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The Labelling of Genetically Modified Foods in India: Consumer's Risk Perception, Trust, and Knowledge

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Abstract

Food labelling is an important component when it comes to consumer awareness, advertisements of brands, information the product wants to convey, and the like. Parallelly, genetically modified foods have always been a controversial experimental product. It is always linked to health and ethical issues. Hence, this paper focuses on the two most important aspects i.e. labelling and Genetically Modified foods. This paper analyses the Indian consumer's knowledge, risk perception, and trust in Genetically Modified labelling. Majorly it focuses on apprehending the consumer awareness about Genetically Modified food labelling in India and understanding the perception of the selected population towards genetically modified food. The sample population involved women who are married and are homemakers, working men who are married and are involved in the grocery purchasing decision of their house, working women and men who are unmarried and are involved in the grocery purchasing decision of their house and students who are involved in the grocery purchasing decision in their house. 227 candidates were selected for this whole analysis. It was found that most of the population was unaware of genetically modified labelling. It was though observed that with increasing consumer awareness, the customers are becoming cautious about the food that they purchase and consume for them and their families. The consumers were divided into three cohorts including, benefit seeker, aware consumers, and risk concerned customers. It was found in the study that education, gender, and marital status did not contribute to the result of our analysis. There is a lot of potential for genetically modified food especially in a country like India, where there is an issue of food security. Genetically modified crops have proved to have better yield and quality. India should ponder upon its production. The consumer should be made aware of Genetically Modified crops. Strict labelling should be done of the food containing Genetically Modified because consumers have the right to know their food.

Keywords: Genetically Modified food, Labelling, Environment, Quality and yield, Market survey.

I. INTRODUCTION

When buyers and sellers do not have the same amount of information, it leads to a condition of asymmetric information [1]. For instance, in a grocery store, the seller knows more about the quality of the products than we as buyers do. This leads to a situation of opportunistic behavior i.e. one party can exploit other party leading to adverse selection and moral hazard [2]. Adverse selection is a hidden type of problem. The hidden information concerns the type (the quality) of a product that is placed on the market. In this situation, a producer of low quality is more likely to join the market when the buyer is not able to ascertain the quality of the product.

Moral hazard is a hidden action problem. Hidden information concerns the producer's actions that determine the quality of the product that is placed in the market. In this situation, a producer is more likely to produce a bad quality when the buyer is not able to ascertain the quality of the product [3]. The asymmetric information condition leads to market failure i.e. a market outcome that differs from the socially optimal outcome. To curb this, food labels were introduced. There are three types of product attributes, namely: Search attribute, in which we learn about this attribute before purchase. e.g.: Color of wine. Experience attributes in which we learn about this attribute after the purchase. e.g.: the taste of wine. Credence attributes in which we never learn about this attribute. e.g.: organic method of production [4].

The food labels help in conveying the experience as well as credence attributes. Food labels give us a surety, a sense of trust, and authentication about the product that we buy from the market. This food label provides complete information about the nutritional information, allergen content, price, expiry date, date of manufacturing, place of origin, and so on. The food label is an important aspect of food quality [3]. The term genetically modified (GM), as it is ordinarily utilized, alludes to the exchange of qualities between life forms utilizing a progression of research center methods for cloning qualities, grafting Deoxyribonucleic acid (DNA) sections together, and embedding qualities into cells. Aggregately, these procedures are known as recombinant DNA innovation. They are developed to improve crop yields, better quality, resistance to diseases, insects, and environmental stress. But genetically modified crops have always been a topic of controversy. It is believed to be hazardous to health, but no such findings have been recorded. GM is believed to be hampering the DNA of plants leading to ethical issues.

In India, Food Safety and Standards Authority of India (FSSAI), which was feeling the squeeze from a few quarters for its supposed inability to limit the import of Genetically modified organisms (GMOs), has started the work on encircling guidelines for genetically modified (GM) food. In an announcement, the nation's zenith food controller said that the expected guidelines would set out the methodology for the wellbeing appraisal and endorsement of nourishments, including imported nourishments, got from hereditary

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adjustment forms dependent on the universally well established and acknowledged logical standards, techniques, and best practices before they are endorsed for food purposes. "The draft guideline, after the conventional endorsement of FSSAI's scientific panel, the scientific committee also, the authority, will be told in the Gazette to inspire the remarks of different partners, which will be properly thought of. After this, the guidelines will be finished with the endorsement of the Government of India," it included. As of late, the FSSAI draft on labeling guidelines made it obligatory for the food business operators (FBOs) to pronounce the marking of genetically engineered (GE) or modified foods. The draft expressed that all food products having GE content five % or greater will be labeled. The all-out GE content will be the main three ratings as far as the content in the item. The naming will be as per the following: "Contains GMO/Ingredients derived from GMO". Nations, for example, Japan, Canada, Thailand, and Indonesia endorse an edge estimation of five for every penny by weight. The European Union (EU) endorses an edge of 0.9 percent. A senior authority with FSSAI expressed, "Independent of the edge, the security of each GM item should be entrenched, and the items must be demonstrated to be as sheltered as non-GM items. The proposed naming of GM nourishments in India falls inside the scope of the universally followed limit level and is by all accounts pragmatic and practical." In the interim, appraisal before the endorsement of such nourishments by FSSAI would be regarding the sanitation, while perspectives identified with their ecological effects would be properly surveyed by the Genetic Engineering Approval Committee (GEAC) before their endorsement as food by FSSAI. The imports of GM food need endorsement under laws, i.e. freedom from the Ministry of Environment, Forest and Climate Change, Government of India, under the Environment Security Act, 1986, which survey the effect of GM items on biodiversity and the Ministry of Health and Family Welfare, Government of India, which supports that GM items are protected for human utilization under the Food Safety and Standards Act, 2006 [5].

Apart from the legal aspects, selling a product highly depends on the Consumer's buying decision behavior which includes problem recognition, information search, evaluation of alternatives, purchase decision, and Post-purchase decision [6]. These factors lead to the success or failure of a product. Consumer perception is the most critical aspect to consider while selling a product in the market. Recently, it has been observed that consumers are becoming more and more aware in the market. There have been various stages of consumer awareness. Initially, they checked the price and quantity, then they started checking for allergens, then they became aware of calorie and nutritional content. Now consumer awareness has evolved. They want to know about the origin, place of production, and other details. This is the duty of the manufacturing companies to make their consumers aware. The food label is the medium through which producers and marketers make their consumers aware of the products. Taking GM foods as the protagonist to the research paper, researcher and purchaser and natural gatherings have referred to numerous wellbeing and ecological dangers with nourishments containing GMO's. In late years, an ever-increasing number of individuals understand that genetically modified food sources have substantially more hazards. One of the principal issues with GM is that the way toward embedding qualities into the DNA of a food plant is arbitrary, researchers have no clue about where the qualities go. This can disturb the working of different qualities and make novel proteins that have never been in the food gracefully and could make poisons and allergens in nourishments. Hence, labeling is required. This research paper will concentrate on analyzing the knowledge of customers in context to the compulsory food labeling having Genetically Modified ingredients and emphasis on the likely incentives behind the readiness of the consumers to purchase these products in India [5].

II. RELATED WORK

Genetically Modified Organism (GMO) In India

There was a study carried out to comprehend the perspective of gatekeepers towards the acceptance of genetically modified food in India. These gatekeepers included merchants and wholesalers, purchasers for grocery store chains, fixing purchasers for producers, and purchasers for hotels. They were chosen as the test sample because these people frequently use gigantic role inside the channel and can be settling on buying choices for the benefit of a great many end-customers. There were mixed responses that were recorded. There were some positive views of GM. These views explained that genetically modified foods are about making food healthier consumers. The new-aged consumers are more aware of their health and fitness, in line with that the genetically modified foods are advantages to them. There were some ambiguous views of GM which focused on the look and price of the product rather than concerning its origin. Then there are some negative views too. This section focused on the fact that consumers today focus on organic food. The paper also showed that there is a major role of the media towards the perception of GMOs in consumers. The limitation of this paper was that the study was limited to very few people. They, inferred that Overall, 32% of the food item tests tried were GM positive. 46% of imported food items tried positive. About 17% of the examples made in India tried positive. Eighty-four per cent per test did not refer to GM on their labels. Of these, 24 per cent were positive. A few brands had asserted on their labels that they had no GM ingredients in foods however were having GM. It has been stated in this paper that in December 2017, a parliamentary committee of India highlighted a key issue which was, there has been no investigation completed so far to consider the effect of GM crops on human wellbeing. Also, long haul impacts on human wellbeing have not been done. Consequently, the administration ought to reevaluate its choice to market GM crops in the nation as it has not been deductively demonstrated that GM crops have no unfavorable effect on human wellbeing. This paper gave us an insight into governmental perception but still did not discuss consumer acceptance [7].

Impact of GM crops

A study on the effect of GM crops perceived through a source in I.S.I Web of Knowledge, Google Scholar, and Ag-Econ. The meta-examination concentrated on the GM crops, including (HT) soybean, maize, and cotton. The paper presumed that GM innovation has expanded harvest yields by 21%. The reap

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increments are not because of higher hereditary yield potential, however, to progressively viable pesticide control and in this way lower crop loss. Simultaneously, GM crops diminished pesticide amount by 37% and pesticide cost by 39%. The research affirmed that disregarding influences the heterogeneity of the normal agro-economic and monetary advantages of GM crops is enormous and huge [8].

In another research, a survey on wellbeing, dangers, and open concern was found. It concentrated on Controversy and open concern including GM foods and yields typically revolving around human and natural wellbeing, marking and customer decision, licensed innovation rights, morals, food security, neediness decrease, and environmental protection. It recommended that GM nourishments are useful in controlling the event of specific illnesses. By changing the DNA course of action of these substances, the properties cause sensitivities. These nourishments become quicker than the food sources that are developed generally. The expanded profitability gives the population more food. On occasion, genetically built food harvests can be created at places with ominous climatic conditions as well. The greatest danger realized by GM nourishments is that they can effectively affect the human body. It is accepted that the utilization of these genetically built food leads to the improvement of diseases that are insusceptible to anti-infection agents. This paper similarly featured that numerous strict and social networks are against such nourishments since they consider it to be an unnatural technique for creating foods. The significant presence of GM food into agro-food markets ought to be joined by sufficient arrangements to ensure buyer wellbeing. This paper is centered around learning the customer conduct towards GMOs [8].

Purchasers' acknowledgement towards GM

A study isolated buyers' affirmations, institutional consideration and trust toward GM banana rules in Uganda. Results depended upon an assessment drove among 421 banana-growing family units. Results displayed a high status to buy GM bananas among customers. An illustrative factor assessment is facilitated to see the recognitions toward inherited modification. The factors identified were utilized in a pack evaluation that gathered purchasers into parts of GM question, government trust, prosperity security concern and food and natural prosperity concern. It communicated that buyer attributes and recognition factors influence customers' ability to buy GM. The findings were essential to system makers when arranging danger correspondence philosophies concentrating on different buyer pieces to ensure fitting discussion and keeping an eye on potential stresses over GM advancement [9].

Like India, Argentina likewise is a making country. In another paper, research was cultivated for purchase reason and perspective on innately modified food among Argentina buyers. It was communicated that GM crops were basic to Argentina's economy. The purchasing decision was more towards the negative scale. Customers purchased GM just if a benefit was seen with it. The higher buying was seen among clients more youthful than 25, low level of preparing and who didn't know about getting some answers concerning the Genetically planned yields. A gender-based preference was similarly looked for instance men were more enthusiastic about buying GM than women [11].

Segmentation technique

Segmentation of the consumer is the final goal that we intend to achieve through our research, previous research conducted talked about different techniques for segmentation of the market one of which talked about factor analysis. This technique is one of the widely used techniques for market segmentation. Factor analysis is used to reduce many variables into less number of factors. This technique is used when we usually do survey. The questionnaire prepared is used to get inputs from consumers on a scale which is further used to find the relationship between the variables by using factor loadings. This gives us factors whose nomenclature can be done further to come up with segments or cohorts. However, this study has been conducted only to do market segmentation. Our research involves using this technique to segment customers on their behavior and perception of GM labelling and hence this analysis technique is taken into consideration [10].

III. METHOD

This research is an examination involving analytics performed on the customers in India [12].

Objective

1) To apprehend the consumer awareness about GM food labelling in India.
2) To understand the perception of the selected population towards GM food

III.I Dataset

This research involves customers from various parts of the country. The sample involves:

Sample 1: Women who are married and are homemakers.
Sample 2: Working Men who are married and are involved in the grocery purchasing decision of their house.
Sample 3: Working Women and men who are unmarried and are involved in the grocery purchasing decision of their house.
Sample 4: Students who are involved in the grocery purchasing decision of their house.

In 2016, a pilot study was led with 20 shoppers to play out an example estimation and the pretesting of examination instruments. The example was determined utilizing a 95% certainty stretch furthermore, a most extreme β (type II) error of 5%. The base value for computing the level of purchasers who effectively distinguished the Genetically Modified food image utilized in the study was 12 percent [13], which would have 163 people in any event. In another similar study carried out on the mandatory food labeling in Brazil the sample of 224 individuals was taken [12]. Hence, in this study, we took a sample of 227

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individuals along with the four samples. These samples were selected in a manner that these individuals must be involved in the buying decision of the food groceries in the place of their residence.

Computation of consumer perception and knowledge.

Firstly, Consumers were asked the social demographic questions including their gender, age, education level, professional level, marital condition, and no of children.

In the second part of the survey, they were asked 14 different questions and were asked to rank every statement using a 5-point Likert scale: lowest being, strongly reluctant to purchase and highest being, very ready to purchase. The attestations were ranked into 5 areas: Trust, low price, hazard discernment, quality, and readiness to purchase. The questions were inspired by a similar study conducted in Brazil [12]. Since no secondary research existed for Indian customers, we made a survey to carry out the study. The unwavering quality of the poll was assessed through factor analysis using SPSS software.

III.II .I Data Analysis

Factor analysis has been utilized for the information that was gathered to interpret the outcome. For the study, it was important to decrease information multifaceted nature by diminishing the number of information factors. The connection between the factors, regardless of whether they are identified with one another or not, and whether all the factors that are considered by inspecting the writing are attainable in the region of study or on the other hand not being discovered by repeating the factors in factor analysis. SPSS is the software that is utilized for interpreting the factors and breaking down the outcome. It is essential to discover the basic factor to stay away from the disarray among the factors. Factor analysis is the method for breaking down the correlations between the factors which decreases the number of factors and helps in clarifying the first information which will be progressively prudent. The understanding of the psychographic factors turns out to be progressively important and gives an understanding into it and the endeavors an assortment of information becomes progressively important. Two phases of factor analysis have been done, the principal stage in which factor extraction has been done which shows the factors that were removed from the information. The strategy that has been consolidated here is principal component analysis. The Eigenvalues of the factors has been viewed as which is critical to decreasing the number of factors. The estimation of the factors more than or equivalent to 1 is thought about. In the second stage rotation of principal components have been finished. In the following errand, the factors were deciphered to give a reasonable name. This procedure is finished by taking a glance at which all factors are identified with one another. For this reason, the factor framework is utilized. The first-factor network which was obtained was unrotated, we utilize the turned factor lattice that is acquired at a later stage, it is because we get the stacking of each estimation of the extricated factors. The values are somewhere in the range of 0 and 1. Values that are more like 1 are considered as high loadings and the values near 0 are considered as low loadings. All the factors in a specific factor contributes to a direct mix and they all have factor loadings closer to 1.

Figure 1. Factor analysis results

Factor Analysis

Correlation Matrix[a]

		VAR00001	VAR00002	VAR00003	VAR00004	VAR00005	VAR00006	VAR00007	VAR00008	VAR00009	VAR00010	VAR00011	VAR00012	VAR00013	VAR00014
Correlation	VAR00001	1.000	.443	.420	.377	.290	.336	.144	.218	.174	.253	.333	.262	.321	.340
	VAR00002	.443	1.000	.597	.443	.381	.293	.236	.197	.169	.224	.267	.261	.219	.269
	VAR00003	.420	.597	1.000	.397	.375	.329	.362	.328	.274	.325	.281	.159	.164	.220
	VAR00004	.377	.443	.397	1.000	.652	.561	.141	.054	.083	.417	.256	.510	.545	.493
	VAR00005	.290	.381	.375	.652	1.000	.709	.204	.118	.109	.474	.320	.467	.425	.337
	VAR00006	.336	.293	.329	.561	.709	1.000	.111	.082	.020	.500	.376	.392	.478	.385
	VAR00007	.144	.236	.362	.141	.204	.111	1.000	.643	.561	.189	.209	.049	.058	.097
	VAR00008	.218	.197	.328	.054	.118	.082	.643	1.000	.805	.087	.292	-.011	-.078	-.012
	VAR00009	.174	.169	.274	.083	.109	.020	.561	.805	1.000	.147	.298	.066	-.039	.054
	VAR00010	.253	.224	.325	.417	.474	.500	.189	.087	.147	1.000	.477	.446	.450	.427
	VAR00011	.333	.267	.281	.256	.320	.376	.209	.292	.298	.477	1.000	.316	.366	.380
	VAR00012	.262	.261	.159	.510	.467	.392	.049	-.011	.066	.446	.316	1.000	.607	.579
	VAR00013	.321	.219	.164	.545	.425	.478	.058	-.078	-.039	.450	.366	.607	1.000	.702
	VAR00014	.340	.269	.220	.493	.337	.385	.097	-.012	.054	.427	.380	.579	.702	1.000
Sig. (1-tailed)	VAR00001		.000	.000	.000	.000	.000	.015	.000	.004	.000	.000	.000	.000	.000
	VAR00002	.000		.000	.000	.000	.000	.000	.001	.005	.000	.000	.000	.000	.000
	VAR00003	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.008	.007	.000
	VAR00004	.000	.000	.000		.000	.000	.017	.207	.108	.000	.000	.000	.000	.000
	VAR00005	.000	.000	.000	.000		.000	.001	.038	.051	.000	.000	.000	.000	.000
	VAR00006	.000	.000	.000	.000	.000		.048	.108	.381	.000	.000	.000	.000	.000
	VAR00007	.015	.000	.000	.017	.001	.048		.000	.000	.002	.001	.231	.193	.073
	VAR00008	.000	.001	.000	.207	.038	.108	.000		.000	.095	.000	.432	.121	.431
	VAR00009	.004	.005	.000	.108	.051	.381	.000	.000		.014	.000	.160	.278	.209
	VAR00010	.000	.000	.000	.000	.000	.000	.002	.095	.014		.000	.000	.000	.000
	VAR00011	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000		.000	.000	.000
	VAR00012	.000	.000	.008	.000	.000	.000	.231	.432	.160	.000	.000		.000	.000
	VAR00013	.000	.000	.007	.000	.000	.000	.193	.121	.278	.000	.000	.000		.000
	VAR00014	.000	.000	.000	.000	.000	.000	.073	.431	.209	.000	.000	.000	.000	

a. Determinant = .001

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IV. RESULT

Descriptive study

227 candidates were accessed for the study. The major population included the people of the age bracket 15-25. In India, the perception is that major households involve women as decision-makers but the reality is that more men are involved in going out to the grocery stores and buying the grocery. They purchase the products that are told by the women of the house but assessing the brand, quality, and labelling is done majorly by the men. Hence, our study involves 54.6% of males and 45.4% females.

Consumer perception and knowledge of GM food labelling

Most respondents (65.2%, n=148) were unaware of the term "GM food" but it was observed that consumer awareness in India has increased a lot recently. People are more conscious about what they are eating, their health benefits, nutritional value, and if any risk is perceived through it. In the study, it was found that 80.7% of people were conscious of the food label in India. According to the department of consumer affairs, certain rights are provided to the consumers of India, which includes the right to safety, right to be informed, right to choose, right to be heard, right to seek redressal and right to consumer education. Under the right to information of the consumer, consumers ought to be educated about the quality, amount, intensity, immaculateness, standard, and cost that the consumer pays, merchandise to ensure the purchaser against any illegal means and malpractices. Consumers should ask for all the data about the product or administration before making a decision. This will help him to act astutely and dependably and help him to cease from falling to wrong selling procedures (Ministry of consumer affairs, food & public distribution, India). Hence, the food labels are mandatory under the right to information of the consumers. Even after the implementation of such laws by the government, the consumers were cheated because they did not use their power. With increasing campaigns and awareness, consumers now want to know about their food. Moreover, according to our study, it has been observed that consumers will buy the products if they impose some health benefits and are less aggressive towards the environment.

According to our study, we categorized the consumers in three cohorts, which includes:

Cohort 1: Benefit seeker.

Cohort 2: Aware

Cohort 3: Risk concerned

The first cohort includes variables 6, 10, 12, 1,3, and 14 of the questionnaires. This section of the people is those which seek all the benefits of a product. These consumers will buy a product if it claims to be health beneficial. They also want more attributes from a product with tapestries. They want the product even to be beneficial for the environment. According to the market, there are four types of consumers, which include:

Consumer 1: Loyal consumers

Consumer 2: Discount consumers

Consumer 3: Impulsive consumers

Consumer 4: Need-based consumers.

The benefit seekers are the need-based consumers as well as discount consumers. They seek to buy a product to fulfill their needs and also are looking for a product the second cohort includes variables 1, 2, and 3. These are the people who are aware of the GM food, they particularly go through the label before buying the product. These are the people whose buying decision majorly affects GM labels on food. The third cohort includes variables 7, 8, and 9. These are risk concerned people. They are more concerned if there is any chance of occurrence of risk from consuming a particular food. They believe that banning GM food will benefit human health. They consider GM to be risky for humans and the environment.

It was found in the study that education, gender, and marital status did not contribute to the result of our analysis.

A. Model Testing

The determinant in the below table shouldn't be 0. If the determinant in the below table is 0, in that case there are some calculation problems with the factor analysis, and the SPSS software may give an error or would not finish the factor analysis. Here the result is .001 showing that there is some kind of relationship between the factors.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.836
Bartlett's Test of Sphericity	Approx. Chi-Square	1556.120
	df	91
	Sig.	.000

Figure 2. KMO and bartlett's test

a. **Kaiser-Meyer-Olkin Measure of Sampling Adequacy** – This measure fluctuates somewhere in the range of 0 - 1, and qualities more like 1 are good. An estimation of .65 is recommended least.

b. **Bartlett's Test of Sphericity** – It tests the null hypothesis whether the correlation matrix is also an identity matrix. An identity matrix is one in which the entirety of the diagonal components is 1 and other components are 0. We need to dismiss the null hypothesis. These are to be cleared before a factor analysis is to be performed.

The scree plot shows the eigen value with the factor number. We refer to the value of scree plot in the below table. From the third factor, it is clear that the line is flat which means each remaining factor includes a small amount of the total variance.

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Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.177	36.978	36.978	5.177	36.978	36.978	3.795	27.109	27.109
2	2.486	17.759	54.737	2.486	17.759	54.737	2.555	18.252	45.361
3	1.220	8.716	63.453	1.220	8.716	63.453	2.533	18.093	63.453
4	.949	6.782	70.235						
5	.802	5.731	75.966						
6	.632	4.512	80.478						
7	.527	3.761	84.239						
8	.473	3.376	87.614						
9	.394	2.811	90.426						
10	.350	2.499	92.925						
11	.322	2.298	95.223						
12	.274	1.954	97.177						
13	.233	1.665	98.843						
14	.162	1.157	100.000						

Extraction Method: Principal Component Analysis.

Figure 3. Total variance results

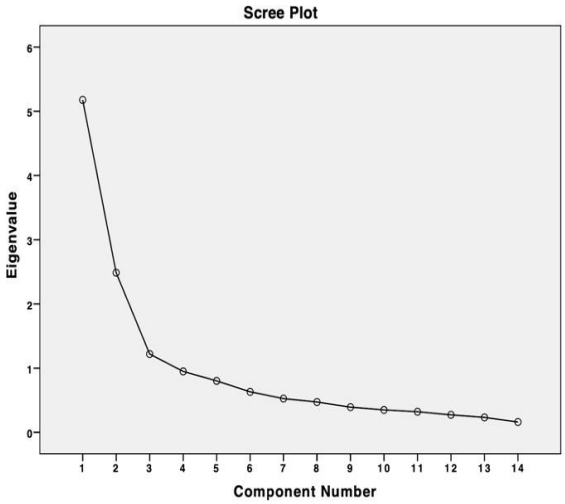

Figure 4. Scree Plot

The scree plot plots the eigenvalue with the factor number. You can see these qualities in the table promptly above. From the third factor, you can see the line is practically level, which means each progressive factor is representing littler and littler measures of the all-out variance.

Rotated Component Matrix[a]

	Component		
	1	2	3
VAR00001			
VAR00002		.814	
VAR00003		.785	
VAR00004			
VAR00005			
VAR00006	.603		
VAR00007			.768
VAR00008			.912
VAR00009			.896
VAR00010	.676		
VAR00011			
VAR00012	.776		
VAR00013	.838		
VAR00014	.785		

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

a. Rotation converged in 5 iterations.

Figure 5. Component Matrix

Here the variables are:

VAR00001: Knowledge about GMO Food

VAR00002: Conscious about food label while buying food

VAR00003: GM labels affect your buying decision

VAR00004: Confidence in Government's decision to allow the sale of GMO food

VAR00005: Confidence that manufacturers producing GM seeds appropriately evaluate the environmental and health risk of their products.

VAR00006: Confidence that the researchers properly investigate the safe utilisation of GM foods

VAR00007: Banning the Genetically Modified foods will promote the health of Indian population

VAR00008: GM foods are risky for human health

VAR00009: GM Foods are risky to the environment

VAR00010: GM foods are better quality than the non-GM foods.

VAR00011: GM foods have better shelf life than Non-GM foods.

VAR00012: Willingness to buy GM foods if it is 10% cheaper than Non-GM food.

VAR00013: Willingness to buy GM foods if they claim to have a health benefit.

VAR00014: Willingness to buy GM foods if production is less aggressive against the environment.

Rotated Factor Matrix- This table contains the rotated factor loadings, which speak to two things the factors are weighted for every factor yet in addition to the correlation between the factors and the factor. Since they are correlations, potential qualities run to -1 to +1., which advises SPSS not to show any of the correlations that are .6 or less. This makes it simpler to peruse by expelling the messiness of low correlations that are likely, insignificant at any rate. For orthogonal rotations, for example, varimax, factor structure matrices, and the factor example are the equivalents. **Factor**-The sections here are the rotated factors that have been extricated. As should be obvious by the commentary given in SPSS (a.), 3 factors were extricated.

These factors are what we are looking for and will try to name them,

Factor 1- The first one is called ***"BENEFIT SEEKERS***"- because of variables like "**VAR00006**: Confidence that the researchers properly investigate the safe utilization of GM foods", "**VAR00010**: GM foods are better quality than non-GM foods", "**VAR00012**: Willingness to buy GM if they are 10% cheaper than Non-GM food", "**VAR00013**: Willingness to buy GM foods if it claims to have a health benefit" and "**VAR00014**: Willingness to buy GM foods if production is less bad against the environment" load highly on it.

Factor 2- The second one may be called "***AWARE***"- because variables like "**VAR00002**: Conscious about food labels while buying food", "**VAR00003**: GM labels affect your buying decision" load on it.

Factor 3- The third one may be called "***RISK CONCERNED***" because variables like "**VAR00007**: Banning the GM foods benefit the health of Indian population", "**VAR00008**: GM foods are risky for human health" and "**VAR00009**: GM Foods are risky to the environment" load highly on it. So, these three factors or courts came out as a result of factor analysis.

V. CONCLUSION

We can conclude from the study that the majority of the population taken into consideration are unaware of GM food. With the increasing consumer awareness in India, inclining this, we have found in our study that there is a segment of people who are concerned about the GM food label. Their buying decision is affected by the information depicted on the food label. Then there is also a section of people who believe that GM foods are associated with health and environmental concerns. They think that GM foods should be banned. They believe that there are ethical issues concerning GM foods as they contravene the natural structure of the crop. Yet, there have not been any studies concluded yet that can depict that the GM crops have health concerns. By and large, GM innovation has expanded harvest yields by 21%. These yield increments are not because of higher hereditary yield potential, yet to progressively viable insect control and in this manner lower crop harm. Simultaneously, GM food has decreased pesticide by 37% and pesticide cost by 39%. The impact on the expense of creation isn't noteworthy. These seeds are more costly than non-GMO seeds, yet the extra seed costs are redressed through not spending on chemical resources. Normal benefit gains for GM-receiving farmers are 69% [8].

In a country like India where there are 1.3 bn people and the majority poverty-stricken. In such a country GM crops can help in food security. Moreover, in recent, news the new variety of paddy sown last year has inspired a majority of cultivators in Golaghat district to shift from traditional ones. The new variety is flood-tolerant, helping farmers against the loss of crops due to floods [14].

Yet, In India, according to Section 22 of the Food Safety and Standards Act, the Genitically Modified food is unlawful until the FSSAI supports and approves it, which isn't the case so far. The FSSAI has as of late proposed the draft Food Safety and Standrds (Labelling and Display) Regulations, 2018, which likewise looks to make marking of Genitically Modified food obligatory. These guidelines have not been concluded at this point of time. The guideline gives, 'all food items having all-out Genetically Engineered (GE) fixings 5 percent or more will be labelled [15]. Though, it cannot be neglected that there has been no Indian logical examination completed so far to contemplate the effect of GM crops on humans. Long-term impacts on human wellbeing have not been considered so far. The Department of Health Research has not made any move concerning the assessment of the effect of GM crops on human wellbeing. The legislature ought to revaluate its choice to market GM crops in the nation as it has not been logically demonstrated that GM crops have no unfavourable effect on human wellbeing. It is depending exclusively on considerations that have not been done in India. It is late in the day for the FSSAI to take a choice to label GMO nourishments brought into the nation [15]. As this study is relatively on a new subject more studies need to be conducted with different factors that affect consumers' choice and purchase of GM food. Also, the study was limited to a particular section of society. The financial status was not considered because of limitations like the digital divide. Hence, more research needs to be conducted to get a better picture. Additionally, worldwide studies should also be done to get a better perception of the subject.

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