	53	88.3
Female	7	11.7
Age		
18 – 23	48	80.0
24 – 29	4	6.7
30 – 35	8	13.3
Educational level		
High school	2	3.3
Degree	48	80.0
Post graduate (masters/doctorate)	10	16.7
Household (family) monthly income		
Less than rm 2000	20	33.3
Rm 2001 to rm 5000	22	36.7
Rm 5001 to rm 8000	5	8.3
More than rm 8000	13	21.7
Heard gmo food		
Yes	32	53.3
No	28	46.7
Gmo food is harmful		
Yes	35	58.3
No	25	41.7
Products contain gmo components		
Chocolate	15	25.0
Rice	6	10.0
Potato chips	8	13.3
Milk	10	16.7
Tomato	15	25.0
soya	4	6.7
Ice cream	2	3.3
Bought gmo food		
Yes	49	81.7
No	11	18.3
Check gmo food		
Yes	12	20.0
No	48	80.0

Table 5 indicates that; 88.3% of the total respondents were male and 11.7% were female. The respondents cover a wide variety of age range, however, most of the respondents (80.0%) are within 18 to 23 years old. 13.3% of the total respondents are between 30 to 35 years old and 6.7% are between to 25 to 29 years old. As the survey was conducted in Malaysia, it found that 78.3% of the total respondents are citizens of Malaysia and only 21.7% of belonging to other nationality. In relation to educational qualifications, it is found that 80.0% of the respondents have completed their Degree, 16.7% completed their Post Graduate (Masters/Doctorate) and another 3.3% completed their High School education. The survey further shows the monthly salary of the respondents; it is found that 33.3% of the total responded earn below RM 2000, whereas 36.7% earns RM 2,001 – RM 5,000, 8.3% earns RM 5,001 – RM 8,000, 5.6% earns and 21.7% earns more than RM 8000 in a month.

Table-6: Summary of Measurement Items

Variable (DV)	Original	Adapt
Willingness to purchase For GMO food products	1. I buy GMO food products if they contain less fat than conventional products.	1. I enjoy the GMO food products although there are less fat than conventional products.
	2. I buy GMO food products if they were cheaper than organic products.	2. I consume the GOM food product with cheaper price than organic food products.
	3. I buy GMO food products if they were grown under similar environmental conditions as organic products.	3. I buy GMO food products if they were similar conditions as organic products.
	4. I buy GMO food products if their price is equal to the price of organic products.	4. I buy the GMO food products if organic food products are like equal price.
	5. I buy a kilogram of GMO food beans if the conventional kilogram of beans cost the same.	5. I buy GMO food product as like a kilogram of beans than conventional kilogram of beans cost the same.

Source: Osval *et al.* [7]

In additional; 53.3% respondents said they have known about GMO foods products but nearby 46.7% didn't know about this. Although 58.3% respondents stated that these GMO food products are harmful for their health and 41.7% were against them. There were 25.0% respondents bought chocolate and tomato, nearby 16.7% were milk with that contained GMO components. The location for buying GMO food products are more like supermarkets with 81.7% and only 18.3% are from other shops. Before they buy,

80.0% of respondents didn't check the product whether the food is GMO food or not, only 20.0% were checking the food.

FACTOR ANALYSIS

Factor analysis is used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. Table 7 shows the factor matrix of each variable of the study.

Table-7: Factor Matric each variable

	Component					
	1	2	3	4	5	6
PCQ5	.896					
PCQ4	.859					
PCQ3	.859					
PCQ1	.794					
PEQ4	.628					
PCQ2	.606					
PDQ5		.872				
PDQ2		.863				
PDQ3		.829				
PDQ4		.758				
PDQ1		.598				
PFQ3			.875			
PFQ1			.796			
PFQ2			.777			
PFQ4	-.615		.633			
PFQ5	-.569		.632			
PBQ2				.857		
PBQ4				.852		
PBQ1				.744		
PBQ3				.581	-.542	
PEQ2					.778	
PEQ3					.679	
PEQ1						.721
PBQ5						

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization^a

The 7 above table shows the factor analysis of the study. The factor analysis was conducted using the ‘Principle Component Factoring’ extraction method and ‘Varimax with Kaiser Normalization’ rotation method. Initially, the factorability of the 24 items was examined with five items for each variable of PB, PC, PD, PF and four items for each variable of PF.

RELIABILITY ANALYSIS

To test the reliability of data model, the internal consistency (reliability) was conducted. Table 8 shows the reliability of each of the variables. According to Nunnally [30], it is acceptable if the Cronbach Alpha is more than 0.7. Meanwhile according to [23], any Cronbach Alpha greater than 0.6 is acceptable. According to George and Mallery [31] Cronbach alpha value below 0.5 is unacceptable.

Table-8: Test of Reliability

	Cronbach’s Alpha (α)	N of Items
Willingness to Purchase	.898	5
Knowledge	.800	4
Perceived Risks	.907	6
Attitude	.837	5
Labeling	.739	2

The above Table 8 shows that all of the Cronbach alpha value is acceptable. However, for the Knowledge and Labeling variables, the Alpha if Item deleted option was used. These are because at first, these give the Cronbach alpha value below 0.6 and after using Alpha if Item Deleted which means three items was removed and rerun the reliability analysis, it gives values of .907 which ideal for the reliability test. Therefore, the deletion of these items can be considered appropriate.

NORMALITY ASSESSMENT

The purpose of normality assessment is to compare the shape of sample distribution with the shape of the normal curve. There are numbers of method available for normality test, however, Shapiro – Wilk test is most commonly used to understand the normality of the data. If Shapiro – Wilk value is more than 0.05, it shows data is normally distributed. Table 9 shows that test of normality.

Table-9: Test of normality

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DV	.093	60	.200*	.975	60	.243
a. Lilliefors Significance Correction						

The above Table 9 shows that the Shapiro – Wilk value of the survey data is not less than 0.05, so it suggests that the data used in this research is normally distributed. On the other hand, To deal with non-normally distributed data researcher often prefer to use Pearson's correlation and Spearman's correlation analysis to identify the relationship between the variables. Pearson's correlation measures the linear relationship between two continuous random variables and Spearman's correlation applies to ranks and so provides a measure of a monotonic relationship between two continuous random variables. Unlike Pearson's correlation, Spearman's correlation is useful with ordinal data and is robust to outliers. In this study to find the correlation between the variables, Spearman's correlation method will be used.

PEARSON CORRELATION ANALYSIS

A correlation matrix is a simple and rectangular array of numbers which gives the

correlation coefficients between single variable and every other variable in the investigation [32].

Table 10 indicates the correlation relationship between the independent variables and dependent variable. If the correlation $\alpha < 0.05$, it means that the independent variable has the relationship with the dependent variable. The correlation coefficients analysis above shows that there is a relationship between perceived risks and labeling with the willingness to purchase GMO food products because its sig. (2-tailed) value showed that it has an $\alpha < 0.05$. There is also a relationship between the perceived risk and labeling with the willingness to purchase GMO food products which have $\alpha = 0.000 < 0.05$ and $\alpha = 0.007 < 0.05$. Whereas, there are no correlation relationship between the perceived risks and the labeling with the willingness to purchase GMO food products. This is because they both have $\alpha > 0.05$.

Table-10: Correlation Analysis

Correlations		Willingness to purchase	knowledge	Perceived risk	attitude	Labelling
willingness_to_purchase	Pearson Correlation	1	.060	-.588**	-.157	-.343**
	Sig. (2-tailed)		.650	.000	.230	.007
	N	60	60	60	60	60
Knowledge	Pearson Correlation	.060	1	.026	.039	-.129
	Sig. (2-tailed)	.650		.841	.767	.327
	N	60	60	60	60	60
perceived_risk	Pearson Correlation	-.588**	.026	1	-.016	.493**
	Sig. (2-tailed)	.000	.841		.902	.000
	N	60	60	60	60	60
Attitude	Pearson Correlation	-.157	.039	-.016	1	-.037
	Sig. (2-tailed)	.230	.767	.902		.778
	N	60	60	60	60	60
Labelling	Pearson Correlation	-.343**	-.129	.493**	-.037	1
	Sig. (2-tailed)	.007	.327	.000	.778	
	N	60	60	60	60	60

**. Correlation is significant at the 0.01 level (2-tailed).

REGRESSION ANALYSIS

Multiple regressions are not just a single technique, but rather a family of techniques that can be used to explore the relationship between one continuous dependent variable and a number of independent

variables or predictors (that are usually continuous). Pallant [33] explains that that multiple regression is based on correlation, but allows a more sophisticated exploration of the interrelationships among a set of variables.

Table-11: Model Summary of Regression Analysis

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.619 ^a	.383	.338	.78878	1.955
a. Predictors: (Constant), labeling, attitude, knowledge, perceived_risk					
b. Dependent Variable: willingness_to_purchase					

Based on table the result shows that all independent variables (knowledge, perceived risks, attitude and labeling) explained 38.3 % on the dependent variable (willingness to purchase). The Model Summary table above refers to a multiple regression analysis where the R represents the combination of all variables. It also contains the R-Square and the Adjusted R-Square column. For Multiple Regression, we wished to report or look at the Adjusted R-Square rather than the R-Square. However,

both of them measure the proportion of the total variability in the dependent variable that is explained by the independent variables (model). From the above Table 11, we can report that 23.8% of total variability in willingness to purchase is explained by the model (knowledge, perceived risks, attitude and labeling). If there are big discrepancies between the R-Square and the Adjusted R-Square, we can suggest that some of the independent variables that included in the regression model are redundant.

Table-12: ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.260	4	5.315	8.542	.000 ^b
	Residual	34.220	55	.622		
	Total	55.479	59			
a. Dependent Variable: willingness_to_purchase						
b. Predictors: (Constant), labeling, attitude, knowledge, perceived_risk						

The above Table 12 also known as the Statistic F-Test for Multiple Regression Analysis. We applied statistician test because we need to know what the null

is and the alternative. The null hypothesis always, for this F-Test in ANOVA table regression, is that the model has no explanatory power, which is the same as

saying that all the coefficients on the independent variables zero. That also the same as saying, none of the independent variables help to predict the dependent variable. In another words, the model is useless. The

Significance column shown that the P-Value is 0.000, which is less than 0.01 and it even way less than 0.05. As such, we conclude that there is a very strong evidence to reject the null hypothesis.

Table-13: Coefficient Table of Regression Analysis

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.986	1.093		6.391	.000
	knowledge	.087	.128	.073	.681	.499
	perceived_risk	-.652	.142	-.562	-4.589	.000
	attitude	-.280	.173	-.172	-1.619	.111
	labeling	-.089	.175	-.063	-.511	.612

a. Dependent Variable: willingness_to_purchase

$$y = 6.986 + 0.87x_1 - 0.652x_2 - 0.280x_3 - 0.089x_4$$

The above 13 table tells about the relationship between the independent variables and the dependent variable for the coefficient. From the table, it clearly shows that only the Perceived Risks is significant as the P-Value is 0.000 which if less than 0.05. As for the other three (3) variables, they are all not significant as their P-Value is more than 0.05. In this study, we failed to reject the null hypothesis, therefore, we have to reject the alternative hypothesis and accept the null hypothesis.

In general, the coefficient on the independent variables in multiple regression can be explained using the above equation which means, for a 1 unit increase in independent variable, the model predicts that the dependent variable will also increase/decrease

(depending on the sign on the coefficient) by 1 unit, holding all of the independent variables constant/fix.

DISCUSSION

The analysis shows that all the four independent variables of the study; knowledge, perceived risks, attitude towards technology and labeling factors with the dependent variables willingness to purchase GMO food products. An opening series of statistical analyses were performed on the data before reaching the concluding analyses. Internal constancy of the study was express by computing Cronbach’s Alpha, followed by process analysis to explore the relationship and the greatest predictor of the study.

Table-14: Hypothesis Testing

Research Question	Hypothesis	Result
a. Does knowledge has a significant influence on consumer’s willingness to purchase GMO food products?	H1: There is a significant influence between knowledge and consumer’s willingness to purchase GMO food products.	Significant .499
b. Do perceived risks have a significant influence on consumer’s willingness to purchase GMO food products?	H2: There is a significant influence between perceived risks and consumer’s willingness to purchase GMO food products.	Significant .000
c. Does attitude towards technology has a significant influence on consumer’s willingness to purchase GMO food products?	H3: There is a significant influence between attitude towards and consumer’s willingness to purchase GMO food products.	Significant .111
d. Does labeling have a significant influence on consumer’s willingness to purchase GMO food products?	H4: There is a significant influence between labeling and consumer’s willingness to purchase GMO food products.	Significant .612

Table 12 provides explain of the MLR analysis. Based on the results, the MLR model with four predictors of consumer’s willingness to purchase GMO food products, anticipation on the overture of GMO food products to the perceived risks, anticipation on the health and environmental outlay aspects of GMO food products and availability of GMO food product reference have worked fine in explaining the conversion

in future to purchase GMO food products (F=8.542; d.f. =4; p=.000^b). From Table 13, insight on GMO food products perceived risks of purchase was bottom to be concerned with significant positive influence on intention to purchase GMO products (t= - 4.589; p=0.000; β= -.562). The quantity of explained variance as measured by R-Squared for the regression is 38.3 % as depicted in Table 11. The beta values specified in

Table 13 seemed to point out perception on GMO food products perceived risks of purchase ($\beta = -.562$) as more essential predictor of willingness to purchase GMO food products. The other dependent variables were not found to be significantly familiar to prospect to purchase GMO food products.

LIMITATION OF STUDY

A limitation of this study is the sample including high percentage of educated young consumers. Hence, the survey can be improved and applied to higher number of participants living in Klang Valley in Malaysia for being more representative for all Malaysian's consumers. Another limitation is appertaining to the fine of outlook for sample selection. This research doomed to get to the bottom of the affair between influencing factors as well as consumer tried to buy intentions. Looking at the geographical data coverage, it is renowned that this experiment is attended based on the data collected from hypermarkets in Klang Valley. This does not bring in other hypermarkets, supermarkets interested in consideration. This design by the same token does not include other areas in Malaysia. Future researchers are assured to plow this study to all consumers from diverse states of Malaysia, especially to describe the full Malaysia. Finally, I focused only on the GMO food products while the factors influencing consumers' willingness to purchase, how these GMO food products influenced the consumers, was not mentioned others related issues on GMO food products in the questionnaire to get response about that.

RECOMMENDATION FOR FUTURE RESEARCH

Few recommendations are latent to infinity studies for also improvement and advancement of the studies in this line. In the describe study, unaccompanied four predictor variables (knowledge, perceived risks, attitude towards technology and labeling) were used. In a superior way detailed understanding of the consumers' purchase intentions is coming by incorporating contrasting predictors appreciate trust, quality in order to have wider thoughtful on the factors fascinating consumers' purchase intentions. Furthermore, we took knowledge, perceived risks, attitude and labeling as routinely whereas greater assessment of more specific knowledge, risks, attitude and labeling devoted to management or organizing, technology uses, practice, dimensions may give a dissimilar image in terms of their consequence on consumers' purchase intentions.

In addition, the present study provided some important insights to improve the methodology. First, the different points of sale represent different types of consumers. However, we do not know how many people fall into each category. Only a household survey could solve this problem, and it is therefore highly recommended. Further, this survey determined the

major sources of information, so future surveys can move from open-ended to close-ended questions.

CONCLUSION

The study was conducted to identify the influence of knowledge, perceived risks, attitude, labeling on the factors influencing consumers' willingness to purchase genetically modified organism (GMO) food products. For the purpose of the study, the survey was conducted upon randomly selected 60 individuals of Klang Valley, Malaysia. The study shows that knowledge, perceived risks, attitude, labeling and willingness to purchase GMO food products have a positive relationship with the factors influencing consumers' willingness to purchase of GMO food products implication.

ACKNOWLEDGEMENT

Authors would like to thanks to Md. Abul Kalam Azad, Faculty of Pharmacy, International Islamic University Malaysia, for his cordial assistance to make it successful and without his kind help it would not be completed.

FUND/SPONSORSHIP

This study was funded by the International Islamic University Malaysia's Research Management Centre bearing the grant number (RIGS- 16-319-0483).

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