

Evaluating Consumer Knowledge Perception and Environmental Risks Perception about Genetically Modified Food in Chennai City

Mrs. PRIYA JOTHILINGAM¹, Dr. Y. KALAIIVANI²

¹Full Time Research Scholar, Department of Commerce,
Shrimathi Devkunvar Nanalal Bhatt Vaishnav College for Women,
Chrompet - 600044.

²Research Guide and Supervisor,
Associate Professor, Department of Commerce,
Srimathi Devkunvar Nanalal Bhatt Vaishnav College for Women,
Chrompet - 600044.

KEYWORDS

Genetically modified foods, environmental risks, consumer knowledge, perception, understanding, labeling, education, regulatory measures.

ABSTRACT

Genetically Modified foods gaining more popularity among public in recent scenario, it has both advantages as well as disadvantages in it, but the need of this is huge for today's world. The present study concentrates on evaluating consumer knowledge perception and environmental risks perception about genetically modified food. This study has 516 respondents was selected through simple random sampling technique by using structured questionnaire in Chennai city. The study adopted some statistical tool to bring out the association between awareness levels of consumers with knowledge perception and environmental risks perception. The findings of the study depicts that consumers have intermediate knowledge about GM foods and the level of understanding is also considered low, and have concerns over environmental risks. The study highlights the need for effective labeling, education, and regulatory measures to enhance consumer trust and informed decision-making regarding GM foods.

Introduction:

Genetically modified (GM) foods have revolutionized modern agriculture, offering promising solutions to challenges such as food security, climate change, and resource scarcity. Despite these advantages, consumer acceptance remains a significant hurdle due to ongoing concerns over the safety and environmental impact of GM products. Public perceptions of GM foods are shaped by a complex interplay of factors, including knowledge, information accessibility, media influence, and personal beliefs. This research seeks to explore the extent of consumer knowledge regarding GM foods, assess how this knowledge influences their perception of environmental risks, and examine how these perceptions impact their acceptance of GM food products. Moreover, environmental risks, such as potential biodiversity loss and unintended ecological consequences, contribute to the hesitance many consumers feel toward GM foods. Additionally, the research highlights the role of effective labeling, public education, and transparent regulatory practices in addressing consumer concerns and fostering trust in GM products.

Through an indepth understanding of how knowledge and environmental risk perception affects consumer behavior, stakeholders can develop focused involvement that support informed

decision-making and help connecting public skepticism and the growing presence of GM foods in the marketplace.

Genetically modified foods:

Genetically modified organisms is defined as organisms such as plants, and animals in which the genetic material has been altered in a way that they doesn't be naturally by mating and/or natural recombination. The technology is usually called "modern biotechnology" or "gene technology", and sometimes also "recombinant DNA technology" or "genetic engineering". This technology permit preferred individual genes to be transferred from one organism into the other, and also between non related species. The foods which are produced by using GM organisms are called GM foods.

Definition of GM food:

Genetically engineering food is a debatable topic. Earlier than thinking of blocking the introduction of genes from one to another species, we have to consider the benefits of these organisms which produce the probable healthiest and most sustainable food system. People knows that something will happen to any organism when it is modified, and we don't know what will happen to other species in that modified organisms ecosystem. Some of the investigators have not found any troubling element. But, we just cannot be convinced what effect a GMO will have on the ecosystem ("Bill Nye").

Review of literature:

Kai Cui & Sharon P. Shoemaker (Jun 2018):-

This study aims to examine consumers' awareness, knowledge, and opinion on GM food. The study findings suggest that the attitude of the consumers is cautious, the conclusion of the study depicts that strengthening communication to the public, government work should change passivity into initiatives, and respecting public opinion have upgraded moderately, and the acceptance of GM food among consumers is related to the understanding of GM technology. The author concentrates on food safety issue surveys in future studies.

Thi Thuy An Ngo, et al., (Oct 2024):-

This study investigates the interrelation of knowledge and trust in shaping Vietnamese consumers' perceptions and purchase intentions regarding genetically modified foods (GMFs), also addressing key debates about GM foods safety, benefits, and acceptance. The study examines the interrelationships among knowledge, trust, perceived benefits, perceived risks, and purchase intentions. The findings reveal that enhanced knowledge of GMFs increases perceptions of benefits, reduces risk perceptions, and strengthens purchase intentions, while trust significantly enhances perceived benefits and directly influences purchase intentions but has no notable effect on risk perceptions. These depicts insights emphasize the need for transparent information, trust-building initiatives, and risk mitigation strategies to foster consumer confidence and acceptance of 'GMFs, in addition, this research provides beneficial implications for policymakers, business leaders, and marketers, proposing targeted strategies to enhance perceived benefits and address perceived risks effectively.

Hyesun Hwang and Su-Jung Nam (Nov 2020):-

This study aims to find out how consumers’ knowledge influences their attitude toward genetically modified food. According to the findings, consumers who are more likely to be involved in food, have greater levels of education and money, and have been exposed to unfavorable information regarding genetically modified foods are more likely to exaggerate their actual knowledge. In comparison to other participants, the overestimation group displayed higher risk perception, lower benefit perception, and reduced intention to purchase genetically modified foods. Customers who had higher incomes and less education were more inclined to underestimate their expertise.

Jintana Pattanapomgthorn et al., (May 2020):-

The study conducted by the researchers says that to satisfy the population's hunger, technology has moved toward genetically modified food. The study's objective was to analyze the environmental impact, knowledge of GM food, and food safety concerns on purchasing intention to GM food products. The result says that environmental consciousness and food safety concerns had an eloquent and supportive effect on purchase intention, but knowledge of GM food was negative. Therefore the study aids citizens and tourists in having an eye on GM food and their superior health and outlines the loop whereby consumers will seek out information about how food is genetically engineered as they become more sensible.

Research Methodology:

The research methodology used for this study is Quantitative research. The sample of 516 respondents who were aware of GM foods has been taken. The study adopts Simple Random sampling technique was used to collect responses from the consumers from different areas in Chennai city. The data has been through a well-structured questionnaire. The sources of data were collected for the study through both Primary and secondary data.

Analytical tools:

The analytical tools used for the collected data have been analyzed with the help of statistical techniques to understand the outcomes with reference to objectives and hypothesis. Data processing was carried out with the help of MS Excel and SPSS. The analytical tools applied for the study are -

- Percentage Analysis
- Regression Analysis

Percentage Analysis: To categorize the respondents based on their demographic and socio economic profile, food consumption details of the consumer patronage.

DEMOGRAPHIC DETAILS OF THE RESPONDENTS	MAJORITY FIGURE	FREQUENCY	PERCENTAGE
Age	20-25 years	190	36.8
Place of Residence	South Chennai	276	53.5
Type of Family	Nuclear	344	66.7
Verifying the method of food production	Maybe	226	43.8
Understanding of new technology in food production	Medium	353	68.4
Degree of knowledge about GM food	Intermediate	258	50.0

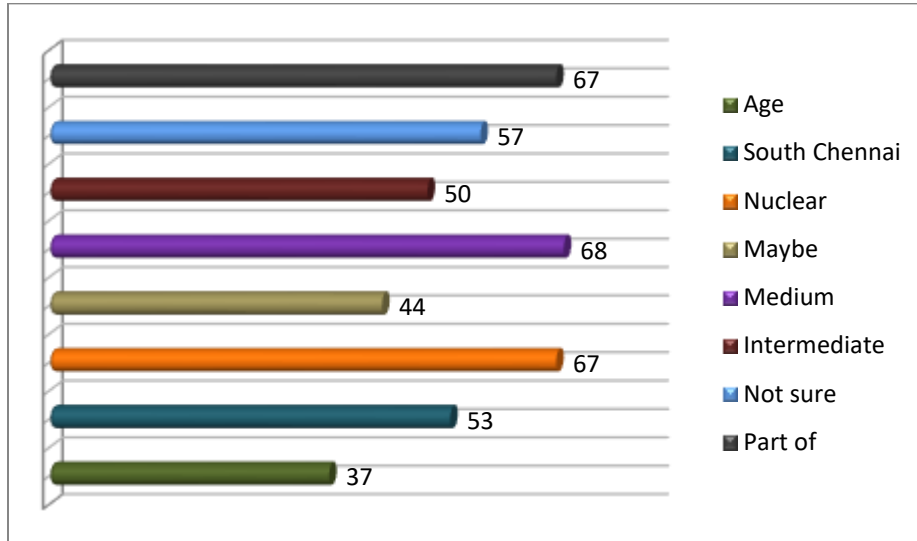
Sufficient facts available about GM food	Not sure	292	56.6
Reading the food label foods	Part of	348	67.4

1.1 TABLE SHOWING DEMOGRAPHIC DETAILS OF THE RESPONDENTS

Source: Computed Data

Table 1.1 showed the demographic details of the respondents. Majority respondents were taken from each demographic detail.

1.1 CHART SHOWING DEMOGRAPHIC DETAILS OF THE RESPONDENTS



Source: Computed Data

The above table shows the socio-economic details and awareness level of the respondents with **37%** of the respondents from the age group of 20-25 years, **53%** of respondents are from South Chennai, **67%** constitutes respondents who are from nuclear family, **44%** of respondents may or may not verify the food production method, **68%** respondents have medium understanding of new technology in food production, **50%** of the respondents constitutes intermediate knowledge of GM foods, **57%** of the respondents were not sure about the availability of facts about GM foods, and **67%** respondents reads only part of the GM food label.

Regression Analysis:

Impact of Consumer Acceptance Perception Factors on Environmental Risk

The impact of independent variables on the environmental risk factor is being analyzed and the results are depicted below.

Table - Consumer Acceptance Perception Factors on Environmental Risk

Sources of Variance	R	R ²	Adjusted R ²	F	Sig.
Regression	0.405	0.164	0.156	20.034	0.000

Source:

Computed data

The above table depicts that the R-value is 0.405; the R² value is 0.164, and the Adjusted R² value is 0.156. This indicates that independent variables such as cost, opinion, information, belief and risk produce a 16.4% influence on Environmental Risk. The F = 20.034, p = 0.000 which is

statistically significant at a 5% level.

Influencing Variable	Standardized Coefficients	t	Sig.
	Beta		
Cost	0.111	2.194	0.029
Information	0.144	3.150	0.002
Belief	0.233	4.935	0.000
Risk	0.112	2.370	0.018

Source: Computed data

The above table shows that the Cost ($\beta = 0.111$, $t = 2.194$, $p = 0.029$), available Information ($\beta = 0.144$, $t = 3.150$, $p = 0.002$), Belief ($\beta = 0.233$, $t = 4.935$, $p = 0.000$), and Risk ($\beta = 0.112$, $t = 2.370$, $p = 0.018$) are statistically significant at 5% level. Cost, information, belief, and risk are significant and positively influence environmental risks related to GM food.

Consumers prefers for GM food products were influenced by cost i.e. they like to consume them at a discounted price (Keiko Komoto et al., 2016) and media helps to seek information, but consumers expect that the information should be based on proof by GM scientists (Haiyan Deng, and Ruifa Hu 2019). The result shows that knowledge factors such as cost, information, belief and risk influence the environmental risk. These are a significant factor affects consumer knowledge perception of GM food. Consumers’ food selections and preference are influenced by cost, information, belief and risk, also consumers are consistently concerned and engrossed in the food that is sourced and produced in addition they also sees whether it is environmentally culpable. This is consistent according to the research of (S. Wunderlich and M.Smoller, 2019) and (Shahida Anusha Siddiqu et al., 2022).

Percentage Analysis of Demographic Profile:

The results of the percentage analysis of Demographic Profile of consumers, of the sample unit surveyed are given below:

- * 36.8% of respondents constitutes to age group of 20-25 years
- * 53.5% of the respondents belong to South Chennai
- * Majority of the respondents are from Nuclear family type with 66.7%
- * 43.8% of the respondents were uncertain in verifying the method of their food produced
- * 68.4% of the respondents have a medium understanding of new technology in food production
- * 50.0% of respondents have an intermediate knowledge of GM food
- * Majority of the respondents who were not sure about the availability of sufficient facts about GM food
- * 67.4% of dominant group of respondents reads only the part of food label

Regression Analysis

The Knowledge factors such as Cost, Information, Belief and Risk influence the Environmental Risk factor, and a significant factor that positively influences Consumer Knowledge Perception factor of GM food.

Suggestions:

- ❏ Social policymakers should concentrate on GM food and try to increase public trust, reduce perceived risks, and enhance benefit perception, which aids in improving public acceptance of GM foods.
- ❏ Government regulation and enhancement in GM technology, and scientists who aware of GM foods should help consumers to understand what GM is actually to enhance acceptance of GM foods in the future.
- ❏ Public urged to conduct some proof-based educational programs to develop the understanding of GMOs and GM foods.

Conclusion:

Genetically Modified Foods are an immense development in biotechnology that offers solutions to challenges like food security, malnutrition, and environmental sustainability. They can increase crop yields, embellish nutrition, and decrease environmental harm, by forming them a beneficial tool for the developing global population. However, there still remain concerns about human health, environmental risks, and ethical issues which highlight to follow some necessary strategies for need of careful regulation, thorough research, and transparent labeling to enhance knowledge of GM food. Public trust can be built through education and open communication. With responsible use and collaboration among scientists, governments, and consumers, GM foods can contribute to a healthier and more sustainable future.

Bibliography

Reference:

1. Haiyan Deng (Beijing Institute of Technology, Beijing, China) Ruifa Hu (Beijing Institute of Technology, Beijing, China), (2019), A Crisis of consumers' Trust in scientists and its influence on consumer attitude toward genetically modified foods, *British Food Journal* ISSN: 0007-070X Article publication date: 28 August 2019, <https://doi.org/10.1108/BFJ-07-2018-0476>
2. Hyesun Hwang and Su-Jung Nam, (2020) The Influence of consumers' Knowledge on their responses to genetically modified foods Pages 146-157 | Received 25 May 2020, Accepted 16 Oct 2020, Published online: 02 Nov 2020
3. Kai Cui & Sharon P. Shoemaker, (05 June 2018) Public perception of genetically-modified (GM) food: A Nationwide Chinese Consumer Study *npj Science of Food* volume 2, <https://doi.org/10.1080/21645698.2020.1840911>
4. Keiko Komoto; Sawako Okamoto; Miki Hamada; Naoya Obana; Mami Samori; Tomoaki Imamura, (2016), Japanese Consumer Perceptions of Genetically Modified Food: Findings From an International Comparative Study Published on 29.8.2016 in Vol 5, No 3 (2016): Jul-Sept
5. S. Wunderlich & M. Smoller, (2019) Consumer awareness and knowledge about food sources and possible environmental impact Author(s), *International Journal of Environmental Impacts* Volume 2 (2019), Issue 1, Pages 11, Page Range 85 – 96, Paper DOI 10.2495/EI-V2-N1-85-96 Copyright WIT Press
6. Shahida Anusha Siddiqui, Tayyaba Alvi, Aysha Sameen, Sipper Khan, Andrey Vladimirovich Blinov, Andrey Ashotovich Nagdalian, Mohammad Mehdizadeh, Danung Nur Adli and Marleen Onwezen , (18 November 2022), Consumer Acceptance of Alternative Proteins: A Systematic Review of Current Alternative Protein Sources and

Interventions Adapted to Increase Their Acceptability Sustainability 2022, 14 (22), 15370; <https://doi.org/10.3390/su142215370>

7. Thi Thuy An Ngo, Thi Yen NhiPhan, ThiNgoc Trang Le, (October 2, 2024), Impacts of knowledge and trust on consumer perceptions and purchase intentions towards genetically modified foods Published: <https://doi.org/10.1371/journal.pone.0311257>

Websites:

- <https://www.collinsdictionary.com/dictionary/english/genetically-modified-food>
- <https://www.food.gov.uk/safety-hygiene/genetically-modified-foods>
- www.google.in
- <https://scholar.google.com>
- <https://www.who.int/news-room/questions-and-answers/item/food-genetically-modified>