CONSUMERS' PERCEPTION AND ATTITUDE TOWARDS GENETICALLY MODIFIED ORGANISM PRODUCTS (GMOs) : A CASE STUDY OF HOUSEWIVES IN METROPOLITAN BANGKOK

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ABSTRACT

The purposes of this survey research were to study the perceptions and attitudes of female consumers about Genetically Modified Organism products (GMOs) as well as to investigate the relations between the independent variables and perceptions, between the independent variables and attitudes as well as the relations between the perceptions and attitudes. The interviewing was conducted following a structured questionnaire administered by the researcher. The sample consisted of 220 randomly selected housewives in metropolitan Bangkok who had bought at least 1 of the 5 Genetically Modified Organism products (GMOs) on the Top's supermarket. The data collected were analyzed using percentages, frequency, means, modes, standard deviation, a Chi-Square test and a Correlation Coefficient test.

The results showed that most of the consumers had a moderately favorable level of perception and attitude vis-à-vis Genetically Modified Organism products (GMOs). The correlations between perception and attitude, however,varied. Both educational level and exposure to information affected perception, whereas only exposure to information influenced attitude. Perception correlated with attitude at the 0.05 significance level. Thus, consumers with a high perception had a positive attitude with respect to Genetically Modified Organism products (GMOs).

These findings firmly suggest that the dissemination and publicization of information about Genetically Modified Organism products (GMOs) should be broadened and enhanced to build a higher awareness of Genetically Modified Organism products (GMOs) among consumers to ensure that they all eventually have accurate knowledge, a full understanding and a positive attitude about GMOs.

KEY WORDS : PERCEPTION / ATTITUDE / GENETICALLY MODIFIED ORGANISM PRODUCTS (GMOs) / CONSUMERS : HOUSEWIVES IN METROPOLITAN BANGKOK

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การรับรู้และเจตคติต่อผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) ของผู้บริโภค : กรณีศึกษาแม่บ้านในเขตกรุงเทพมหานคร CONSUMERS' PERCEPTION AND ATTITUDE TOWARDS GENETICALLY MODIFIED ORGANISM PRODUCTS (GMOs) : A CASE STUDY OF HOUSEWIVES IN METROPOLITAN BANGKOK)

ประพันธ์ ศรีสวัสดิ์ 4337340 SHED/M

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บทคัดย่อ

การวิจัยครั้งนี้เป็นการวิจัยเชิงสำรวจเพื่อศึกษาการรับรู้และเจตคติต่อผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) ของผู้บริโภค รวมทั้งศึกษาความสัมพันธ์ระหว่างตัวแปรอิสระกับการรับรู้และเจตคติ ตลอดจนศึกษาความสัมพันธ์ระหว่างการรับรู้และเจตคติ โดยใช้แบบสัมภาษณ์รวบรวมข้อมูลและคัดเลือกกลุ่มตัวอย่างแบบบังเอิญ จำนวน 220 คน จากผู้บริโภคที่เป็นแม่บ้านซึ่งมาซื้อผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) จำนวน 1 ใน 5 ชนิดที่จำหน่ายในร้านท๊อปส์ และนำมาวิเคราะห์โดยใช้สถิติร้อยละ แจกแจงความถี่ มัชฌิมเลขคณิต ฐานนิยม ส่วนเบี่ยงเบนมาตรฐาน ค่าไคสแควร์ และค่าสัมประสิทธิ์สหสัมพันธ์

ผลการศึกษาพบว่าผู้บริโภคส่วนใหญ่มีการรับรู้และเจตคติในระดับปานกลาง การรับรู้มีความสัมพันธ์กับระดับการศึกษาและการรับรู้ข่าวสาร เจตคติมีความสัมพันธ์กับการรับรู้ข่าวสาร และการรับรู้มีความสัมพันธ์กับเจตคติต่อผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) อย่างมีนัยสำคัญทางสถิติที่ระดับ 0.05 คือผู้บริโภคที่มีการรับรู้เกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) ในระดับสูงจะมีเจตคติที่ดีต่อผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)

จากการวิจัยครั้งนี้มีข้อเสนอแนะว่า ควรเพิ่มการเผยแพร่และประชาสัมพันธ์ข้อมูลข่าวสารเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) ให้เข้าถึงกลุ่มเป้าหมาย เพื่อส่งเสริมให้ผู้บริโภคได้รับรู้เกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) มากยิ่งขึ้นเพื่อที่จะนำมาซึ่งความรู้ความเข้าใจและเจตคติที่ถูกต้องต่อไป

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CHAPTER I
INTRODUCTION

1.1 Background

Due to the rapid increasing of the world population and the economic growth causing from the country development, the natural resources and the environment are also utilized and destroyed at the same rate. How can the human and all creatures live as well as they should be, if the world runs out of the natural resources that are the primary factors for living.

Science and technology are utilized to keep the human beings meet their demands. Genetic engineering and biotechnology are one of those important to the human beings in various ways: food quality control by DNA verification, criminal investigation using DNA, Genetically Modified Organisms (GMOs), medical testing, etc. These technologies result from the new knowledge development procedure of the scientists to compensate the things running out and to respond to the endless desires of the human beings. By the way, each society is a compound of many aspects. When one aspect is changed, the others may get some affects. We all are obliged to beware of the impacts occurred, support the appropriate technologies and take a special care of all technologies needed to maximize the society's benefits. (National Center for Genetic Engineering and Biotechnology,2002: 3)

According to Nares Damrongchai (2000: 3-4), approximately since 1998-1999, GMOs (Genetically Modified Organisms) has been referred to in several media, i.e. radio, television, etc. Also, it has become the topic of many seminars under responsibility of the concerned organizations trying to tell the facts of its security and benefits. But most of the concerned news are published in the negative way.

Many of the GMOs' problems are interesting and worth studying since they are affecting the world and our country in aspect of much concern in the environment safe, the human beings; animals and plants' health and the contrary of the trade protection

In 1990s, there were some experiments with several kinds of GMO plants for years. In 1993, some GMO plants were sold in USA and in many countries. These caused the GMO farm increasing rapidly as in the table 1.

Table 1 Global Area of Transgenic Crops, 1996 to 2002

Year	Hectare (Million)	Rai (Million)
1996	1.7	10.6
1997	11.0	68.7
1998	27.8	173.7
1999	39.9	249.4
2000	44.2	276.2
2001	52.6	328.7
2002	58.7	366.9

Source : Clive James, ISAAA Briefs,2002. (refered in National Center for Genetic Engineering and Biotechnology, 2003: 2)

When the GMO foods much increased in the market, esp. in European market, they were doubted in the risk of consumption this kind of foods and were opposed aiming at USA who was the biggest provider in the market. Some multinationals that developed and sold the GMO seeds in USA and the other countries were protested, claiming of the environmental impacts and the monopoly of the intellectual property.

For the GMO foods, there was some propaganda to make people be suspicious in GMO foods; someone even called it the ‘frankenfoods’. In the beginning of 1999, the result from a study in UK on the safeness of the GMO foods consumption was published on air without any peer review. It said the GMO foods are not enough safe to consume. This causes people frightened and cannot be wiped out even when many leading scientists comes to point out that the result can not be counted on by scientific criteria and that the GMO foods in the market are safe enough to consume.

These come to the point that many people feel uncertain of the GMO foods

consumption, causing from various aspects of information received from media.

It's true that some information from those media is correct, but in many cases, those information are incorrect or misinterpreted that cause people confusion or misunderstanding.

According to Sutasana Sriwatanaphong (2000: 81), many GMO products are in the world and Thai markets now; 80 GMO drugs taken by 200 million of patients e.g. insulin and anti-biotic plus 350 on-studied new comers for which tens million of patients are waiting, 75 % of enzymes using in cheese manufacturing all over the world, most kind of yeast all over the world, or even the enzymes containing in the detergents are all the GMOs.

In USA and Europe, the GMOs experiments have been conducted with more than 4,500 of plants and the trade volume of GMO products is more than 3 billion baht. This is quite high volume that we cannot look upon. The GMO products are becoming parts of our lives. It is necessary for agriculture-based countries to think of the benefits of utilizing the appropriate technologies to their agriculture, their conservation of biological diversity, their country development, and their technological competition ability. Due to our existing biological diversity, it is necessary to have the biotechnological knowledge and skill to increase our capability of long-term conservation.

One thing to be concerned is that the technology development needs the specialized human resource and the infrastructure that are rarely found in the developing countries. The problem of technology development is such a complicated problem. By the way, it is accepted that it is necessary to increase our scientific and technological capability to make science and technology a part of our beautiful culture.

Being spread out by various resources, the GMOs information is sometimes abused and can cause confusion. In many cases, the information is too complicated to be understood. Making it plain and easy will allows consumers to receive the fact as they should do. This can help them come up with their own decision either to consume the GMO products or not.

Most of the GMO products in the market are provided by the multinationals for the demand of huge markets such as USA and Europe. That is why our main

products are not developed by these multinationals. So we should develop ourselves to provide the appropriate GMO products for medical and agriculture to our society. Furthermore, the biotechnology leaps of upcountry also force us to have more basic knowledge to support our agriculture-based export. (National Center for Genetic Engineering and Biotechnology, 2000: 3)

According to Nares Damrongchai (2000: 8), the problems of GMO products seem to be increasing since the EU began to publish the rule of declaring non-GMOs text on the food product label. This rule is being applied for the other kinds of product also. Though there is some discussion on these problems, there hasn't been any conclusion of international standard for the import-export. In this situation, the safety issue of GMO products is being used to prevent the commercial instead of taxation measures and causes much impact to the international commercial.

At present, Thailand entrepreneurs, esp. the one who performs agriculture product export to Europe, begin to get the impacts of this commercial prevention. Most of the prevention is performed through the rules that the exporters shall guarantee no GMOs in their products. The products shall be verified, as the importers require, with the exporters' expense. Since Thailand needs some possible GMOs materials such as bean and corn, our exporters need to show their sign of no GMOs on their product label as Europe market requirement.

The aforesaid studies show that as we get benefits from technology, we get damages too. Though there is no conclusion on the risk of consumer and environment, we cannot be ignorant of biotechnology and GMO plant that grow up continuously. We, as the consumer, have no way to block the GMO product growth. Though the GMOs news has been published continuously, it cannot be said that people will have perception and attitude in the same way.

The researcher's interest is focused on housewives; a member of family who is responsible for buying for her family's consumption. Housewives have much influence to other member on whether to consume GMO products or non-GMO products. One of the main factors that is important to product consumption decision is the perception and attitude of buyer. So it is interesting to perform a research on the consumers'perception and attitude towards Genetically Modified Organism products

(GMOs) : a case study of housewives in metropolitan Bangkok. The research will be useful to organization providing GMOs knowledge to the public.

1.2 Research of Objectives

1.2.1 To study the perception and attitude of consumer towards Genetically Modified Organism products (GMOs).

1.2.2 To study the correlation of the age, family income per month, occupation, educational level, exposure to information, and consumption frequency of each consumer against her perception and attitude on Genetically Modified Organism products (GMOs).

1.2.3 To study the correlation of perception and attitude towards Genetically Modified Organism products (GMOs).

1.3 Research of Hypothesis

Perception and attitude of consumer towards Genetically Modified Organism products (GMOs) is depending on her age, family income per month, occupation, educational level, exposure to information and consumption frequency.

1.4 Research of Framework

1.4.1 This is a survey research aimed at the perception and attitude of consumer towards Genetically Modified Organism products (GMOs) in case of consumer is housewife going out to buy GMO products. According to the Greenpeace Southeast Asia (2001: n.p.), on October 15, 2001, it is found that 5 GMO products were sold in Thailand department stores:

1. Nestle Cerelac (mixed fruit) of the Nestle Thai Ltd.
2. Gerber rice and mixed fruit of the Novartis Nutrition (Thailand) Co.,Ltd.
3. Gold Roast cereal drink (Vanilla flavour) of the Gold Roast Food Ltd.,Part.; Songkhla Province

4.Nissin Cup Noodles (spicy duck) of the Nissin Foods (Thailand) Co.,Ltd.

5. Pringle (original flavour) of the Procter and Gamble Co.,Ltd.

The places of the research were the Top's Supermarket in metropolitan Bangkok. The reason of performing the research with the Top's supermarkets only is that the Top's supermarket use no GMOs in their products provided in Netherland, on which their head office locates, and that they have their policy of non-GMOs in their food and pet food products in Denmark, Sweden and Norway. By the way, we have found the GMO products provided in Top's supermarkets in Thailand. (Greenpeace Southeast Asia, n.d.: n.p.)

1.4.2 Variables

1.4.2.1 Independent Variables: age, family income per month, occupation, educational level, exposure to information and consumption frequency.

1.4.2.2 Dependent Variables: perception and attitude towards Genetically Modified Organism products (GMOs)

1.5 Research Conceptual Framework

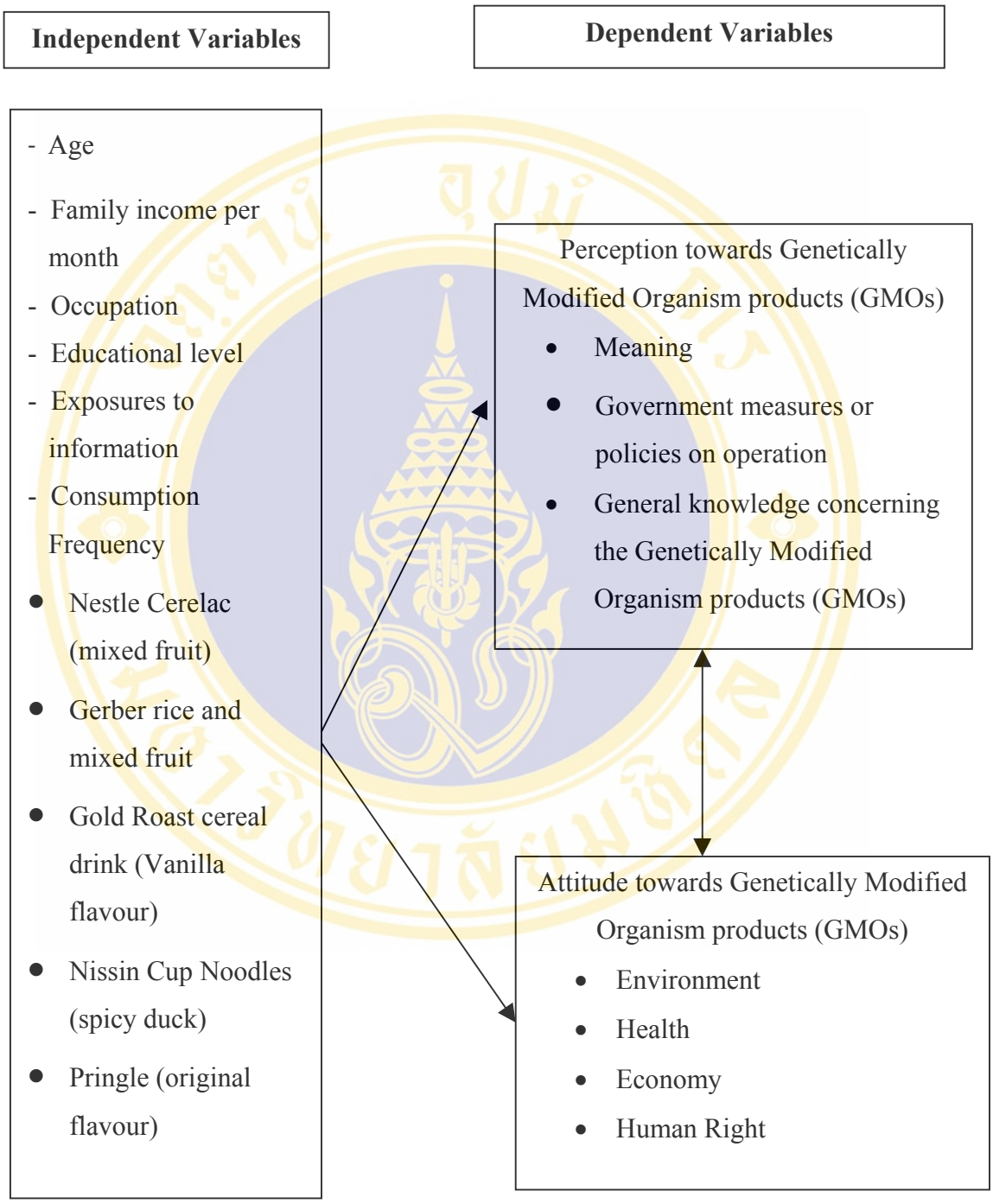

Figure 1 Research Conceptual Framework of consumers'perception and attitude towards Genetically Modified Organism products (GMOs) : a case study of housewives in metropolitan Bangkok

1.6 Basic decision

This research is only performed with housewives buying at least 1 of 5 GMO products, published on October 15, 2001 by Greenpeace Southeast Asia, in the Top's supermarket in metropolitan Bangkok.

1.7 Definition of Terms

Perception means the process of receiving the information on GMOs and interpreting that information for understanding and perceiving the following facts: meaning, government measures or policies on operation and general knowledge concerning GMO products.

Attitude means opinion and posture of consumer to the events or activities concerning to GMOs in the aspects of the environment, health, economy and human rights.

Exposure to information means consumer's receiving the facts and information concerning to GMOs from the government or any media e.g. press, radio, television, internet, person, etc.

Consumer means housewives coming out to buy 5 products, published on October 15, 2001 by Greenpeace as GMO products, provided in the Top's supermarket in metropolitan Bangkok.

Genetically Modified Organism products (GMOs) means product consisting of GMOs ingredient or the production of genetic engineering.

1.8 Beneficial Expectations

The result should be able to explain the situation of the perception and attitude of consumer in metropolitan Bangkok towards GMO products. It will be useful in providing knowledge and promoting GMOs to public. The concerned organizations shall be able to use it as the guideline for planning to promote the right perception and attitude. The interest shall be able to continue on studying and utilize it.

CHAPTER II
LITERATURE REVIEW

All documentation and research reports concerning to this research are derived from the appropriate textbook, documentation, magazine, research report and thesis and used as the research guideline as the followings:

2.1 Concepts of Perception

2.2 Concepts of Attitude

2.3 Concepts of Genetically Modified Organism products (GMOs)

2.4 Literature and Researches related to Variables

2.1 Concepts of Perception

2.1.1 Definition of perception

Warin Sai-eob-uea and Sunee Theeradakorn (1979: 37) described that perception is a process of brain to interpret received information. The perception allows us to know what and how the stimulus is and what it refers to by using existing experience to help interpret.

Pranee Ramasuta (1985: 57) described that perception is a process of physical sensation from the environment and interpret the meaning of that physical sensation using the existing knowledge and experience to help interpret it into understanding.

Pachnee Choeijanya et al. (1987: 71-73) described that perception is a process of mind to respond to the stimulus received. It is a process of information choosing, manipulating and interpreting as our own understanding and feeling. Perception is, normally, taken place with unawareness or unwillingness and always depending on experience. So we can learn to develop this process.

By the way, whether the perception will happen or not, it depends on

information receiver to choose it or not. This is like information filter for human perception.

1. Factor of mind is the most important factor. If the information receiver runs out of interest and refuses to accept the information, the communication will become inefficient. In the other hand, it is a process to make a decision to accept the information for consideration which is depending on some stimuluses and to interpret its meaning into the understanding or responding. (Nopparat Wongkolthoot,1991: 29)

2. Factor of society is an indirectly influence factor which provides experience, vision, thought, and normal behavior of the information receiver. (Chawarat Cherdchai, 1984: 164)

Conclusion: Perception derives from translating or interpreting and varies in each person depending on existing experience or knowledge. In this research, we define the word "perception" as the process of receiving the information on GMOs and interpreting that information for understanding and perceiving the following facts: meaning, government's measures or policies on operation, general knowledge concerning GMO products.

2.1.2 Process of perception

Jamnien chaungchote et al. (1990: 3) described that the process of perception consists of the physical sensation - process of perceiving physical sensation from any stimulus, and the interpreting of that perceiving - that is depending on the intelligence, observation, intention, interest, and quality of mind of that person at that moment.

Applying the existing knowledge or experience to the interpreting needs the sufficient and efficient of knowledge while the experience is also much important.

2.1.3 Influential factors to the perception

There are 2 types of influential factor is classified to the attribute of receiver and the attribute of stimulus. (Sathit Wongsawan,1984: 79-105)

1. Attribute of receiver is an influential factor to the process of perception which is classified into 2 categories:

- Physical - e.g. sex, age, nationality, education, etc are influential to the perception. Effective perception is also depending on the quality of body sensor

e.g. whether the receiver is deep or short-sight. Two or more body sensors working together causes better result of perception e.g. tongue and noses for taste perception, eyes and ears for visual perception.

- Mental - e.g. memory, maturity, intelligence, observation, interest, skill, vogue, culture, etc.

2. Attribute of stimulus is the external factor that makes people feeling interested. Some attributes of stimulus can cause inconsistent perception: the distance, similarity, and continuation of stimulus.

2.1.4 Importance of perception

Perception is important to attitude, emotion and behavior. Perception causes some emotions, which will become the attitude and finally causes behavior.

2.1.5 Perception measurement

Since the perception is a process of brain interpreting from sensing received to knowledge and understanding, the existing knowledge and understanding can be useful. We can perform the perception measurement by measuring knowledge and understanding when there is a stimulus coming in to stimulate our physical sensation. This research is performed using True-False measuring (Yes-No-Not Sure). 1 score for answer Yes and 0 score for answering No or Not Sure.

2.2 Concepts of Attitude

2.2.1 Definition of attitude

Cherdsak Kowasin (1979: 93) described that attitude is people's feelings to things due to their knowledge and experience. Attitude can stimulate people to behave in a certain manner to respond to the stimulant either in positive or negative way.

Munn (referred in Sathit Wongsawan, 1984: 179) described that attitude is either positive or negative feeling or opinion of people to people, things, institutes, and offers that causes people to act as practical response.

Secord and Backman (referred in Chithathai Bhatarachiyanon, 1999: 17) described that attitude is people's feelings to the environment. We will see from the

above that attitude is intangibles in people's mind. People use their own thinking to make a decision against people, events or things. People's attitude might be various in either positive or negative way.

Allport (1953: 810) described that attitude is the readiness status of mind according to experience. This readiness status sets the direction of people's response to the given people, things or situations.

Thurstone (1967: 77) described that attitude is a summary of human in aspects of feeling, bias, opinion, and fear. Opinion can be shown by speaking out and is the symbol of attitude, so we can measure the people's attitude by measuring their opinion.

According to the above definitions, we can conclude that "attitude is the readiness status of mind according to experience toward situation, people, or thing and can be shown either in the positive or negative way." In this research, the researcher provides the definition of attitude that "opinion and acting of consumer toward activities or events of the GMO products in aspects of the environment, health, economy and human right.

2.2.2 Components of attitude

Rosenberg and Hovland (1960: 15) classified attitude into 3 categories:

1. Cognitive component - believing or concept or perception towards a thing either in the positive way or in negative way.

2. Affective component - personal emotion toward a thing as love, hate, like, anger, etc depending on each person.

3. Behavioral component - possibility to respond to the given thing, person, or situation in case of receiving the appropriate stimulus. Cherdsak Kowasin (1979: 93) classified attitude into 3 categories:

1. Cognitive component - component of personal knowledge or understanding toward the given object, which allows people to conclude or evaluate the object.

2. Feeling component - component of personal feeling or emotion toward stimulus after evaluating that stimulus.

3. Action tendency component - component of readiness status of people's mind toward situation, people, or thing either in the positive or negative way, depending on their believing or feeling which derive from their evaluating.

Assumption of attitude measurement:

1. The attitude studying is the studying of people's feeling in stable or quite stable in a period of time.

2. The attitude cannot be measured directly, so it is indirectly measured from the possibility to respond or to act against the object, not direct human behavior.

3. The attitude studying is not studying their attitude direction only. We have to study their attitude level or intensity too.

2.2.3 Attitude measurement

Attitude is invisible and can be classified into 3 categories [Wairach Jiambanjong (1981: 50-60) and Raweewan Angdanurakphan (1990: 17-23)] as the followings:

1. Directive Technique - divided into:

1.1 Interview - Talking with some purpose in mind to receive the planned information. The interview is the same as the oral questionnaire using 2 types of conversation.

1.1.1 Structured Interview - Question and answer are fixed. The interview will be performed the same in every object or object group.

1.1.2 Unstructured Interview - Question and answer are not fixed. The interviewer uses high skill to free up the object's mind. Psychiatrist and social worker usually use this technique in their interview.

1.2 Questionnaire - a set of questions submitted to people to gain any information of their opinion, interest and feeling. It is an instrument for affective domain scale, inventory and check list. Questionnaire is always used when the researcher cannot communicate directly to their objects. There will be explanation for all questions to set all the answers in the same pattern. There are several kinds of questionnaire for attitude measuring as the followings:

1.2.1 Thurstone Scale - consists of sentences depending on topic to scale. There will be scale value or number 1-11 with decimal point in front of each sentence. The scale value will tie to the sentence forever.

1.2.2 Lekert Scale - consists of questionnaire and the following choices to answer: completely agree, agree, uncertain, disagree and completely disagree. Positive attitude will be rated higher scores while negative attitude will be rated lower scores. Summate ratings, then calculate average to know the attitude. Don't forget to bias scores for negative sentence.

1.2.3 Osgood Scale - or Semantic Deferential Scale - used to scale the difference of meanings e.g. beautiful, rich. Osgood Scale uses denotative meaning and connotative meaning e.g. quick, slow, hot, cool. It is used for normal scale.

2. Indirective Technique:

2.1 Sentence Completion - Object will not know what to be scaled.

2.2 Word Association - Object will write down what he think of after seeing each word.

2.3 Story Telling - Object will tell a story after seeing each picture. The story will be depending on their experience, so we can know his attitude.

3. Unobtrusive Technique - the scale is of little stability and should be used together with the other techniques. This technique can be classified into 3 types as the followings:

3.1 Erosion Measures - notice from the erosion of concerned things or people such as notice from much erosion of the floor in front of Monalisa's, we will know that people have a positive attitude toward that painting.

3.2 Trace Measures - notice from any trace left such as footprints, fingerprints, bottle, purse, etc. The ashtray full of ash on the desk shows that its owner is visited by a lot of persons.

3.3 Archive observations - We can observe from some archives or documents such as marriage license, student report or guest book.

From the above classification, this research used the Directive Technique - Questionnaire - Likert Scale. The answer was a choice of 5 positive and negative feelings, that is completely agree, agree, uncertain, disagree, and completely disagree, toward the GMO products in aspects of the environment, health, economy and human

rights. For positive sentence, answering completely agree will get 5 scores while agree gets 4 scores, uncertain gets 3 scores, disagree gets 2 scores, and completely disagree gets 1 score, and vice versa for negative sentence.

2.2.4 Influential factors to the attitude

Attitude is from learning rather than natural originated. That's why some environments have influence to attitude, for example, religion, belief, custom and tradition, society and media. (Pradinan Uparamai, 1975: 117) The followings are influential factors to people's attitude:

1. Learning - Children born in Buddhist family will have faith in Buddhism because of their learning and experience.
2. Direct Experience - People who have experience in having an allergy to seafood will have negative attitude toward it.
3. Both of the above factors need repeatedly experience to become attitude but sometimes, one-time impressive experience can cause attitude as well, nevertheless, it's positive or negative.
4. Attitude inheritance - esp. from the upper level to the lower level. Freshmen get their attitude from seniors.
5. Personality - People who always think negative, always have negative attitude toward things.
6. Media influence - Information received from media can cause both understanding and some emotion.

2.2.5 Attitude Conversion

Some attitudes will not be stable and can be changed in different environment. Chalong Bhiromrat (1978: 75-76) described that attitude can be changed due to some external factors as the followings:

1. Persuasion - is providing knowledge or persuade someone to believe that what we suggest is true and good. Changing someone's attitude is not easy if we don't have any important rule in the society. We need some techniques such as referring to the famous one or giving him admiration and never let him know we're trying to change his mind.

2. Group Change - Group always has influence over its members. If we want to change someone's attitude, we may persuade him to change his group to let him meet new members from various occupations.

3. Advertisement - has much influence to someone's attitude. As we can see in our daily lives, someone doesn't like Thai movies, but if there is an advertisement that a movie is good and become the first Thai movie accepted by the foreigners together with showing some interesting scene, his attitude might be changed.

4. Source of the Message - The paper, article, radio, television, etc play a big role to change people's attitude since they believe in the news of those media. This method is good to the developing countries, i.e. their population are not well-graduated.

5. Group Pressure - Since group has got power over its members, it can force its members to the way expected by that group.

Sucha Chan-aim (1988: 245) described 3 ways to change someone's attitude as the followings:

1. Persuasion - Many people can change their attitude after receiving some advice or knowledge.

2. Group Change - Group has much influence to someone's attitude, so we may change his attitude by changing his group.

3. Advertisement - is creating the new interesting things for people's attention.

According to the aforesaid, we will see that someone's attitude can be changed. And the important thing that can change his attitude is to let him perceive some knowledge, which in this research means to perceive information of GMOs. Showing various aspects of information may change consumer's attitude.

2.3 Concepts of Genetically Modified Organism products (GMOs)

2.3.1 The definition of Genetically Modified Organisms (GMOs)

Nares Damrongchai (2000: 2) said that Genetically Modified Organisms (GMOs) is the adapted or embellished DNA (Deoxyriboneclease) of bio-product.

DNA is the chemical complex, which forming a plant gene, animal gene or bacteria gene.

Department of Economic and Commercial (1999: 1) define the meaning of Genetically Modified Organisms or GMOs as a bio-life including plant, animal and bacteria which pass the genetically modified process by gene transfer from one to another and results the new target properties.

Amara Wongputthipitak (2001: 1) said that the GMOs named from Genetically Modified Orginisms and can have a different meaning in each country. Normally, the known meaning of it is the modified gene by using new biotechnology. This bio-life can be bacteria plant or animal. When use these things as a food we called it Genetically Modified Food (GMFs) or GMO food by mass communication calling.

In conclusion, GMOs is the bio-life includes with plant, animal and bacteria, which pass the process of genetically, modified. The production of GMOs is product consisting of GMOs ingredient or the production of genetic engineering.

Nares Damrongchai (2000: 6-14) published the reconciled and defected of GMOs as follows:

2.3.2 The benefits of GMOs

The benefits of GMOs is the high progression of molecular biotechnology especially, genetic engineering. This will encourage scientist and the global researches institutes throw plenty of all the idea and fund for this technology. This is to develop the quality of global life in nutrition, medical and public health.

The successful of this technical develops intangibles of the improvement of nutrition, medicine and the medical technology, as we nowadays, acceptation. The increasing of population while decreasing of production area, genetic engineering can solve the problems of short supply of food and medicine in the next future. Because genetic engineering give more rate of product per area than the old method. The best example is agriculture in USA. Cause of it's useful; the genetic engineering is called "genomic revolution".

The developed and in developing benefits of GMOs are as the followings:

Benefits to agriculturists

1. New line production of plants which have a condition resistance such as: resize from pesticide, virus fungi or bacteria, resist to salty, sour and drought these all called agronomic traits.

2. New line production of delayed storing such as in ripe delayed tomatoes these also called agronomic traits. All the GMO products in market now qualified as in 1 and 2.

Benefits to consumers

3. New line of cereals, vegetables and fruits which is bigger than usual or has higher quality such as orange and lemon with bigger size or higher vitamin c, called quality traits.

4. New line of economic productions, such as flowers or decorated plants, which has a strange shape or bigger size than usual is also called quality traits.

GMOs as in 3 and 4 has been distributed in USA and Japan markets with increasing public favour. All the GMOs in 1 to 4 is the shortcut of the old processes that safes time and rub existing mistakes.

The benefits in the industries

5. Decrease the used of chemical and asset such as the soy or bean for animal food. This gains much more benefits over the competitors.

6. The use of GMOs in industry such as enzyme which produce vegetable juice and fruit juice or comycin enzyme in cheese production.

7. The production of vaccines now is performed using GMO techniques. In the future, we will have milk with essential hormone, which is produced by GMO techniques.

The benefits to the environments

8. No need to use the pesticide since GMO techniques help strengthen plants. If the use of pesticide is decreasing, the pollution is decreasing too.

9. Increasing many new lines of life-bio, causing the dominant genes more chance to show off.

2.3.3 The defection of GMOs

Every technology has defect and reconciles. In case of GMOs the defect is the risk and complication in management for safety. Although it has no reported bout the dangers of GMO food but the worry about the risk is still concerned:

The risk of consumer

1. The L-Tryptophan in GMOs of Showa Denko made maltality in USA but the real is the quality control in contamination destroys not from the GMOs.

2. The worry about the carrier of poisoning from the GMOs process such as virus. Dr.Pusztai gives raw potatoes to mice and found that it decreases the immunization and causes the intestine inflaming of mice. But this cannot accept by the others scientist cause of unconcise experimental.

3. The essential nutrition in GMOs is less than the natural food such as in GMOs soy has isoflavone much more than natural soy. Isoflavone is the phytoestrogen; the increasing of estrogen hormone is danger for the consumer or not especially in children. It is necessary for studying the effect of isoflavone.

4. The allergen is in the gene, which use in the process of GMOs such as in Brazil nut, which used in GMOs process for protein increasing to use as an animal food. The previous experimental said that it can be the cause allergy from protein in this nut. So this cause the GMOs process was quitted. The GMOs of soy and corn have no problems about this cause it pass the testing process and found that they gave the same results as natural products.

5. The genetic engineering inanimate safety or not? especially in animal, which received the recombinant growth hormone, will have a different quality from the natural animal. They will also have a contaminated chemical. This entire question has no answer now cause in animal there have lots of complication process, so the concerning of evaluation in safety must have much more than plant and bacteria.

6. The medicine resistance, normally marker gene is the antibiotic resistance gene so the new line plant will also have the antibiotic resistance gene. So the question are:

6.1 If the antibiotic is in use, does it become inefficiency because of GMO plants or not? The scientist said that it is a rare case and we can cure or avoid it.

6.2 If the existing bacteria in our body integrate such a marker gene into its chromosome, it is possible to get new breed bacteria with antibiotic resistant. This is also a rare case.

When the concerning of marker gene happen scientist choose the way with unelectable marker or quit the marker gene before push it into the food chain.

7. The 35S promoter and NOS terminator in the GMOs cell will diffuse into stomach and intestine this will cause of active in gene mutation. This is the less chance can happen so people should not worry.

8. However, in some case such as in newborn baby have a short way of gastroentesternal system so this could cause some problems, so it needs more study.

The risk to the environment

9. The pesticide such as Bt toxin in GMOs will kill the useful insect. Losey from the Cornell University, reported the effect of Bacillus thuringensis in GMOs corn and Monarch. He found that the study must be performed in bigger field before the conclusion and expansion in the future.

10. Gene transfer to the environmental will cause the effect on life cycle of the original line. The important character transfer to the unneeded breed. The pesticide will cause of super bug or super weed.

Concerning on social- economics

11. The over science worry is the patent of GMOs will cause of the secure of food in the world. Also the self relying in each country this asking by NGO and the impeding in the global market. This is also the problem in Thailand now.

Although they're a lots of GMOs concerning, in Thailand we have a rule for bio-safety (bio-safety guideline) in laboratory and in the field. The evaluation in risk is the important things, which must be continuing from now and then in the trait condition for the best of information.

However, GMOs is the good chance for activated people to learn about the new biotechnology. It is important cause when you made decision you must use the base of science and it's process. So this is the important of the source of information and the evaluation of deficiency not for the anxiety or trend.

Arkhom Sritubtim (n.d: 14-16) reported about the GMO product as follows:

Biological apprehensive

Genetic engineering is the connecting of gene to gene which scientist cannot plagiarize it directly. When insert it to another gene this will cause some effect that we don't want.

The side effect will happen because genetic engineering is the complicate things that science do not know all about it. So, this will cause the unusual things about the environmental and health of human being. This is the dare of nature indeed.

The genetic engineering can be the economic benefit by the seed's patent. When agricultural plant these seed it will cause of mutant bug which resistance normal pesticide or extinct of this plant.

The plant pollen will flew all over by wind, insect, birds to the next area when it breed with the others this will cause the mutate of plants.

Concerning on sanitation health

The genetic engineering is the change of human nutrition. It inserts the strange things into food, which we never eat it before. This process does not have the safety-testing process and no one knows that it is the safety food or not.

The genetic engineering can make the strange things in life and it can be store and leave toxic in our body when we use it as a food.

The genetic engineering will cause of food allergic which we never know it before, because we are stuck in the beautiful taste and smell of it.

The genetic engineering which made the antibiotic resistance implant will leave the bacteria which dangerous for man, and will cause of antibiotic resistance in bacteria also. The non-label on food is the cause of undetectable when we face the problems.

Concerning on the pollution

It will increase the use of pesticide and not concerning about anything's.

The genetic engineering seed is also call pesticide, this means that the increasing of pesticide in use and in the field.

The genetic engineering made changing of lifecycle and environmental in area. And no one knows about new technology.

If the genetic engineering products spread in environmental system, which we cannot control it and cannot call it back, it will cause of worst thing with unevaluated of value.

Scientist said that if the pollen of this gen-en plant breed with weed, so the new generation of these weed will have a high resistance. But the another side said that it cannot breed across species and the genetic engineering is cut the choosing gene which not related to the weed so nothing can happen in this case. The scientist divided two sides of decision. Which contain the idea of genetic engineering has effect on plant and another side said that no effect. Both sides do the research for supporting their hypothesis but no one fined it now.

Nowadays, GMO food in the market made from gene of bacteria and virus. In the future it will have others genes of insect, animal and fish. The importance thing is the consumer never knows about this. When they take this food it will cause the storage of toxic component in body and the food allergy. In usual we will have immune system to control the work processing of body but the GMO product will annoy the immune system. This will cause of Parkinson disease, Elzimer or Aids. Moreover if it can integrate into the host gene and destroy system of our body or our immune this will resistance the medicine intake for cure the disease. The GMO gene cannot be digested by enzyme, so we think that this gene can produce immune which resistance gastric juice enzyme.

- The effect on weed : Breed the new weed which has much more immune or we called super weed. This weed got gene from virus and bacteria, which have a high resistance of pesticide.

- Activated insect to produce the high immune instead.

- Virus gene inside will produce new virus, which has high immune and resistance.

- Toxic for the digest system of insect, birds and others animals. When the GMO product died, the gene will stay in soil and will be the food of fungi and moss and will be effected on the others life in the world. If these gene spread into he water source it will be the food of plankton or water plant and animal. All of these will be the cause of problems in life cycle of bio-life.

2.3.4 The effect to Thailand (Sutasana Sriwatanaphong,1999: n.p.)

Thailand cannot be stop GMO product cause the plants of GMO product is continue increasing. The half of soybean plants in the world is GMOs. Thailand imports soybean about 8.6 and 6.8 hundred thousand tons in 1997 and 1998, respectively. In the global market of GMOs is 3 billion dollars in 2000 and increase to 8 billion in 2005 and 2.5 ten billion in 2005 in USA. Thailand face problems on GMO product cause we produced from the GMO raw materials for example tomato can, corn can, tuna can and soy source, the customers want the certificate of GMO product or non GMO product. Also the product of rice flour and corn flour, customers want the certificated of non GMOs. The meat industry will also face this problem cause the food that give to animal came from GMO plants. In Europe, for chicken meat the customer just wants to label for the bio-products or organic products. Europe is the biggest and important export market for Thai and very concern about the process of production, they gave the choice for the customer to choose what they want by look at the level.

We found that the organic product has a high cost than bio-product about 10-15 %. In this case, Thailand is the big exporter in this global must take this chance to produce the organic products to be exported.

The others import countries; Japan, China, India and Philippines concern about this technology and supported the study of this field for increasing the food products to feed their country and to reduce the imported food. In Thailand should be supported the study of this technology for produce the product to be the great exporter in the world in the future.

2.3.5 The importing of GMO products into Thailand (Nares Damrongchai, 2000: 43-44)

The imported of GMO products is illegal in Thailand for produce and sell in market in commercial ways. But we have the bile product which is the GMO products such as: the raw material in agriculture, seed, manure, animal breed, soybean, seed corn and vitamin amino acid the growth catalyzing agent, food appetizer, digestion chemical, and the consumer product, fruits, vegetables and meats. In each year is about hundred thousand million baht per year. In the others industrial such as:

medical, dietary, butter, corn, potato and food mixture are the imported products to be the raw material for the process of others production. Mostly of soybean and corn came from Argentina, USA and Brazil, which are the GMO production countries. But in Thailand the consumer cannot know which is GMOs, which is not cause, we do not have a legal to level on products.

2.4 Literature and Researches related to Variables

To propose the researches report of concerning factors is to report the influential factors towards the perception and attitude, and to study the results of these factors to the perception and attitude. The researches report is as the followings:

Rat Jumpathong (1985: 102-108) studied the knowledge, attitude and way of practice when consuming vegetable. The population study is limited to housewives in metropolitan Bangkok. The results showed that the group got high score of knowledge, attitude and the consuming of vegetable and a difference on house area, education, family income per month, the frequency of cooking in each day causes the difference towards knowledge, perception, attitude, and way of practice on vegetable consuming. Moreover, knowledge, attitude and way of practice are correlated in positive way.

Jiraporn Jukpaiwong (1987: 90-95) Reported the factors of awareness on problems in consuming of contaminated foods and mixtures of housewives in metropolitan Bangkok. She found that the education and income are the factors of difference in awareness of consuming contaminated food and mixtures. The difference significant is by 0.05. The group of education higher than pratom 4, group of high perception towards the news from media, and group of well-communicating in one another have knowledge of the contaminated foods and mixtures consuming much more than the others.

Pratin Junpraparb (1989: 107-114) studied the knowledge, attitude and the practical way against contaminated foods and mixtures in secondary school in Bangkok and found that the providers have knowledge in the moderate level. The training of food sanitary and news about this matter made a difference knowledge, attitude and practical. The difference of income and cooking experience showed no

difference towards knowledge, attitude and the practical way. The difference of educational level gave the difference on knowledge but no difference towards attitude and practical way. The correlation between the knowledge, attitude and practical way towards the contaminated foods and mixtures of providers is positive in moderate level. Knowledge and attitude is double multiple with practical way.

Aree Punyakorn (1992: 65-68) studied the awareness of housewives on using plastic in food packaging in metropolitan Bangkok and found that the groups of government and state enterprise officer have a higher level of awareness on using of plastic than the others. The education and attitude towards the problems of plastic using and the knowledge of plastic, food, and the environment has positive correlation to the awareness on plastic in food packaging with 0.001statistic significantly.

Revadee Likitwong (2000: 83-113) studied the perception on the benefits of Imperata in hill tribes : a case study of Development project of Doi Tung Mae Pha loung, Chiangrai, found that the hill-man has knowledge in the moderate level. The perception on the benefits of Imparata to the environment and soil protection is depending on the age, tribe, educational level, members of family, length of staying in the area. The perception on economical benefits of the product depends on the tribe, educational level, members of family, length of staying in the area and the areas of planting.

Suwimol Wichaitumkul (2000: 55-56) studied about the perception on social security of the TT&T employees and found their perception on the social security and concerned conditions of using is in the high level. The perception level on their social security knowledge is not different, except by gender, men seemed to have more knowledge than women do, in the significant of 0.05. The difference of employees' income and educational didn't show any different result.

Chananun Kongtanalitre (2000: 127-133) studied the exposure to information, knowledge, attitude and the acceptation towards consuming the GMOs of people in metropolitan Bangkok and found that the difference on gender, age, educational level, occupation and income gave the different results in exposure to information of consuming GMO products. The exposure to information is correlated with the knowledge and acceptation on GMOs but no correlation with attitude towards it.

Sirikamol Srijard (2001: 114-126) studied the perception on no.5 saving label, the factor of complex market and the decision making of target consumer. She found that the group knows about the label in the moderate level to quite high level. The difference on gender, age, educational level, occupation, and experience in electronic using causes the difference on the exposure to information. The difference on electronic using experience results in the difference towards the understanding and attitude. The influential factors to the decision are the long-lived being, reasonable price, good quality and meet standard.

Na Mada Seangnimnuan (2000: 107-131) studied the perception, expectation and the satisfaction towards projects of metropolitan Bangkok in 1996-2000, and found that people from different social and economic status have no difference on perception and satisfaction. But the difference on family income per month and the educational level provide correlation with the expectation on the projects.

Sanya Kawsawang (2000: 138-151) studied the perception of the TAO's members on the performance of developers in supporting the Tumbon Administration Organization: a case study of members in Samut-Songkram province and found that the perception on the performance of developers was at the moderate level. The factors of social/psychology, knowledge, the exposure to information and experience in these activities correlated with the perception. The attitude towards the developers' characteristic correlated with the perception towards the performance of developers in supporting the TAO.

Arkom Sritubtim (n.d.: 29-31) explained the reaction of consumer about the GMO products from the survey of overseas countries as the followings:

England

In England made the poll from consumer (June 1998) found that 75 % from the random samples didn't agree with the GMO production unless they have the study before present, 73 % worry about the pollution from the GMO product, 61 % said no for the GMO consuming and 58 % do not want GMOs to be the gradient of foods and that 95 % want to label the GMO food.

Furthermore, this random found that 85 % of the questionnaire want to separate the GMO food from the normal food.

France

France people 76 % do not want to eat GMO food.

Austria

In 1997, the 1.2 million Austrian people or 22 % of all population said that they did not want GMO products in Australia and made a poll for this kind of food.

Europe

European do not like the GMO food but 4 % trust this kind of food.

USA

The survey of 1997 found that 54 % want to get rid of chemical using in plant, 93 % want to label on GMO food and 73 % worried about this food. The random of 74 % worry about the medicine from GMOs method should not be safety enough.

From the above documentation and research, we can conclude that the age, educational level, occupation, family income per month, exposure to information and consumption frequency have influence to perception and attitude in different and non-different way. Anyway, there is no confirmation that these variables have influence to differentiation of the housewives' perception and attitude. So the researcher included all the variables into this researcher too.

CHAPTER III
RESEARCH METHODOLOGY

This research is a Descriptive Research aiming at studying of the consumers' perception and attitude towards Genetically Modified Organism products (GMOs) : a case study of housewives in metropolitan Bangkok using the structured questionnaire to collect data in the following ways:

3.1 Population and Sampling

3.2 Research Instrument

3.3 Data Collection

3.4 Data Analysis

3.5 Statistical Data Analysis

3.1 Population and Sampling

Population in this research are the consumers who are housewives buying at least 1 of 5 products specified by Greenpeace Southeast Asia on October 15, 2001 as GMO products from the Top's supermarket in metropolitan Bangkok. The interview was performed to this housewife group using the structured questionnaire.

Sampling size in this research consists of 220 housewives. Sampling procedure was divided into 3 steps as the followings:

Step 1 Perform sampling of the department stores in metropolitan Bangkok - Researcher chose sampling area by Purposive Sampling the Top's supermarkets since Top's still provided the GMO products in Thailand.

Step 2 Perform sampling of the Top's supermarkets - Researcher performed Simple Random Sampling by drawing 5 of 24 Top's supermarkets in metropolitan Bangkok as in Table 2 and 3.

Table 2 Number and branch name of Top's supermarket in metropolitan Bangkok

No	Branch name	Location
1	Bangkae	Phasicharoen
2	Bangrak	Bangrak
3	Chokchai IV	Wangthonglang
4	Fashion Iland	Kannayao
5	Jaransanitwong	Bangkoknoi
6	Kaset	Chatuchak
7	Ladpraw	Chatuchak
8	Ladpraw 87	Wangthonglang
9	Ladyar	Khlongsan
10	Maboonkrong	Pathumwan
11	Prapadang	Ratburana
12	Pinklao	Bangkoknoi
13	Prachaniwet	Chatuchak
14	P.S.Silom	Bangrak
15	Rama III	Yannawa
16	Ramindra	Bangkhen
17	Rajhvithi	Ratchatewi
18	Ratchada	Dindaeng
19	RCA	Huaikhwang
20	Silom	Bangrak
21	Srinakarin	Pravet
22	Sukhapiban III	Saphansung
23	Sukhumvit 41	Vadhana
24	Wangburapa	Phranakhon

Source : http: www.tops.co.th/loc_main_bkk_th.htm [2002, February 27]

Table 3 Number of sample group classified by Top's Supermarket branch

No	Branch name	Location	Sample size (person)
1	Ladpraw	Chatuchak	44
2	Pinklao	Bangkoknoi	44
3	Rama III	Yannawa	44
4	Silom	Bangrak	44
5	Wangburapha	Phranakhon	44
Total			**220**

Step 3 Perform Accidental Sampling - Researcher performed Proportional Accidental Sampling to the housewives buying the GMO products in 5 Top's supermarkets: Ladpraw, Pinklao, Rama III, Silom, and WangBurapa branch, 44 housewives per branch, total 220 housewives as in Table 3.

3.2 Research Instrument

Research Instrument is the structured questionnaire created after studying concerned documentation and researches as the guideline. The questionnaire structure was provided into 4 sections as the followings:

Section 1: questions of the general information. Variables are age, family income per month, occupation, educational level, exposure to information and consumption frequency.

Scoring the consumption frequency is as the followings:

Never consumed / First time consuming	get	0	score
1 time consumed	get	1	score
2 times consumed	get	2	scores
3 times consumed	get	3	scores
more than 3 times consumed / Always consumed	get	4	scores

The consumption frequency can be classified using the values of mean and standard deviation (S.D.) as the followings:

1. Group with low consumption frequency – group with range of scores lower than mean – S.D.

2. Group with moderate consumption frequency – group with range of scores within mean – S.D. up to mean + S.D.

3. Group with high consumption frequency – group with range of scores higher than mean + S.D.

Section 2: Questions of perception towards GMO products. The questions were about the meaning, government measures or policies on operation and general knowledge concerning the Genetically Modified Organism products (GMOs).

Scoring is as the followings: 1 score for answering Yes and 0 score for answering No or Not sure.

The perception level towards the GMO products can be classified using the values of Mean and S.D. as the followings:

1. Group with low level of perception – group with range of scores lower than mean – S.D.

2. Group with moderate level of perception – group with range of scores within mean – S.D. up to mean + S.D.

3. Group with high level of perception – group with range of scores higher than mean + S.D.

Section 3: Questions of attitude towards the GMO products. Type of structured questionnaire was the Rating Scale of Likert Scale. Five of the answers; completely agree, agree, uncertain, disagree, and completely disagree, will be selected. A chart will be used to indicate concept of the issues effected from the policies concerning guidelines of GMOs. Four kinds of questions can be classified as environment, health, economy, and human rights. (National Center for Genetic Engineering and Biotechnology, 2001: 14)

Scoring of attitude towards the GMO products for positive sentence is as the followings:

Completely Agree	get	5	scores
Agree	get	4	scores

Uncertain	get	3	scores
Disagree	get	2	scores
Completely Disagree	get	1	score

And vise versa for negative sentence.

The attitude towards the GMO products can be classified using the values of Mean and S.D. as the followings:

1. Group with low level of attitude or negative attitude – group with range of scores lower than mean – S.D.

2. Group with moderate level of attitude or moderate attitude – group with range of scores within mean – S.D. up to mean + S.D.

3. Group with high level of attitude or positive attitude – group with range of scores higher than mean + S.D.

Section 4 : Questions of any commendation and suggestion on providing the information of the GMOs.

Scale Efficiency Test

The structured questionnaire was verified and improved by the specialist, then tried out with virtual sample group of 30 housewives buying the GMO products in Top's Supermarket in Bangkae branch. It was analyzed as the followings:

1. The GMOs perception questionnaire efficiency test was performed with scoring as the followings: 1 score for the correct answer and 0 score for the wrong answer. Summed for total score in each person then analyzed by method of Item Analysis to classify the Difficulty Level, Discrimination Power and Reliability.

1.1 Difficulty level classification – with 25% technique as the followings formulas:

$$p = \frac{P_H + P_L}{2n}$$

$$r = \frac{P_H - P_L}{n}$$

Where p = difficulty index

r = Item-total Correlation

P_H = the proportion of correct responses in high group only

P_L = the proportion of correct responses in low group only

n = all responses in both group

For selecting the questions, the researcher selected as the real questions with difficulty level value range between 0.2-0.8 and classification power value at least 0.2.

1.2 Once receiving the questionnaire with appropriate difficulty level value and classification power value, we performed the reliability test for internal consistency by the Kuder Richardson 20 method as the followings:

$$r_{tt} = \frac{n}{n-1}\left\{1 - \frac{\sum pq}{s^2}\right\}$$

where r_{tt} = reliability value of the questionnaire

n = number of questions

p = the proportion of correct responses

q = the proportion of wrong responses or 1- p

s^2 = variance of scores

2. The attitude questionnaire efficiency test was performed with scoring as the followings:

	Positive sentence	Negative sentence
Completely Agree	5	1
Agree	4	2
Uncertain	3	3
Disagree	2	4
Completely Disagree	1	5

The item-total correlation was calculated using the 25% technique of high group and low group by calculating the Likert item-total correlation to t-test. (Likert, refered in Boontham Kijpreedaborisut, 1992: 222) as follows:

$$t = \frac{\overline{X}_H - \overline{X}_L}{\sqrt{\frac{S_H^{\,2} + S_L^{\,2}}{n}}}$$

where $\overline{X}_H$ = average score of high group

$\overline{X}_L$ = average score of low group

S^2_H = variance of scores in high group

S^2_L = variance of scores in low group

n = total number of responses

The questions with t value of 2.0 or more were applied. The structured questionnaire then was tested for criterion-related validity using the Cronbach's Alpha $(\alpha - Coefficien\, t)$ (Cronbach refered in Boontham Kijpreedaborisut, 1992: 208) as follows:

$$r_{tt} = \frac{k}{k-1}\left\{1 - \frac{\sum S^{2}{}_{i}}{S^{2}{}_{x}}\right\}$$

where k = number of questions

$\sum S^{2}{}_{i}$ = summary of the variance from each question

$S^{2}{}_{x}$ = variance of total scores

The result of the criterion-related validity test is as the followings:

Section 2 - Questions of perception towards the GMO products get 0.81 of score.

Section 3 - Questions of attitude towards the GMO products get 0.88 of score.

Conclusion: The section 2 and 3 were all right. The section 1 needed improving the attribute of questions and the section 4 needed more choices according to the specialist. Finally, all were improved.

3.3 Data Collection

Data collection was performed by interviewing consumer that is housewives buying the GMO products in 5 branches of Top's supermarket: Ladprao, Pinklao, Rama III, Silom, and WangBurapa; 44 housewives each, total 220 housewives.

3.4 Data Analysis

After data collecting, the researcher verified the integrity of data, then created instrument for data code entry and entered these data codes. All data were analyzed by the Statistical Package for the Social Science or SPSS.

3.5 Statistical Data Analysis

1. General attributes of sample group are age, family income per month, occupation, educational level, exposure to information and consumption frequency, together with perception and attitude towards GMOs. These attributes are presented using the percentages, means, standard deviation, modes and frequency.

2. Testing the relation of one of the independent variables (age, family income per month, occupation, educational level, exposure to information and consumption frequency) and one of the dependent variables (perception or attitude) was performed using the Chi-Square Test.

3. Testing the relation of the dependent variables (perception and attitude) using the Pearson's Product Moment Correlation Coefficient technique.

CHAPTER IV
RESULTS

The research of the consumers'perception and attitude towards Genetically Modified Organism products (GMOs) : a case study of housewives in metropolitan Bangkok studied the sample group of 220 housewives using the structured questionnaire as an instrument. The questions concerned to the sample group's general information, perception towards the GMO products, attitude towards the GMO products, comments and suggestions on GMOs knowledge providing and information publicizing. The results are as the followings:

4.1 General information attributes of the sample group

4.2 The perception towards Genetically Modified Organism products (GMOs) of the sample group

4.3 The attitude towards Genetically Modified Organism products (GMOs) of the sample group

4.4 Comments and suggestions on GMOs knowledge providing and information publicizing

4.5 The correlation between the independent variables and the perception of the sample group towards GMO products

4.6 The correlation between independent variables and the attitude of the sample group towards GMO product

4.7 The correlation between perception towards GMO products and attitude towards GMO products of the sample group

4.1 General information attributes of the sample group

Regarding to the age of the sample group, it was found that 43.63 % of sample group or 96 persons belonged to the group of 31-40 years old, the biggest group and 42.73 % of sample group or 94 persons belonged to the group of not over

30 years old and that 13.64 % of sample group or 30 persons belonged to the group of higher 40 years old, as in the Table 4.

Table 4 Number and percentage of sample group classified by age

Age	N.	PCT.
Not over 30 years	94	42.73
31-40 years	96	43.63
Higher 40 years	30	13.64
Total	220	100.00

Regarding to the family income per month of the sample group, it was found that 40.91 % of sample group or 90 persons belonged to the group of family income per month not over 25,000 baht and 40.45 % of sample group or 89 persons belonged to the group of family income per month 25,001-50,000 baht and that 18.64 % of sample group or 41 persons belonged to the group of family income per month higher 50,000 baht, respectively, as in the Table 5.

Table 5 Number and percentage of sample group classified by family income per month

Family income per month	N.	PCT.
Not over 25,000 baht	90	40.91
25,001-50,000 baht	89	40.45
Higher 50,000 baht	41	18.64
Total	220	100.00

Regarding to the occupation of the sample group, it was found that 50.00 % of sample group or 110 persons were private employee, 12.27 % or 27 persons were government officer and 10.91 % or 24 persons were state enterprise officer, respectively, as in the Table 6.

Table 6 Number and percentage of sample group classified by occupation

Occupation	N.	PCT.
Government officer	27	12.27
State enterprise officer	24	10.91
Private employee	110	50.00
Entrepreneur	15	6.82
Freelance Employee	21	9.55
Housewives	23	10.45
Total	220	100.00

Regarding to the educational level of the sample group, it was found that 60.00 % of sample group or 132 persons had the educational level of bachelors degree, 29.55 % or 65 persons had the educational level of lower than bachelors degree, and 10.45 % or 23 persons had the educational level of higher than bachelors degree, respectively, as in the Table 7.

Table 7 Number and percentage of sample group classified by educational level

Educational level	N.	PCT.
Lower than Bachelors degree	65	29.55
Bachelors degree	132	60.00
Higher than Bachelors degree	23	10.45
Total	220	100.00

The media that the sample group were exposed the information most were television, press (e.g. paper, magazine, brochure) and radio, respectively, as in the Table 8.

Table 8 Number and percentage the top three of the media which are exposed to the sample group

Media	First		Second		Third	
	N.	PCT.	N.	PCT.	N.	PCT.
Television	143	65.00	61	27.73	14	6.36
Radio	9	4.09	61	27.73	126	57.27
Press (e.g. paper, magazine, brochure)	66	30.00	96	43.64	55	25.00
Internet	2	0.91	2	0.91	19	8.64
Person	-	-	-	-	6	2.73
Total	220	100.00	220	100.00	220	100.00

Regarding to the exposure to information of the sample group, it was found that 70.91 % of sample group or 156 persons ever had exposure to information of GMO products and 29.09 % or 64 persons never had exposure to information of GMO products, respectively, as in the Table 9.

Table 9 Number and percentage of exposure to information about Genetically Modified Organism products (GMOs)

Exposure to information	N.	PCT.
Never	64	29.09
Ever	156	70.91
Total	220	100.00

The media from which the sample group were exposed the information of GMOs most was press e.g. paper, magazine, brochure (40.68 % or 96 persons), television (38.14 % or 90 persons), and radio (12.29 % or 29 persons), respectively, as in the Table 10.

Table 10 Number and percentage of media which are exposed about Genetically Modified Organism products (GMOs)

Media	N.	PCT.
Press (e.g. paper, magazine, brochure)	96	40.68
Television	90	38.14
Radio	29	12.29
Internet	19	8.05
Person	2	0.85
Total	236	100.00

*** Choose more than 1 choice**

Regarding to the interest level of the sample group, it was found that 52.27 % of sample group or 115 persons, the biggest group, were interested in the information on GMO products at the moderate level, 23.64 % or 52 persons were interested in the information at the low level and 15.91 % or 35 persons, respectively, were interested in the information at the high level, as in the Table 11.

Table 11 Number and percentage of Genetically Modified Organism products (GMOs) information interest level

Interest level	N.	PCT.
No interest	18	8.18
Low level	52	23.64
Moderate level	115	52.27
High level	35	15.91
Total	220	100.00

Regarding to the decision of the sample group, it was found that 69.55 % of sample group or 153 persons decided not to buy the products and 30.45 % or 67 persons decided to buy the products in case of acknowledgement of GMOs concern in the products, as in the Table 12.

Table 12 Number and percentage of buying decision making in case of acknowledgement of Genetically Modified Organisms (GMOs) concern in the products

Buying decision	N.	PCT.
Buying	67	30.45
No buying	153	69.55
Total	220	100.00

Most of the sample group had never consumed the Nestle Cerelac (mixed fruits), Gerber rice and mixed fruit, Gold Roast cereal drink (Vanilla flavour), and Nissin Cup Noodles (spicy duck) or had just buy them for the first time. But the sample group had ever consumed the Pringle (original flavour) for more than three times or always consumed, as in the Table 13.

Table 13 Number, percentage and mode of consumption frequency of Genetically Modified Organism products (GMOs)

Products	Never consumed / First time consuming		1 time consumed		2 times consumed		3 times consumed		more than 3 times consumed / Always consumed		Total		Mode
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	
1. Nestle Cerelac (mixed fruit)	126	57.27	67	30.45	4	1.82	12	5.45	11	5.00	220	100.00	**Never consumed / First time consuming**
2. Gerber rice and mixed fruit	147	66.82	55	25.00	3	1.36	2	0.91	13	5.91	220	100.00	**Never consumed / First time consuming**
3.Gold Roast cereal drink (Vanilla flavour)	100	45.45	42	19.09	24	10.91	17	7.73	37	16.82	220	100.00	**Never consumed / First time consuming**
4. Nissin Cup noodles (spicy duck)	99	45.00	51	23.18	29	13.18	17	7.73	24	10.91	220	100.00	**Never consumed / First time consuming**
5. Pringle (original flavour)	51	23.18	22	10.00	24	10.91	14	6.36	109	49.55	220	100.00	**more than 3 times consumed / Always consumed**

Regarding to the GMO consumption frequency of the sample group, it was found that, most of the sample group, 72.27 % or 159 persons, had consumption frequency at the moderate level and 17.73 % or 39 persons had consumption frequency at the high level and that 10.00 % or 22 persons had consumption frequency at the low level, respectively, as in the Table 14.

Table 14 Number and percentage of consumption frequency of Genetically Modified Organism products (GMOs)

Consumption Frequency	N.	PCT.
Low	22	10.00
Moderate	159	72.27
High	39	17.73
Total	220	100.00
Mean = 1.24 S.D. = 0.74	Min = 0	Max = 4

4.2 The perception towards Genetically Modified Organism products (GMOs) of the sample group

This research focused on the perception of 3 subjects: meaning, government measures or policies on operation, and general knowledge concerning the GMO products. The results were analyzed as the followings:

Meaning

Question 1. GMOs is the abbreviation of Genetically Modified Organisms. It was found that 60 % of the sample group were correct and 40 % were wrong. The result showed that more than a half of the group had the correct perception on GMOs' abbreviation.

Question 2. GMOs is the organisms including plant, animal, and microorganism received from the genetical modification by transferring genes from one organism to the other. It was found that 79.09 % of the sample group provided the correct answer and 20.91 % provided wrong answer. The result showed that most of

the group knew the correct answer and almost 80 % had the correct perception on the fact that GMOs is the organisms including plant, animal, and microorganism received from the genetical modification by transferring genes from one organism to the other.

Government measures or policies on operation

Question 3. There are widely and acceptable GMO plantings in Thailand. It was found that 64.09 % of the sample group provided the correct answer and 35.91 % provided the wrong answer. This showed that more than a half of the group had the correct perception that there weren't widely and acceptable GMO plantings in Thailand.

Question 4. Thailand, now, does not allow the GMO seeds for planting. It was found that 29.09 % of the sample group provided the correct answer and 70.91 % provided the wrong answer. This showed that most of the group didn't have the correct perception that Thailand, at that moment, did not allow the GMO seeds for planting or commercial production but for research and study only.

Question 5. We, here in Thailand, have law to force the product providers to show the GMOs texts label on the product compounded of more than 5 % of GMOs corn and soybean. It was found that 44.55 % of the sample group provided the correct answer and 55.45 % provided the wrong answer. This showed that more than a half of the sample group didn't have the correct perception that in Thailand, there haven't had any law to force the product providers to show the GMOs texts label on the product compounded of more than 5 % of GMOs corn and soybean.

General knowledge concerning the GMO products

Question 6. Thailand has got some affects from the foreigners' laws issued to force the product providers to show the GMOs texts label on the product compounded of GMOs. It was found that 32.27 % of the sample group provided the correct answer and 67.73 % provided the wrong answer. This showed that more than a half of the sample group didn't have the correct perception that Thailand has got some affects from the foreigners' laws issued to force the product providers to show the GMOs texts label on the product compounded of GMOs. Since some of our products

is compounded of GMO plants e.g. soybean and corn, so those laws force our providers to show the GMOs texts label on our products too.

Question 7. Improving the plant breed using the GMOs method takes longer time than improving by nature. It was found that 70.91 % of the sample group provided the correct answer and 29.09 % provided the wrong answer. This showed that most of the sample group had the correct perception that the GMOs method takes a short time to improve the organisms as required and can be controlled.

Question 8. The USA is the biggest area in the world for GMO planting. It was found that 57.73 % of the sample group provided the correct answer and 42.27 % provided the wrong answer. This showed that more than a half of the sample group had the correct perception that the USA is the biggest area in the world for GMO planting.

Question 9. Without text label, we can see with our naked eyes that which food contains GMOs. It was found that 83.18 % of the sample group provided the correct answer and 16.82 % provided the wrong answer. This showed that most of the sample group had the correct perception that to verify the GMO foods, it is necessary to use the biotechnological technique and the process must be performed in the full-equipped laboratory by the experts.

Question 10. All kinds of GMO plant can stand all kinds of climates. It was found that 44.09 % of the sample group provided the correct answer and 55.91 % provided the wrong answer. This showed that more than a half of the sample group didn't have the correct perception that all kinds of GMO plant cannot stand all kinds of climates because of the different transferred genes i.e. some is drought-resistant and some is cold-resistant.

The analysis result showed that the sample group had the most perception towards the general knowledge of GMOs by mean of 2.88. The perception towards the meaning followed up by mean of 1.39 and perception towards the government measures or policies by mean of 1.38, respectively.

Table 15 Number and percentage of perception towards Genetically Modified Organism products (GMOs)

Questions	Wrong Answer		Correct Answer		Total	
	N.	PCT.	N.	PCT.	N.	PCT.
Meaning						
1. GMOs is the abbreviation of Genetically Modified Organisms.	88	40.00	132	60.00	220	100.00
2. GMOs is the organisms including plant, animal, and microorganism received from the genetical modification by transferring genes from one organism to the other.	46	20.91	174	79.09	220	100.00
Mean = 1.39 S.D. = 0.72			Min = 0		Max = 2	
Government measures or policies on operation						
3. There are widely and acceptable GMO plantings in Thailand.	79	35.91	141	64.09	220	100.00
4.Thailand, now, does not allow the GMO seeds for planting.	156	70.91	64	29.09	220	100.00
5. We, here in Thailand, have law to force the product providers to show the GMOs texts label on the product compounded of more than 5% of GMOs corn and soybean .	122	55.45	98	44.55	220	100.00
Mean = 1.38 S.D. = 0.90			Min = 0		Max = 3	
General knowledge concerning the GMO products						
6. Thailand has got some affects from the foreigners' laws issued to force the product providers to show the GMOs texts label on the product compounded of GMOs.	149	67.73	71	32.27	220	100.00

Table 15 Number and percentage of perception towards Genetically Modified Organism products (GMOs) (Continued)

Questions	Wrong Answer		Correct Answer		Total	
	N.	PCT.	N.	PCT.	N.	PCT.
7. Improving the plant breed using the GMOs method takes longer time than improving by nature.	64	29.09	156	70.91	220	100.00
8. The USA is the biggest area in the world for GMO planting.	93	42.27	127	57.73	220	100.00
9. Without text label, we can see with our naked eyes that which food contains GMOs.	37	16.82	183	83.18	220	100.00
10. All kinds of GMO plant can stand all kinds of climates.	123	55.91	97	44.09	220	100.00
Mean = 2.88 S.D. = 1.09			Min = 0		Max = 4	

According to the analysis in the aspect of the meaning, 53.20 % of the sample group or 117 persons had the perception towards the meaning of GMO products at the high level and 32.70 % or 72 persons had the perception towards the meaning at the moderate level and that 14.10 % or 31 persons had the perception towards the meaning at the low level, respectively, as in the Table 16.

Table 16 Number and percentage of perception level towards Genetically Modified Organism products (GMOs) in meaning

Perception level	N.	PCT.
Low	31	14.10
Moderate	72	32.70
High	117	53.20
Total	220	100.00
Mean = 1.39 S.D. = 0.72	Min = 0	Max = 2

According to the analysis in the aspect of the government measures or policies on operation, 53.60 % of the sample group or 118 persons had the perception towards the government measures or policies on operation against the GMO products at the low level and 36.40 % or 80 persons had the perception towards the government measures or policies on operation at the moderate level and that 10.00 % or 22 persons had the perception towards the government measures or policies on operation at the high level, respectively, as in the Table 17.

Table 17 Number and percentage of perception level towards Genetically Modified Organism products (GMOs) in government measures or policies on operation

Perception level	N.	PCT.
Low	118	53.60
Moderate	80	36.40
High	22	10.00
Total	220	100.00
Mean = 1.38 S.D. = 0.90	Min = 0	Max = 3

According to the analysis in the aspect of the general knowledge of the GMO products, 59.10 % of the sample group or 130 persons had the perception towards the general knowledge of the GMO products at the moderate level and

30.50 % or 67 persons had the perception towards the general knowledge of the GMO products at the high level and that 10.50 % or 23 persons had the perception towards the general knowledge of the GMO products at the low level, respectively, as in the Table 18.

Table 18 Number and percentage of perception level towards Genetically Modified Organism products (GMOs) in general knowledge concerning Genetically Modified Organism products (GMOs)

Perception level	N.	PCT.
Low	23	10.50
Moderate	130	59.10
High	67	30.50
Total	220	100.00
Mean = 2.88 S.D. = 1.09	Min = 0	Max = 4

According to the analysis in overall, 64.09 % of the sample group or 141 persons had the perception towards the GMO products at the moderate level and 23.18 % or 51 persons had the perception towards the GMO products at the low level and that 12.73 % or 28 persons had the perception towards the GMO products at the high level, respectively, as in the Table 19.

Table 19 Number and percentage of perception level towards Genetically Modified Organism products (GMOs) in overall

Perception level	N.	PCT.
Low	51	23.18
Moderate	141	64.09
High	28	12.73
Total	220	100.00
Mean = 5.65 S.D. = 1.56	Min = 2	Max = 9

4.3 The attitude towards Genetically Modified Organism products (GMOs)

This research focused on the attitude on GMO products in 4 categories: environment, health, economy and human rights as in the Table 20. The results were analyzed as the followings:

Environment

Issue 1. GMO plants increase the immune system of pests. It was found from the research that 48.64 % of the sample group or 107 persons were uncertain that GMO plants increase the immune system of pests, 33.18 % of the sample group or 73 persons agreed and 11.36 % of the sample group or 25 persons disagreed, respectively.

Issue 2. GMOs method causes mutation to the plants. It was found from the research that 44.55 % of the sample group or 98 persons agreed that GMOs method causes mutation to the plants, 34.00 % of the sample group or 75 persons were uncertain and 15.45 % of the sample group or 34 persons completely agreed, respectively.

Issue 3. GMO planting can cause hybridization and cause no ordinary breed left. It was found from the research that 40.00 % of the sample group or 88 persons agreed that GMO planting can cause hybridization and cause no ordinary breed left, 30.91 % of the sample group or 68 persons were uncertain and 20.91 % of the sample group or 46 persons completely agreed, respectively.

Issue 4. GMO plants cause changing in the local life cycle and environment. It was found from the research that 46.36 % of the sample group or 102 persons agreed that GMO plants cause changing in the local life cycle and environment, 34.55 % of the sample group or 76 persons were uncertain and 15.45 % of the sample group or 34 persons completely agreed, respectively.

It can be noticed that more than 40 % of the sample group agree that GMOs method causes mutation to the plants, GMO planting can cause hybridization and cause no ordinary breed left, and that GMO plants cause changing in the local life cycle and environment. This means that the sample group feels concerned over the environment and the ecology system issues, respectively.

Issue 5. GMO plants cause agriculturist to use more pesticide. It was found from the research that 58.64 % of the sample group or 129 persons were uncertain that GMO plants cause agriculturist to use more pesticide, 16.36 % or 36 persons agreed and another 16.36 % or 36 persons disagreed, respectively.

Health

Issue 6. Food contained GMOs materials are certainly safe to health. It was found from the research that 60.91 % of the sample group or 134 persons were uncertain that food contained GMOs materials are certainly safe to health, 24.55 % or 54 persons disagreed and 6.82 % or 15 persons agreed, respectively.

Issue 7. GMO foods consuming is a way to let your body get the toxic substances. It was found from the research that 66.36 % of the sample group or 146 persons were uncertain that GMO foods consuming is a way to let your body get the toxic substances, 24.09 % or 53 persons agreed and 7.73 % or 17 persons disagreed, respectively.

Issue 8. GMO foods consuming can cause inheritance of some substances causing allergy. It was found from the research that 55.45 % of the sample group or 122 persons were uncertain that GMO foods consuming can cause inheritance of some substances causing allergy, 30.45 % or 67 persons agreed and 9.55 % or 21 persons disagreed, respectively.

Issue 9. GMO foods consuming can cause antibiotic-resistance. It was found from the research that 69.09 % of the sample group or 152 persons were uncertain that GMO foods consuming can cause antibiotic-resistance, 23.64 % or 52 persons agreed and 5.45 % or 12 persons disagreed, respectively.

Issue 10. GMOs can be used to improve nutrition values. It was found from the research that 54.09 % of the sample group or 119 persons were uncertain that GMOs can be used to improve nutrition values, 24.55 % or 54 persons agreed and 12.27 % or 27 persons disagreed, respectively.

Issue 11. GMOs decreases our food security since it can be owned as intellectual property under its patent. It was found from the research that 61.36 % of the sample group or 135 persons were uncertain that GMOs decreases our food

security since it can be owned as intellectual property under its patent, 26.36 % or 58 persons agreed and 7.73 % or 17 persons disagreed, respectively.

Economy

Issue 12. GMO planting causes production style changed into mono-agriculture. It was found from the research that 56.36 % of the sample group or 124 persons were uncertain that GMO planting causes production style changed into mono-agriculture, 37.73 % or 83 persons agreed and 2.73 % or 6 persons disagreed, respectively.

Issue 13. GMOs can reduce production cost due to its high proportion of product/area. It was found from the research that 43.18 % of the sample group or 95 persons were uncertain that GMOs can reduce production cost due to its high proportion of product/area, 38.18 % or 84 persons agreed and 13.18 % or 29 persons disagreed, respectively.

Issue 14. Issuing law of showing text label on the GMO products is a commercial prevention. It was found from the research that 36.82 % of the sample group or 81 persons were uncertain and another 36.82 % of the sample group or 81 persons disagreed that issuing law of showing text label on the GMO products is a commercial prevention, and 18.18 % or 40 persons agreed, respectively.

Issue 15. GMOs allows agriculturists to stand on their own legs. It was found from the research that 57.73 % of the sample group or 127 persons were uncertain that GMOs allows agriculturists to stand on their own legs, 21.82 % or 48 persons disagreed and 15.45 % or 34 persons agreed, respectively.

Issue 16. To open our country for importing of GMO plants is to let multinational come to monopolize our agricultural system. It was found from the research that 38.64 % of the sample group or 85 persons were uncertain that to open our country for importing of GMO plants is to let multinational come to monopolize our agricultural system, 32.73 % or 72 persons agreed and 14.55 % or 32 persons completely agreed, respectively.

Human rights

Issue 17. Genetic modification method restricts choices of production. It was

found from the research that 53.18 % of the sample group or 117 persons were uncertain that Genetic modification method restricts choices of production, 27.27 % or 60 persons agreed and 12.27 % or 27 persons disagreed, respectively.

Issue 18. Production and distribution of double standard products which one of them contain GMOs is depriving consumers of their human rights. It was found from the research that 60.45 % of the sample group or 133 persons were uncertain that production and distribution of double standard products which one of them contain GMOs is depriving consumers of their human rights, 15.91 % or 35 persons agreed and another 15.91 % or 35 persons disagreed, respectively.

Issue 19. GMOs freely research causes the commercial benefits searching. It was found from the research that 43.18 % of the sample group or 95 persons agreed that GMOs freely research causes the commercial benefits searching, 32.27 % or 71 persons were uncertain and 16.82 % or 37 persons completely agreed, respectively. From the result, more than 40 % of the sample group agreed that GMOs freely research causes the commercial benefits searching. This shows that the sample group feels concerned over the affects from GMOs freely research as said by Jakkrit Kuanpoj (2002: 36). He said that GMOs freely research causes the investors' commercial benefits searching and private company can control products that are necessary to living such as controlling production and distribution of medicine, food, animal, plant and seeds by investors. As a technology development leader and intellectual property owner, some private companies can monopolize agricultural products market, increasing difficulties to people who need these products and allow competition ability of developed countries against developing countries in which agricultural products are the main products.

Issue 20. Original agricultural technology is enough to produce materials for food and no need to use the GMOs process. It was found from the research that 42.27 % of the sample group or 93 persons were uncertain that original agricultural technology is enough to produce materials for food and no need to use the GMOs process, 28.18 % or 62 persons agreed and 14.55 % or 32 persons completely agreed, respectively.

Issue 21. Getting GMO plants into the country for planting is destroying of the existing local breeds. It was found from the research that 37.73 % of the sample group or 83 persons agreed that getting GMO plants into the country for planting is destroying of the existing local breeds, 33.18 % or 73 persons were uncertain and 18.64 % or 41 persons completely agreed, respectively.

Issue 22. Putting specific label on the product containing GMOs allows consumer to make decision to buy or not to buy the product. It was found from the research that 40.91% of the sample group or 90 persons completely agreed that putting specific label on the product containing GMOs allows consumer to make decision to buy or not to buy the product, 38.64 % or 85 persons agreed and 16.82 % or 37 persons were uncertain, respectively.

Issue 23. The appropriate way to protect consumer is to put the label to clarify products containing GMOs. It was found from the research that 41.82 % of the sample group or 92 persons completely agreed that the appropriate way to protect consumer is to put the label to clarify products containing GMOs, 29.55 % or 65 persons agreed and 26.36 % or 58 persons were uncertain, respectively.

It can be noticed that more than 40 % of the sample group agreed that the appropriate way to protect consumer is to put the label to clarify products containing GMOs and that putting specific label on the product containing GMOs allows consumer to make decision to buy or not to buy the product. This shows that the sample group considered it important to put the label to clarify the products containing GMOs. This might be explained that this issue causes the affect to consumer directly and that putting the label allows consumer to know the product information and remain the right to select the products as in the consumer protect act (1979). The consumer protect act describes that consumer has got rights to receive the correct and enough explanation, i.e. right to receive the correct advertisement or label; right to get the perception on product and service correctly, right to make decision to buy product or service, i.e. right to make decision to buy product or service without any commercial monopolize and unfair leading. (The Office of the Consumer Protection Board,1991: 5-6)

Table 20 Number, percentage and mode of attitude towards Genetically Modified Organism products (GMOs)

Issue	Completely Disagree		Disagree		Uncertain		Agree		Completely Agree		Total		Mode
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	
Environment													
1. GMO plants increase the immune system of pests.	5	2.27	25	11.36	107	48.64	73	33.18	10	4.55	220	100.00	Uncertain
2. GMOs method causes mutation to the plants.	-	-	13	5.91	75	34.00	98	44.55	34	15.45	220	100.00	Agree
3. GMO planting can cause hybridization and cause no ordinary breed left.	-	-	18	8.18	68	30.91	88	40.00	46	20.91	220	100.00	Agree
4. GMO plants cause changing in the local life cycle and environment.	-	-	8	3.64	76	34.55	102	46.36	34	15.45	220	100.00	Agree
5. GMO plants cause agriculturist to use more pesticide.	4	1.82	36	16.36	129	58.64	36	16.36	15	6.82	220	100.00	Disagree
Mean = 2.49		S.D. = 0.52			Min = 1						Max = 3.8		
Health													
6. Food contained GMOs materials are certainly safe to health.	13	5.91	54	24.55	134	60.91	15	6.82	4	1.82	220	100.00	Uncertain
7. GMO foods consuming is a way to let your body get the toxic substances.	-	-	17	7.73	146	66.36	53	24.09	4	1.82	220	100.00	Uncertain

Table 20 Number, percentage and mode of attitude towards Genetically Modified Organism products (GMOs) (Continued)

Issue	Completely Disagree		Disagree		Uncertain		Agree		Completely Agree		Total		Mode
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	
8. GMO foods consuming can cause inheritance of some substances causing allergy.	-	-	21	9.55	122	55.45	67	30.45	10	4.55	220	100.00	Uncertain
9. GMO foods consuming can cause antibiotic-resistance.	2	0.91	12	5.45	152	69.09	52	23.64	2	0.91	220	100.00	Uncertain
10. GMOs can be used to improve nutrition values.	4	1.82	27	12.27	119	54.09	54	24.55	16	7.27	220	100.00	Uncertain
11. GMOs decreases our food security since it can be owned as intellectual property under its patent.	-	-	17	7.73	135	61.36	58	26.36	10	4.55	220	100.00	Uncertain
Mean = 2.84	S.D. = 0.37						Min = 1.67					Max = 3.67	
Economy													
12. GMO planting causes production style changed into mono-agriculture.	2	0.91	6	2.73	124	56.36	83	37.73	5	2.27	220	100.00	Uncertain
13. GMOs can reduce production cost due to its high proportion of product/area.	2	0.91	29	13.18	95	43.18	84	38.18	10	4.55	220	100.00	Uncertain

Table 20 Number, percentage and mode of attitude towards Genetically Modified Organism products (GMOs) (Continued)

Issue	Completely Disagree		Disagree		Uncertain		Agree		Completely Agree		Total		Mode
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	
14. Issuing law of showing text label on the GMO products is a commercial prevention.	10	4.55	81	36.82	81	36.82	40	18.18	8	3.64	220	100.00	Disagree / Uncertain
15. GMOs allows agriculturists to stand on their own legs.	4	1.82	48	21.82	127	57.73	34	15.45	7	3.18	220	100.00	Uncertain
16. To open our country for importing of GMO plants is to let multinational come to monopolize our agricultural system.	-	-	31	14.09	85	38.64	72	32.73	32	14.55	220	100.00	Uncertain
Mean = 2.93	S.D. = 0.34						Min = 2						Max = 3.8
Human rights													
17. Genetic modification method restricts choices of production.	-	-	27	12.27	117	53.18	60	27.27	16	7.27	220	100.00	Uncertain
18. Production and distribution of double standard products which one of them contain GMOs is depriving consumers of their Human rights.	5	2.27	35	15.91	133	6.45	35	15.91	12	5.45	220	100.00	Disagree

Table 20 Number, percentage and mode of attitude towards Genetically Modified Organism products (GMOs) (Continued)

Issue	Completely Disagree		Disagree		Uncertain		Agree		Completely Agree		Total		Mode
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.	
19. GMOs freely research causes the commercial benefits searching.	-	-	17	57.73	71	32.27	95	43.18	37	16.82	220	100.00	Uncertain
20. Original agricultural technology is enough to produce materials for food and no need to use the GMOs process.	6	2.73	27	12.27	93	42.27	62	28.18	32	14.55	220	100.00	Uncertain
21. Getting GMO plants into the country for planting is destroying of the existing local breeds.	2	0.91	21	9.55	73	33.18	83	37.73	41	18.64	220	100.00	Agree
22. Putting specific label on the product containing GMOs allows consumer to make decision to buy or not to buy the product.	-	-	8	3.64	37	16.82	85	38.64	90	40.91	220	100.00	Completely Agree
23. The appropriate way to protect consumer is to put the label to clarify products containing GMOs.	5	2.27	-	-	58	26.36	65	29.55	92	41.82	220	100.00	Completely Agree
Mean = 3.02		S.D. = 0.41				Min = 2						Max = 4.14	

According to analysis in each issue, the sample group had the attitude towards GMO products in the aspect of human rights, economy, health, and environment at the moderate level by mean of 3.02, 2.93, 2.84, and 2.49, respectively. This shows that consumers considered human rights the most important, and follows by economy, health, and environment, respectively as in the Table 21.

Table 21 Mean and standard deviation of attitude towards Genetically Modified Organism products (GMOs)

Attitude	Mean	S.D.	Level
Environment	2.49	0.52	moderate
Health	2.84	0.37	moderate
Economy	2.93	0.34	moderate
Human rights	3.02	0.41	moderate
Total	2.82	0.29	moderate

According to overall analysis, 79.54 % of the sample group or 175 persons had the attitude towards the GMO products at the moderate level or were uncertain to the products, 13.64 % of the sample group or 30 persons had the attitude at the low level and 6.82 % or 15 persons had the attitude at the high level, respectively, as in the Table 22.

Table 22 Number and percentage of attitude level towards Genetically Modified Organism products (GMOs)

Attitude level	N.	PCT.
Low	30	13.64
Moderate	175	79.54
High	15	6.82
Total	220	100.00
Mean = 2.82 S.D. = 0.29	Min = 2.019	Max = 3.8

4.4 Comments and suggestions on GMOs knowledge providing and information publicizing of the sample group

Most of the sample group, 98.19 % or 216 persons need to have the GMOs information publicized and 1.82 % or 4 persons don't need to have the GMOs information publicized, as in the Table 23.

Table 23 Number and percentage of inquiring publicization of the information about Genetically Modified Organism products (GMOs)

Inquiring information	N.	PCT.
No need	4	1.82
Need	216	98.18
Total	220	100.00

The GMOs information that the sample group inquires to have it publicized most is the advantages and disadvantages of GMO products (24.16 %), general knowledge concerning Genetically Modified Organisms (GMOs) (21.20 %), and the affects caused by GMO products (20.62 %), respectively, as in the Table 24.

Table 24 Number and percentage the kind of inquiring publicization of the information about Genetically Modified Organism products (GMOs)

Inquiring information	N.	PCT.
1. Advantages and disadvantages of GMO products.	210	24.19
2. General knowledge concerning GMOs	184	21.20
3.The affects caused by GMO products	179	20.62
4. Meaning	164	18.89
5. Government measures or policies on operation	125	14.40
6. Others	6	0.69
Total	868	100.00

*** Choose more than 1 choice**

The sample group also provided the comments that to allow people to understand the GMO products, the given government organizations should provide the information through media (12.58 %), mass media publish the fact as it should be (11.26 %), and educational institutes and technical expert publish their information, research, and opinion via media (10.70 %), respectively, as in the Table 25.

Table 25 Number and percentage of method to promote understanding about Genetically Modified Organisms (GMOs)

Method to promote understanding	N.	PCT.
1. Government organizations provide information through media.	181	12.58
2. Mass media publish the fact information.	162	11.26
3. Educational institutes and technical expert publish their information, research, and opinion via media.	154	10.70
4. Product provider or entrepreneur show the label to declare the detail of ingredient of product clearly.	153	10.63
5. Educational institute provide the education about GMOs widely.	135	9.38
6. Concerning government organization, NGO and private individual launch to seminar, train to provide knowledge to the consumer widely and continually.	133	9.24
7. NGO provide the accurate of fact information through any media including distribute handbook, poster and other document to the consumer.	126	8.76
8. Distributor joint to propagate and publish the information.	101	7.02
9. Student joint to propagate the information, exhibition and distribute the document to the consumer.	99	6.88
10. The consumer joint to broadcast to the friend, relative and other person.	99	6.88
11. Product provider joint to associate and open opinion through the media exactly.	91	6.32
12. Others	5	0.35
Total	**1,439**	**100.00**

*** Choose more than 1 choice**

4.5 The correlation between the independent variables and the perception of the sample group towards GMO products

The research on the correlation between the independent variables including age; family income per month; occupation; educational level; exposure to information; consumption frequency and perception towards GMO products resulted as the followings:

1. Age

Age of the sample group was classified into 3 groups: not over 30 years old, 31-40 years old, and higher than 40 years old. The correlation between age and perception towards GMO products was tested using Chi-squire and found that all age levels of the sample group had perception at the moderate level. The correlation test result showed that there was no correlation between age and perception towards the GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 26.

Table 26 The correlation between age with perception towards Genetically Modified Organism products (GMOs)

Age	Perception towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Not over 30 Years	22	23.40	59	62.77	13	13.83	94	100.00
31-40 Years	23	23.96	62	64.58	11	11.46	96	100.00
Higher 40 Years	6	20.00	20	66.67	4	13.33	30	100.00
Total	51	23.18	141	64.09	28	12.73	220	100.00
Chi-Square = 0.438			df = 4			Significance = 0.979		

2. Family income per month

The correlation between family income per month and perception towards GMO products was tested using Chi-squire and found that most of the sample group with family income per month lower than 25,000 baht up to more than 50,000 baht had perception at the moderate level. The correlation test result showed that there was no correlation between family income per month and perception towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 27.

Table 27 The correlation between family income per month with perception towards Genetically Modified Organism products (GMOs)

Family income per month	Perception towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Not over 25,000 baht	18	20.00	61	67.78	11	12.22	90	100.00
25,001-50,000 baht	19	21.35	57	64.04	13	14.61	89	100.00
Higher 50,000 baht	14	34.15	23	56.10	4	9.75	41	100.00
Total	51	23.18	141	64.10	28	12.72	220	100.00
Chi-Square = 3.797			df = 4				Significance = 0.434	

3. Occupation

The correlation between occupation and perception towards GMO products was tested using Chi-squire and found that most of the sample group had perception at the moderate level. The correlation test result showed that there was no correlation between occupation and perception towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 28.

Table 28 The correlation between occupation with perception towards Genetically Modified Organism products (GMOs)

Occupation	Perception towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Government officer	5	18.52	18	66.67	4	14.81	27	100.00
State enterprise officer	3	12.50	14	58.33	7	29.17	24	100.00
Private employee	27	24.55	72	65.45	11	10.00	110	100.00
Entrepreneur	2	13.33	13	86.67	-	-	15	100.00
Freelance Employees	6	28.57	12	57.14	3	14.29	21	100.00
Housewives	8	34.78	12	52.17	3	13.05	23	100.00
Total	51	23.18	141	64.09	28	12.73	220	100.00
Chi-Square = 13.576			df = 10				Significance = 0.193	

4. Educational level

The correlation between educational level and perception towards GMO products was tested using Chi-squire and found that most of the sample group with all educational levels had perception at the moderate level, and that most of the sample group with educational level of higher than bachelors degree had perception at the moderate level and most of the rest had perception at the high level. The correlation test result showed that there was correlation between educational level and perception towards GMO products with statistical significance of 0.05, corresponding to the existing assumption, as in the Table 29.

Table 29 The correlation between educational level with perception towards Genetically Modified Organism products (GMOs)

Educational level	Perception towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Lower than Bachelors degree	21	32.31	41	63.08	3	4.61	65	100.00
Bachelors degree	30	22.73	83	62.88	19	14.39	132	100.00
Higher Bachelors degree	-	-	17	73.91	6	26.09	23	100.00
Total	51	23.18	141	64.09	28	12.73	220	100.00
Chi-Square = 14.940			df = 4			Significance = 0.005*		

5. Exposure to information

Exposure to information happened via several channels e.g. television, radio, press, internet, person, etc. but in this correlation test, the exposure was classified into 2 groups: had exposure and never had exposure. The correlation between exposure to information and perception towards GMO products was tested using Chi-squire and found that most of the sample group had exposure to GMOs information and that the sample group of both had exposure and never had exposure groups had perception at the moderate level but the most of the sample group that had perception at the high level had ever had exposure to information. The correlation test result showed that there was correlation between exposure to information and perception towards GMO products with statistical significance of 0.05, corresponding to the existing assumption, as in the Table 30.

Table 30 The correlation between exposure to information with perception towards Genetically Modified Organism products (GMOs)

Exposure to information	Perception towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Never	27	42.19	36	56.25	1	1.56	64	100.00
Ever	24	15.38	105	67.31	27	17.31	156	100.00
Total	51	23.18	141	64.09	28	12.73	220	100.00
Chi-Square = 23.769			df = 2				Significance = 0.000*	

6. Consumption frequency

The correlation between consumption frequency and perception towards GMO products was tested using Chi-squire and found that most of the sample group had consumption frequency at the low level and had perception at the moderate level. The correlation test result showed that there was no correlation between consumption frequency and perception towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 31.

Table 31 The correlation between consumption frequency with perception towards Genetically Modified Organism products (GMOs)

Consumption Frequency	Perception towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Low	34	25.19	86	63.70	15	11.11	135	100.00
Moderate	17	21.80	49	62.82	12	15.38	78	100.00
High	-	-	6	85.71	1	14.29	7	100.00
Total	51	23.18	141	64.09	28	12.73	220	100.00
Chi-Square = 3.178			df = 4				Significance = 0.529	

4.6 The correlation between the independent variables and the attitude of the sample group towards GMO products

The research on the correlation between the independent variables including age; family income per month; occupation; educational level; exposure to information; consumption frequency and attitude towards GMO products resulted as the followings:

1. Age

The correlation between age and attitude towards GMO products was tested using Chi-squire and found that all age levels of the sample group had attitude at the moderate level. The correlation test result showed that there was no correlation between age and attitude towards the GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 32.

Table 32 The correlation between age with attitude towards Genetically Modified Organism products (GMOs)

Age	Attitude towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Not over 30 Years	9	9.58	82	87.23	3	3.19	94	100.00
31-40 Years	17	17.71	70	72.92	9	9.37	96	100.00
Higher 40 Years	4	13.33	23	76.67	3	10.00	30	100.00
Total	30	13.64	175	79.54	15	6.82	220	100.00
Chi-Square = 6.746			df = 4				Significance = 0.150	

2. Family income per month

The correlation between family income per month and attitude on GMO products was tested using Chi-squire and found that most of the sample group with all levels of family income per month had attitude at the moderate level. The correlation test result showed that there was no correlation between family income per month and attitude on GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 33.

Table 33 The correlation between family income per month with attitude towards Genetically Modified Organism products (GMOs)

Family income per month	Attitude towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Not over 25,000 baht	8	8.90	77	85.55	5	5.55	90	100.00
25,000-50,000 baht	15	16.85	68	76.40	6	6.74	89	100.00
Higher 50,000 baht	7	17.07	30	73.17	4	9.76	41	100.00
Total	30	13.64	175	79.54	15	6.82	220	100.00
Chi-Square = 3.977			df = 4				Significance = 0.409	

3. Occupation

The correlation between occupation and attitude towards GMO products was tested using Chi-squire and found that most of the sample group had attitude at the moderate level. The correlation test result showed that there was no correlation between occupation and attitude towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 34.

Table 34 The correlation between occupation with attitude towards Genetically Modified Organism products (GMOs)

Occupation	Attitude towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Government officer	3	11.11	23	85.19	1	3.70	27	100.00
State enterprise officer	5	20.83	17	70.84	2	8.33	24	100.00
Private employee	15	13.64	89	80.91	6	5.45	110	100.00
Entrepreneur	2	13.33	11	73.34	2	13.33	15	100.00
Freelance	4	19.05	14	66.67	3	14.28	21	100.00
Housewives	1	4.35	21	91.30	1	4.35	23	100.00
Total	30	13.64	175	79.54	15	6.82	220	100.00
Chi-Square = 7.840			df = 10				Significance = 0.644	

4. Educational level

The correlation between educational level and attitude towards GMO products was tested using Chi-squire and found that most of the sample group with all educational levels had attitude at the moderate level. The correlation test result showed that there was no correlation between educational level and attitude towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 35.

Table 35 The correlation between educational level with attitude towards Genetically Modified Organism products (GMOs)

Educational level	Attitude towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Lower than Bachelors degree	3	4.62	59	90.77	3	4.61	65	100.00
Bachelors degree	25	18.94	97	73.48	10	7.58	132	100.00
Higher Bachelors degree	2	8.69	19	82.61	2	8.70	23	100.00
Total	30	13.64	175	79.54	15	6.82	220.	100.00
Chi-Square = 9.372			df = 4				Significance = 0.052	

5. Exposure to information

The correlation between exposure to information and attitude towards GMO products was tested using Chi-squire and found that most of the sample group had exposure to GMOs information and had attitude at the moderate level. The correlation test result showed that there was correlation between exposure to information and attitude towards GMO products with statistical significance of 0.05, corresponding to the existing assumption, as in the Table 36.

Table 36 The correlation between exposure to information with attitude towards Genetically Modified Organism products (GMOs)

Exposure to information	Attitude towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Never	2	3.13	58	90.62	4	6.25	64	100.00
Ever	28	17.95	117	75.00	11	7.05	156	100.00
Total	30	13.64	175	79.54	15	6.82	220	100.00
Chi-Square = 8.749			df = 2				Significance = 0.013*	

6. Consumption frequency

The correlation between consumption frequency and attitude towards GMO products was tested using Chi-squire and found that most of the sample group had consumption frequency at the low level and had attitude at the moderate level. The correlation test result showed that there was no correlation between consumption frequency and attitude towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption, as in the Table 37.

Table 37 The correlation between consumption frequency with attitude towards Genetically Modified Organism products (GMOs)

Consumption Frequency	Attitude towards Genetically Modified Organism products (GMOs)							
	Low		Moderate		High		Total	
	N.	PCT.	N.	PCT.	N.	PCT.	N.	PCT.
Low	21	15.55	105	77.78	9	6.67	135	100.00
Moderate	9	11.54	65	83.33	4	5.13	78	100.00
High	-	-	5	71.43	2	28.57	7	100.00
Total	30	13.64	175	79.54	15	6.82	220	100.00
Chi-Square = 7.012			df = 4				Significance = 0.135	

4.7 The correlation between perception towards GMO products and attitude towards GMO products of the sample group

The correlation between perception towards GMO products and attitude towards GMO products was tested using Pearson Product Moment Correlation Coefficient and found that there was correlation between perception towards GMO products and attitude towards GMO products with statistical significance of 0.05, corresponding to the existing assumption that if the sample group have perception towards GMO products at the high level, they will have positive attitude too, as in the Table 38.

Table 38 The correlation between perception towards Genetically Modified Organism products (GMOs) with attitude towards Genetically Modified Organism products (GMOs)

		Attitude
Perception	Pearson Correlation	0.255**
	Sig (2-tailed)	0.000
	N	220
Pearson correlation = 0.255		Significance = 0.000*

CHAPTER V
DISCUSSION

In the research on the consumers'perception and attitude towards Genetically Modified Organism products (GMOs) : a case study of housewives in metropolitan Bangkok, the researcher provided structured questionnaire to consumers that were housewives coming to the Top's supermarkets in Metropolitan Bangkok to buy 5 products specified as GMO products by the Greenpeace Southeast Asia (2001: n.p.) on 15 October 2001. The discussion of research result is as the followings:

5.1 The correlation between the independent variables, perception and attitude of the sample group towards GMO products

5.1.1 Perception towards GMO products

It was found from the research that consumer had perception towards the GMO products in the aspect of the meaning at the high level, in the aspect of government measures or policies on operation at the low level, and in the aspect of general knowledge on GMO products at the moderate level. By overall, consumer had perception towards the GMO products at the moderate level. Maybe the GMO product was a new issue so consumer had perception at moderate level. This is corresponding to the study of Saowanit Saenhom (2002: 32) in topic of the influential factors to perception and demand on buying natural product of population in Muang district, Chiangmai. She found that population had perception on natural products at moderate level. And it can be explained using the perception meaning Patchanee Choeijanya et al. (1987: 71-73) explained that perception is a process of mind responding to receiving stimulus, is a co-process of receiving, manipulating, and interpreting message received as one's own understanding and feeling. Normally, perception occurs unconsciously or unwillingly by experience and social accumulation. So perception is a process that can be learned. Similarly, the fact that consumer had perception toward the GMO products at the moderate level shows that most of the Consumers has

the process of receiving, manipulating, and interpreting message of GMO products as their understanding and feeling at the moderate level. By the way, since the perception can be learned, so perception of consumer on GMO products can be built up also.

5.1.2 Attitude towards GMO products

It was found from the research that consumer had attitude towards the GMO products at the moderate level, corresponding to the study of Chantima Chatchaipholarat (2000: 155) in the topic of the behavior on exposure to mass media, knowledge and attitude towards food and nutrition of middle-aged women in metropolitan Bangkok that the sample group had moderate attitude towards food and nutrition of middle-aged women. It's also corresponding to the study of Anchanee Wichyaphai Boonnark (1997: 110) in the topic of the searching for information, attitude and behavior on healthy products consumption of consumer in metropolitan Bangkok that the sample group had neutral attitude towards the healthy products. It is also corresponding to the study of Jitlekha Suksermsongchai (1999: 106) in the topic of the perception and attitude of consumer towards complementary products in lady magazines that the sample group had neutral attitude towards complementary products in lady magazines. This can be explained using the meaning of attitude (Cherdsak Kowasin,1979: 93) that attitude is a feeling of person toward things depending on learning and experience of that person, attitude stimulates person's behavior or possibility to respond to the given stimulus in a certain way either positive or negative ways. Similarly, it was found in this research that consumer had attitude at the moderate level which probably because they didn't have enough learning and experience on GMO products and GMO products was a new issue.

5.1.3 Age

It was found from the research that there was no correlation between age and perception towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption and that there was no correlation between age and attitude on GMO products with statistical significance of 0.05, not corresponding to the existing assumption as well. This can be explained that the

different ages of people don't have any correlation to perception and attitude towards GMO products.

This research result is not corresponding to the concept of Burgoon referred in Kusuma Kou-yai (1997: 197) that the different group of ages will have different interest and this can be a figure of experience and vision that are different in each person.

5.1.4 Family income per month

It was found from the research that there was no correlation between family income per month and perception, and attitude towards GMO products, corresponding to the study of Sirikamol Srijard (2001: 123-124) in the topic of the perception towards no.5 saving label and the factor of complex market and the decision making of target consumer that the different groups of family income per month didn't have different perception towards no.5 saving label. So it can be said that there was no correlation between family income per month and perception towards GMO products.

The research result which showed that there was no correlation between family income per month and attitude towards GMO products is corresponding to the study of Waraporn Siripituphume (2000: 106) in the topic of the attitude and behavior of consumer towards non-toxin vegetables that consumers of different income per month didn't have different attitude towards marketing mixtures, non-toxin vegetables in aspects of products and channels. This is also corresponding to the study of Nipatpong Srithongthuam (1999: 59) in the topic of the attitude of Christian Thai towards beef consumption, which found that there was no correlation between income and attitude towards beef consumption. It can be explained from the research that the consumers of different family income per month didn't have different attitude towards GMO products.

5.1.5 Occupation

It is found from the research that there was no correlation between occupation and perception/attitude towards GMO products. The fact that there was no correlation between occupation and perception is corresponding to the study of Peerawat Wijitphat (2001: 96) on the influential factors to the decision of unpolished

rice consumer in Muang district, Chiangmai, which found that there was no correlation between occupation and perception, i.e. consumers with different occupations didn't have different perception towards unpolished rice.

The fact that there was no correlation between occupation and attitude is corresponding to the study of Praphai Nantagowat (2001: 85) on the attitude towards herbal shampoo usage of customer in Muang district, Udon Thani, which found that customers of different occupations didn't have different attitude towards herbal shampoo usage. So it can be explained that there was no correlation between occupation and perception/attitude towards GMO products at all.

5.1.6 Educational level

It was found from the research that there was correlation between educational level and perception towards GMO products with statistical significance of 0.05, corresponding to the study of Chokchai Wanitlerthanasarn (1998: 113) on the acceptance on knock-down goods, which found that there was correlation between educational level and perception towards knock-down goods. This showed that person with higher educational level had higher perception than person with lower educational level had. Maybe this is because the educational level can tell the perception level of people.

But it was found from the research that there was no correlation between educational level and attitude towards the GMO products, corresponding to the study of Waraporn Siripituphume (2000: 106) in the topic of the attitude and behavior of consumer towards non-toxin vegetables, which found that consumers of different educational level didn't have different attitude towards marketing mixtures, non-toxin vegetables. This showed that consumers of different educational level didn't have different attitude towards GMO products.

5.1.7 Exposure to information

The exposure to information were classified into 2 types: ever had exposure and never had exposure. It was found that there was correlation between exposure to information and perception towards GMO products with statistical significance of 0.05, corresponding to the existing assumption and the study of Aaker (referred in

Wiriya Saroj, 2000: 97), which found that perception of each consumer was different depending on the exposure to information considered interesting. This can be explained that there was correlation between the exposure to information and perception towards GMO products, i.e. the more exposure to information, the more perception towards GMO products.

It was found from the research that there was correlation between exposure to information and attitude towards GMO products, i.e. having ever had exposure or having never had exposure can be used to measure attitude towards GMO products of consumer. This was not corresponding to the study of Chananun Kongtanalitre (2000: 133) on the exposure to information, knowledge, attitude and acceptation towards consuming the GMOs of people in metropolitan Bangkok, which found that there was no correlation between exposure to information and attitude towards GMO products. Also, it was found that most of the consumers exposed to GMOs information from newspaper and felt interested in it at the moderate level, and that most of the consumers decided not to buy the products if they knew that the products were GMO products. This can be explained that consumers were interested in the GMOs information at moderate level, so exposure to information correlated to attitude of the consumers.

5.1.8 Consumption frequency

It was found that there was no correlation between consumption frequency and perception towards GMO products. This showed that consumption frequency was not the influential factor of perception towards GMO products.

Also, there was no correlation between consumption frequency and attitude towards GMO products with statistical significance of 0.05, not corresponding to the existing assumption and the study of Jongrak Maliwan (1988: 62) on the correlation between attitude and behavior towards consumption of products with industrial standard sign of teacher in secondary school in Bangkok, which found that there was correlation between attitude and behavior towards consumption of products with industrial standard sign. This can be explained using the study of Lakhana Sariwat (2001: 71), which said that the influential source of attitude origination and changing was direct experience to the target of attitude. She also said that having direct

experience to the target of attitude brought the attitude more corresponding to personal behavior than indirect attitude and that the attitude could cause the behavior too. These were not corresponding to this research result, which found that consumption frequency, which is a kind of behavior, didn't have correlation to attitude towards GMO products at all.

5.2 Correlation between perception and attitude of sample group towards GMO products

It was found from the research that there was correlation between perception and attitude of consumer in metropolitan Bangkok on GMO products with statistical significance of 0.05, according to the existing assumption, i.e. the higher level of perception towards GMO products, the better attitude towards GMO products. This is corresponding to the study of Maneerat Tantikunarak (2001: 98) on the binding and behavior of consumer on pioneer brand, which found that consumer perception had correlation to attitude towards soy-been milk and trinitron television. This can be explained using the concept of Schiffman and Kanuk referred in Wiriya Saroj (2000: 100-101) that consumer perception comes from stimulus selection, organization, and interpretation till the overall image occurs. That's why perceptions of each consumer are different. Since the perception is mainly depending on personal demand, value and expectation, though in the situation of the same stimulus, each consumer will have different perception level. In this case, perception will support the originating of attitude towards it. These are corresponding to the concept of Chawarat Cherdchai (1984: 164), which said that perception will be originated from selection process of message receiver that works like information filter for personal perception and will be the influential factor to attitude towards GMO products. That is, the high level of perception towards GMO products brings a positive attitude towards GMO products.

CHAPTER VI
CONCLUSION AND RECOMMENDATION

The purpose of research on consumers'perception and attitude towards Genetically Modified Organism products (GMOs) : a case study of housewives in metropolitan Bangkok is to research the perception and attitude of consumer towards GMO products to study the correlation between age; family income per month; occupation; exposure to information; together with consumption frequency and perception/attitude towards GMO products and to study the correlation between perception and attitude towards GMO products. The population of the research was consumers who were housewives buying GMO products in the Top's supermarket in Metropolitan Bangkok. Size of the sample group was 220 housewives. Coincident sampling was utilized. Research instrument was the structured questionnaire containing questions of general information of sample group, perception towards GMO products, attitude towards GMO products, comments and suggestions on GMOs knowledge providing and information publicizing. The Statistical Package for the Social Sciences (SPSS) was used to execute information. Statistical analysis used the percentages, means, standard deviation, modes, frequency, a Chi-square, and Pearson Product Moment Correlation Coefficient. The research result can be summarized as the followings:

6.1 Conclusions

6.1.1 Attributes of the sample group

Size of the sample group was 220 housewives, most of them were 31-40 years old (96 persons), had family income per month not over 25,000 baht (90 persons), had occupation of private officer, educational level of bachelors degree, most exposure to GMOs information via press, were interested in GMOs information at the moderate level, had consumption frequency at the moderate level, and decided not to buy products if they knew the products were GMO products.

6.1.2 Perception towards GMO products

Perception towards GMO products and correlation between perception towards GMO products and independent variables including age, family income per month, occupation, educational level, exposure to information, and consumption frequency can be analyzed and summarized as the followings:

1. Most of the sample group had perception towards GMO products at the moderate level.

2. There was no correlation between perception towards GMO products and age with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different age didn't have different perception towards GMO products.

3. There was no correlation between perception towards GMO products and family income per month with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different family income per month didn't have different perception towards GMO products.

4. There was no correlation between perception towards GMO products and occupation with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different occupation didn't have different perception towards GMO products.

5. There was correlation between perception towards GMO products and educational level with statistical significance of 0.05, corresponding to the existing assumption. This showed that consumers of higher educational level had higher level of perception towards GMO products.

6. There was correlation between perception towards GMO products and exposure to information with statistical significance of 0.05, corresponding to the existing assumption. This showed that consumers having had exposure to information had higher level of perception towards GMO products than consumers having never had exposure to information had.

7. There was no correlation between perception towards GMO products and consumption frequency with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different consumption frequency didn't have different perception towards GMO products.

These could be summarized that perception towards GMO products was at the moderate level and that the perception towards GMO products didn't have correlation to the age, family income per month, occupation, and consumption frequency with statistical significance of 0.05, not corresponding to the existing assumption. But the perception towards GMO products had correlation to the educational level and exposure to information with statistical significance of 0.05, so the assumption was acceptable.

6.1.3 Attitude towards GMO products

Attitude towards GMO products and correlation between attitude towards GMO products and independent variables including age, family income per month, occupation, educational level, exposure to information, and consumption frequency can be analyzed and summarized as the followings:

1. Most of the sample group had attitude towards GMO products in aspects of the environment, health, economy, and human rights at the moderate level.

2. There was no correlation between attitude towards GMO products and age with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different age didn't have different attitude towards GMO products.

3. There was no correlation between attitude towards GMO products and family income per month with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different family income per month didn't have different attitude towards GMO products.

4. There was no correlation between attitude towards GMO products and occupation with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different occupation didn't have different attitude towards GMO products.

5. There was no correlation between attitude towards GMO products and educational level with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumers of different educational level didn't have different attitude towards GMO products.

6. There was correlation between attitude towards GMO products and exposure to information with statistical significance of 0.05, corresponding to the existing assumption. This showed that consumers having had exposure to information had better attitude towards GMO products than consumers having never had exposure to information had.

7. There was no correlation between attitude towards GMO products and consumption frequency with statistical significance of 0.05, not corresponding to the existing assumption. This showed that consumption frequency was not influential factor of the difference in attitude towards GMO products.

These could be summarized that attitude towards GMO products was at the moderate level and that the attitude towards GMO products didn't have correlation to the age, family income per month, occupation, educational level, and consumption frequency with statistical significance of 0.05, not corresponding to the existing assumption. But the attitude towards GMO products had correlation to the age and exposure to information with statistical significance of 0.05, so the assumption was acceptable.

6.1.4 Correlation between perception and attitude towards GMO products

The analysis result was summarized that the sample group had the perception towards GMO products which correlated to the attitude towards GMO products with statistical significance of 0.05, corresponding to the existing assumption that if customers had perception towards GMO products at the high level, they would have a positive attitude too.

6.2 Recommendation from Research

The research of the consumers'perception and attitude towards Genetically Modified Organism products (GMOs) : a case study of housewives in metropolitan Bangkok resulted in the following recommendations:

1. This research was limited to 5 products as published by Greenpeace Southeast Asia on 15 October 2001. This caused specific target group together with

this was a quite new topic, so some of the population refused to participate since they didn't have the information.

2. According to the research result, exposure to information had correlation to perception towards GMO products. We should create network for knowledge distribution. Since GMOs is a new topic to Thai society, we should start at the mass media, which have influence to consumer's thought. It was found from the research that 98.18 % of the sample group or 216 persons want to have GMOs information publicized in aspects of advantage and disadvantage, general knowledge, and the affects of GMO products. Information, research, and comment continuously publicized by the government will open up the opportunity to learn of population. People should be able to verify information as appropriate.

3. According to the research result, the difference in attributes of consumers, esp. housewives in metropolitan Bangkok, had influence to perception and attitude towards GMO products. To distribute the information to housewives in metropolitan Bangkok as required, we should consider the difference of their educational level and exposure to information. To distribute the information to all consumers, we should perform using press.

4. According to the research result, consumers, by overall, had perception towards GMO products at the moderate level and had perception towards government measures or policies on operation at the low level. It is necessary for all concerning organizations i.e. National Center for Genetic Engineering and Biotechnology, Department Of Agriculture, Department Of Fisheries, Department Of Livestock Development, Department Of Medical Sciences, Thailand Institute of Scientific and Technological Research, Food and Drug Administration, Biological Diversity Division, Office of the Consumer Protection Board, educational institutes, NGO and mass media to cooperate in performing the appropriate information distribution continuously. All concerning organizations should play a hard role to show the clearance of government measures and policies and to provide people the right knowledge, awareness, and attitude towards this topic.

5. The Office of the Consumer Protection Board has duty and authority to provide assistance to consumers as the followings: listen to issues of consumer damage causing from the entrepreneurs, monitor and verify products/services to keep

the equity as appropriate, cooperate with organizations in supporting to or study and research problems on consumer protection, support consumer education, perform knowledge distribution as appropriate, cooperate with government organizations in consumer protection to provide consumer the equity in buying products/services and perform other tasks as assigned by specific committee and the most important is publicize information of products or services that may corrupt to consumer rights. (The Office of the Consumer Protection Board, 1991: 11)

According to the above duty and authority, the Office of the Consumer Protection Board should support education providing to consumers and population and should increase the appropriate information distribution to consumers by cooperating with concerning government organizations and NGO. It is found from the research result that the top three of influential media are as the followings: press i.e. newspaper; magazine; brochure, television, and radio, respectively. So the best way to reach the target group is using press.

6. It was found from the research that most of the consumers want to have information publicized in the aspects of the advantages/disadvantages, general knowledge, affects, meaning of the GMO products and government measures or policies or any other that product manufacturers do not fully distribute to public. The Office of the Consumer Protection Board should neutrally publicize these information to allow consumer to consider and compare the difference. This will be more reliable than being distributed by product manufacturers and will be exactly useful to consumer. The information publicizing should be clear and reasonable. It is important to create perception on GMO products since this will finally cause the accurate knowledge, a full understanding and a positive attitude.

6.3 Recommendation for further Research

This research causes researcher to know the obstructions during the research, so the researcher provides plans of improvement for further researches as the followings:

1. This research was performed on specific group of consumer while this issue concerns to various groups. The next research should be performed on other

groups e.g. agriculturist, researcher, government authority, manufacturer and distributor, NGO and mass media to meet the target groups as required.

2. It was found from the research that perception on GMO products was correlated to exposure to information. There should be the research studying of GMO training course planning to build up the perception and attitude of the target group towards the GMOs in the right way.

3. As it was found from the research that press was the most influential media to the target group, followed by television and radio, we should study of the strategies and methods on media creation to support the information publicizing to reach the target group.

4. It was found from the research that the sample group had perception and attitude towards GMO products at the moderate level and also, was interested in this information at the moderate level, and that the consumer paid less attention to the environmental issues. The further researches should focus on the publicizing of the GMO products knowledge to publicize the information, esp. the environmental issues. This will stimulate the interest, knowledge and understanding, and the accurate attitude that are helpful to the society using the process of the environmental education.

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APPENDIX A

- Structured questionnaire of consumers' perception and attitude towards Genetically Modified Organism products (GMOs) : a case study of housewives in metropolitan Bangkok

แบบสัมภาษณ์

เรื่อง การรับรู้และเจตคติต่อผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) ของผู้บริโภค กรณีศึกษาแม่บ้านในเขตกรุงเทพมหานคร

หมายเลขแบบสัมภาษณ์.....

สถานที่เก็บข้อมูล.....

ตอนที่ 1 ข้อมูลทั่วไป

<u>คำชี้แจง</u> ให้ผู้สัมภาษณ์อ่านข้อความคำถาม ถามข้อเท็จจริงของข้อมูลทั่วไปแล้วบันทึกคำตอบ

1. อายุ.....ปี
2. รายได้ต่อครอบครัว.....บาท/ เดือน หรือ.....บาท/ปี
3. อาชีพ
   - ( ) แม่บ้าน (ไม่ทำงานนอกบ้าน)
   - ( ) แม่บ้านและทำงานนอกบ้านด้วย (โปรดระบุ)
     - ( ) รับราชการ
     - ( ) พนักงานรัฐวิสาหกิจ
     - ( ) พนักงานบริษัท
     - ( ) เจ้าของกิจการ
     - ( ) รับจ้างอิสระ
     - ( ) อื่น ๆ (โปรดระบุ).....
4. ระดับการศึกษา
   - ( ) ประถมศึกษา
   - ( ) มัธยมศึกษา / ปวช.
   - ( ) อนุปริญญา / ปวส.
   - ( ) ปริญญาตรี
   - ( ) ปริญญาโทหรือสูงกว่า
   - ( ) อื่น ๆ (โปรดระบุ).....
5. โดยปกติท่านรับข้อมูลข่าวสารจากสื่อใดมากที่สุด (โปรดระบุสื่อ 3 ชนิดแรกที่ท่านได้รับข้อมูลข่าวสาร)

   1.....

   2.....

   3.....

6. ท่านเคยได้รับข้อมูลข่าวสารเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) หรือไม่ หากเคยได้รับโปรดระบุชนิดของสื่อ

( ) ไม่เคยได้รับข้อมูลข่าวสารเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) เลย

( ) เคยได้รับข้อมูลข่าวสารเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) **(โปรดระบุชนิดของสื่อ)**

1.....

2.....

3.....

7. ท่านสนใจข้อมูลข่าวสารต่าง ๆ เกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) มากน้อยเพียงใด

( ) ไม่สนใจเลย ( ) สนใจน้อย ( ) สนใจปานกลาง ( ) สนใจมาก

8. หากทราบว่าผลิตภัณฑ์ที่จะซื้อมีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) ท่านจะตัดสินใจอย่างไร

( ) ตัดสินใจซื้อ ( ) ตัดสินใจไม่ซื้อ

( ) อื่น ๆ (โปรดระบุ).....

9. ท่านและสมาชิกในครอบครัวบริโภคผลิตภัณฑ์ต่อไปนี้บ่อยครั้งเพียงใด

ชนิดผลิตภัณฑ์	**ไม่เคยบริโภคมาก่อน / ซื้อครั้งนี้เป็นครั้งแรก**	**เคยบริโภคมาก่อน**			
		1 ครั้ง	**2 ครั้ง**	**3 ครั้ง**	**มากกว่า 3 ครั้ง / บริโภคเป็นประจำ**
1. เนสท์เล่ซีรีแล็คสูตรผลไม้รวม					
2. เกอร์เบอร์สูตรข้าวเจ้าผสมผลไม้รวม					
3. โกลด์โรสท์เครื่องดื่มธัญญาหารปรุงสำเร็จกลิ่นวนิลา					
4. นิชชินคัพนูดเดิ้ลรสเป็ดพะโล้					
5. พริงเกิ้ลรสดั้งเดิม					

ตอนที่ 2 การรับรู้เกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดแต่งพันธุกรรม (GMOs)

<u>คำชี้แจง</u> ให้ผู้สัมภาษณ์อ่านข้อความต่อไปนี้และถามว่าใช่หรือไม่ใช่หรือไม่แน่ใจ แล้วบันทึกคำตอบ

ข้อความ	ใช่	ไม่ใช่	ไม่แน่ใจ
<u>ด้านความหมาย</u>			
1. GMOs เป็นคำย่อมาจาก Genetically Modified Organisms			
2. GMOs คือ สิ่งมีชีวิตทั้งพืช สัตว์ และจุลินทรีย์ที่ผ่านกระบวนการดัดแปลงพันธุกรรมโดยการถ่ายเทยีนจากสิ่งมีชีวิตหนึ่งไปสู่สิ่งมีชีวิตอีกชนิดหนึ่ง			
<u>ด้านมาตรการหรือนโยบายของรัฐในการดำเนินการ</u>			
3. ประเทศไทยมีการปลูกพืชที่ตัดต่อพันธุกรรม (GMOs) กันอย่างแพร่หลายเป็นที่ยอมรับ			
4. ขณะนี้ประเทศไทยห้ามนำเข้าเมล็ดพันธุ์พืชที่ดัดแปลงพันธุกรรมเพื่อการเพาะปลูก			
5. ประเทศไทยมีกฎหมายบังคับให้ผู้ประกอบการติดฉลากสินค้าที่มีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)ประเภทข้าวโพดและถั่วเหลืองมากกว่า 5 เปอร์เซ็นต์			
<u>ด้านความรู้ทั่วไปเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)</u>			
6. ประเทศไทยได้รับผลกระทบจากการที่ต่างประเทศได้ออกกฎหมายให้ติดฉลากสินค้าที่มีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)			
7. การปรับปรุงพันธุ์พืชด้วยวิธีการดัดแปลงพันธุกรรม (GMOs) ใช้เวลามากกว่าการปรับปรุงพันธุ์ตามธรรมชาติ			
8. ประเทศสหรัฐอเมริกาเป็นแหล่งปลูกพืชที่ตัดต่อพันธุกรรม (GMOs) ที่ใหญ่ที่สุดของโลก			
9. หากไม่มีฉลาก เราสามารถมองได้ด้วยตาเปล่าว่าอาหารชนิดใดมีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)			
10. พืชที่ตัดต่อพันธุกรรม (GMOs) ทุกชนิดสามารถทนทานต่อทุกสภาพอากาศ			

ตอนที่ 3 เจตคติต่อผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)

<u>คำชี้แจง</u> ให้ผู้สัมภาษณ์อ่านข้อความเชิงเจตคติ ถามตอบว่าเห็นด้วยหรือไม่เห็นด้วยอย่างไร แล้วบันทึกคำตอบ

ข้อความเชิงเจตคติเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
<u>ด้านสิ่งแวดล้อม</u>					
1. พืชที่ตัดต่อพันธุกรรม (GMOs) กระตุ้นให้แมลงศัตรูพืชสร้างภูมิคุ้มกันในตัวเองมากขึ้น					
2. วิธีการตัดต่อพันธุกรรม (GMOs) ทำให้พืชชนิดนั้นเกิดการกลายพันธุ์					
3. การปลูกพืชที่ตัดต่อพันธุกรรม (GMOs) อาจทำให้มีการผสมข้ามพันธุ์จนไม่มีพันธุ์ธรรมชาติเหลืออยู่					
4. พืชที่ตัดต่อพันธุกรรม (GMOs) ทำให้วัฏจักรชีวิตและสภาพแวดล้อมในท้องถิ่นเปลี่ยนแปลงไป					
5. พืชที่ตัดต่อพันธุกรรม (GMOs) ทำให้เกษตรกรใช้ยาปราบศัตรูพืชมากขึ้น					
<u>ด้านสุขภาพอนามัย</u>					
6. อาหารที่มีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) มีความปลอดภัยต่อสุขภาพสูง					
7. การบริโภคอาหารที่มีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)จะทำให้ร่างกายได้รับสารพิษ					
8. อาหารที่มาจากสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) อาจทำให้เกิดการถ่ายทอดสารที่ทำให้เกิดภูมิแพ้ต่อผู้บริโภคได้					
9. การบริโภคอาหารตัดต่อพันธุกรรม (GMOs) ทำให้เกิดการดื้อยาปฏิชีวนะได้					
10. การตัดต่อพันธุกรรม (GMOs) อาจใช้ในการช่วยปรับปรุงคุณค่าทางโภชนาการของอาหาร					

ข้อความเชิงเจตคติเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
11. การตัดต่อพันธุกรรม (GMOs) ทำให้ความมั่นคงทางอาหารลดลงเพราะมีการจดสิทธิบัตรถือครองทรัพย์สินทางปัญญาของสิ่งที่ตัดต่อพันธุกรรมได้					
ด้านเศรษฐกิจ					
12. การปลูกพืชที่ตัดต่อพันธุกรรม (GMOs) ก่อให้เกิดการเปลี่ยนแปลงรูปแบบการผลิตไปสู่การเกษตรเชิงเดี่ยว					
13. วิธีการตัดต่อพันธุกรรม (GMOs) ช่วยลดต้นทุนการผลิตเนื่องจากผลผลิตต่อไร่สูง					
14 .การออกกฎหมายให้ติดฉลากระบุว่าผลิตภัณฑ์ใดมีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) เป็นการกีดกันทางการค้า					
15. การตัดต่อพันธุกรรม (GMOs) ส่งผลให้เกษตรกรสามารถพึ่งพาตนเองได้มากยิ่งขึ้น					
16. การเปิดประเทศให้พืชที่ตัดต่อพันธุกรรม (GMOs) เข้ามาเท่ากับเป็นการอนุญาตให้บรรษัทต่างชาติเข้ามาผูกขาดระบบเกษตรกรรมของไทย					
ด้านสิทธิมนุษยชน					
17. วิธีการตัดต่อพันธุกรรม (GMOs) เป็นการจำกัดทางเลือกในวิธีการผลิตของเกษตรกร					
18. การผลิตและจำหน่ายสินค้าสองมาตรฐาน (Double Standard) ซึ่งมีมาตรฐานหนึ่งที่มีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) เป็นการลิดรอนสิทธิมนุษยชน					
19. การศึกษาวิจัยด้านการตัดต่อพันธุกรรม (GMOs) อย่างเสรีนำไปสู่การแสวงหาผลประโยชน์เชิงพาณิชย์					

ข้อความเชิงเจตคติเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)	เห็นด้วยอย่างยิ่ง	เห็นด้วย	ไม่แน่ใจ	ไม่เห็นด้วย	ไม่เห็นด้วยอย่างยิ่ง
20. เทคโนโลยีการเกษตรแบบดั้งเดิมสามารถผลิตวัตถุดิบเป็นอาหารที่เพียงพอต่อความต้องการได้โดยไม่จำเป็นต้องพึ่งพาการตัดต่อพันธุกรรม (GMOs)					
21. การนำเข้าพืชที่ตัดต่อพันธุกรรม (GMOs) มาปลูกในประเทศเป็นการทำลายพันธุกรรมพื้นเมืองที่มีอยู่					
22. การติดฉลากแสดงว่าผลิตภัณฑ์ใดมีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) เป็นการสร้างทางเลือกให้กับผู้บริโภคในการตัดสินใจเลือกซื้อผลิตภัณฑ์					
23. วิธีที่เหมาะสมในการคุ้มครองผู้บริโภค คือการติดฉลากเพื่อให้ทราบว่าผลิตภัณฑ์ใดมีส่วนประกอบของสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)					

ตอนที่ 4 ความคิดเห็นและข้อเสนอแนะเกี่ยวกับการให้การศึกษา การเผยแพร่ข้อมูล เกี่ยวกับสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) ต่อผู้บริโภค

<u>คำชี้แจง</u> ให้ผู้สัมภาษณ์อ่านคำถามความคิดเห็นและข้อเสนอแนะ แล้วบันทึกคำตอบ

1. ท่านต้องการให้มีการเผยแพร่ความรู้เกี่ยวกับสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) แก่ประชาชนทั่วไปหรือไม่ **หากต้องการโปรดระบุประเภทข้อมูล**

( ) ไม่ต้องการ เพราะ.....

( ) ต้องการ เพราะ.....

โปรดระบุประเภทของข้อมูลที่ต้องการให้เผยแพร่ **(ตอบได้มากกว่า 1 ข้อ)**

( ) ความหมาย

( ) ข้อดี-ข้อเสีย

( ) ผลกระทบ

( ) มาตรการหรือนโยบายของรัฐในการดำเนินการ

( ) ความรู้ทั่วไปเกี่ยวกับผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs)

( ) อื่น ๆ (โปรดระบุ).....

2. ท่านคิดว่าจะมีวิธีการอย่างไรที่จะทำให้ผู้บริโภคมีความรู้และความเข้าใจในเรื่องผลิตภัณฑ์สิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) มากขึ้น **(ตอบได้มากกว่า 1 ข้อ)**

( ) หน่วยงานของรัฐที่เกี่ยวข้องให้ข้อมูลข่าวสารผ่านสื่อต่าง ๆ

( ) สถาบันการศึกษาและนักวิชาการเผยแพร่ข้อมูล งานวิจัยและแสดงความคิดเห็นผ่านสื่อต่าง ๆ

( ) สถาบันการศึกษาให้การศึกษาด้านสิ่งมีชีวิตที่ตัดต่อพันธุกรรม (GMOs) อย่างแพร่หลาย

( ) นักศึกษาร่วมเผยแพร่ข้อมูล จัดนิทรรศการและแจกเอกสารต่อผู้บริโภค

( ) NGO ให้ข้อมูลตามข้อเท็จจริงอย่างถูกต้องผ่านสื่อต่าง ๆ ตลอดจนแจกคู่มือ โพสเตอร์และเอกสารประกอบอื่น ๆ

( ) ผู้ผลิตหรือผู้ประกอบธุรกิจแสดงฉลากแจ้งส่วนประกอบของผลิตภัณฑ์อย่างละเอียดชัดเจน

( ) ผู้ผลิตร่วมเสวนาและแสดงความคิดเห็นอย่างตรงไปตรงมาผ่านสื่อต่าง ๆ

( ) สื่อมวลชนนำเสนอข่าวสารตามข้อเท็จจริงที่ถูกต้อง

( ) ร้านค้าผู้จำหน่ายร่วมประชาสัมพันธ์และเผยแพร่ข้อมูล

( ) ผู้บริโภคร่วมกระจายข้อมูลข่าวสารสู่เพื่อน ญาติ คนรู้จักและคนอื่น ๆ

( ) หน่วยงานของรัฐ NGO และเอกชนร่วมมือกันจัดสัมมนา อบรม ให้ความรู้แก่ผู้บริโภคอย่างทั่วถึงและต่อเนื่อง

( ) อื่น ๆ (โปรดระบุ).....

3. ข้อเสนอแนะอื่น ๆ

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.....ขอขอบคุณในความร่วมมือ.....

วันที่.....เวลา.....

ผู้สัมภาษณ์.....

APPENDIX B

- **The letter of specialist appointment**
- **The resume of specialist**
- **The letter to request help in information cooperation**
- **A chart will be used to indicate concept of the issues effected from the policies concerning guidelines of GMOs**

ที่ ทม 0812/ 4496

คณะสังคมศาสตร์และมนุษยศาสตร์
มหาวิทยาลัยมหิดล ศาลายา
อ.พุทธมณฑล จ. นครปฐม 73170

10 ตุลาคม 2545

เรื่อง ขอเรียนเชิญเป็นผู้เชี่ยวชาญ

เรียน ดร. นเรศ ดำรงชัย

ด้วย นางสาวประพันธ์ ศรีสวัสดิ์ นักศึกษาปริญญาศึกษาศาสตรมหาบัณฑิต สาขาวิชาสิ่งแวดล้อมศึกษา (ภาคพิเศษ) คณะสังคมศาสตร์และมนุษยศาสตร์ มหาวิทยาลัยมหิดล กำลังทำวิทยานิพนธ์เรื่อง การรับรู้และเจตคติต่อผลิตภัณฑ์สิ่งมีชีวิตที่ดัดต่อพันธุกรรม (GMO_s) ของผู้บริโภค กรณีศึกษาแม่บ้านในกรุงเทพมหานคร โดยมี อาจารย์ ดร. ภัทรบูรณ์ พิชญไพบูลย์ เป็นอาจารย์ผู้ควบคุมวิทยานิพนธ์ ในการนี้ คณะสังคมศาสตร์และมนุษยศาสตร์ ในการนี้ คณะสังคมศาสตร์และมนุษยศาสตร์ มีความประสงค์ใคร่ขอเรียนท่าน เป็นผู้เชี่ยวชาญตรวจสอบแบบสัมภาษณ์ ในการทำวิจัย เพื่อประกอบการทำวิทยานิพนธ์ ให้แก่ นางสาวประพันธ์ ศรีสวัสดิ์

คณะสังคมศาสตร์และมนุษยศาสตร์ จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์แก่นักศึกษาดังกล่าวด้วย จักเป็นพระคุณยิ่ง

ขอแสดงความนับถือ

(รองศาสตราจารย์วิราพร จักรไพวงส์)
รองคณบดี
ปฏิบัติราชการแทนคณบดีคณะสังคมศาสตร์และมนุษยศาสตร์

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ตำแหน่งปัจจุบัน

นักวิจัยนโยบาย โครงการศึกษานโยบายด้านเทคโนโลยีชีวภาพ
ศูนย์พันธุวิศวกรรมและเทคโนโลยีชีวภาพแห่งชาติ
สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ

คุณวุฒิ ปริญญาเอก (Biotechnology)

สถานที่ติดต่อ

ศูนย์พันธุวิศวกรรมและเทคโนโลยีชีวภาพแห่งชาติ
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ความเชี่ยวชาญและงานที่รับผิดชอบ

ด้านนโยบาย

การศึกษาเชิงนโยบายด้านเทคโนโลยีชีวภาพ เน้นเกี่ยวกับความปลอดภัยทางชีวภาพ (biosafety) ชีวจริยธรรม (bioethics) และยุทธศาสตร์การพัฒนาระบบนวัตกรรมระดับชาติ

ด้านเทคนิค

เทคนิค protein molecular assembly
การเพาะเลี้ยงเซลล์ผิวหนัง (human keratinocyte culture)
วิศวกรรมเนื้อเยื่อ (tissue engineering)

ประวัติการศึกษา

1990 Bachelor of Engineering (Bioengineering, Tokyo Institute of Technology)
1992 Master of Engineering (Bioengineering, Tokyo Institute of Technology)
1995 Doctor of Engineering (Biotechnology, Tokyo Institute of Technology)

การทำงานและการนำเสนอผลงาน

1. วิจัยระดับหลังปริญญาเอก (post-doctoral research) ภายใต้ R&D program ของหน่วยงาน New Energy and Industrial Technology Development Organization (NEDO) ของรัฐบาลญี่ปุ่น ตุลาคม 2538 - มีนาคม 2539 หัวข้อวิจัย “การสร้างแผ่นฟิล์มโพลิเมอร์ที่หันเรียงอย่างเป็นระเบียบและผลที่มีต่อการเพาะเลี้ยงเซลล์ตับเพื่อประยุกต์ใช้ในการสร้างตับเทียม”
2. ผู้จัดการห้องปฏิบัติการวัสดุชีวภาพ (Biomaterial Laboratory) 2539 - 2542
3. นำเสนอผลงานวิจัยในข้อ 1. ในการประชุมวิชาการ 5th Biomaterial World Congress จัดขึ้น ณ เมือง Toronto ระหว่าง พ.ค.-มิ.ย. 2539
4. นำเสนอผลงานวิจัยเรื่อง "การปลูกถ่ายผิวหนังด้วยเคอราทิโนศัยต์เพาะเลี้ยง ระยะที่ 1 (Cultured Keratinocytes Graft phase 1)" สรนิต ศิลธรรม, นเรศ ดำรงชัย, พรพรหม เมืองแมน, จอมจักร จันทรสกุล, ศิริยา โชควิวัฒนวนิช ในงานประชุมประจำปีของราชวิทยาลัยศัลยแพทย์แห่งประเทศไทย ครั้งที่, โรงแรม The Royal Clif Beach Hotel Pattaya, 24-27 กรกฎาคม 2542.
5. นำเสนอผลงานเรื่อง "การเพาะเลี้ยงเนื้อเยื่อผิวหนังมนุษย์เพื่อใช้ปลูกถ่ายเชิงศัลยกรรม (Culture of Human Skin Sheet for Wound Therapy)" นเรศ ดำรงชัย, รัชนีพร เจนวิถีสุข และสรนิต ศิลธรรม. บรรยายในงานประชุมครั้งที่ 25 ของสมาคมวิทยาศาสตร์และเทคโนโลยีแห่งประเทศไทย, พิษณุโลก, 19-22 ตุลาคม 2542.
6. จัดทำรายงานสรุปสถานภาพเกี่ยวกับ GMOs ในประเทศไทย สำหรับเป็นข้อมูลแก่ผู้กำหนดนโยบายของรัฐ ขณะนี้ตีพิมพ์ไปแล้วมากกว่า 3000 เล่ม (จนถึง มกราคม 2544)
7. ผู้ทำงาน คณะทำงานกำหนดมาตรฐานการตรวจสอบและออกใบรับรองสินค้าเทคโนโลยีชีวภาพตามคำสั่งคณะอนุกรรมการนโยบายสินค้าเทคโนโลยีชีวภาพ พฤษภาคม 2543
8. เลขานุการและอนุกรรมการ คณะอนุกรรมการความปลอดภัยทางชีวภาพด้านอาหาร ตั้งแต่เดือนพฤศจิกายน 2543
9. ผู้ทำงาน คณะทำงานพิจารณากำหนดแนวทางการแสดงฉลากอาหารที่ได้จากการตัดแต่งพันธุกรรม ตั้งแต่ 2543
10. อนุกรรมการ คณะอนุกรรมการนโยบายระดับชาติด้านความปลอดภัยทางชีวภาพ ตั้งแต่ 2544
11. อนุกรรมการ คณะอนุกรรมการพิจารณาความปลอดภัยอาหารตัดแต่งพันธุกรรม ตั้งแต่ 2544
12. Member, OECD Conference Steering Group, New Biotechnology Foods and Crops: Science, Safety and Society, 10-12 July 2001, Bangkok Thailand.
13. Member and Secretary, Scientific Committee, APEC-JIRCAS Joint Symposium and Workshop on Agricultural Biotechnology, 3-12 September 2001, Amari Watergate Hotel, Bangkok, Thailand.
14. อนุกรรมการ คณะอนุกรรมการกลั่นกรองโครงการวิจัยการเกษตร สำนักพัฒนางานวิจัยการเกษตร ตั้งแต่ 2544
15. อนุกรรมการ คณะอนุกรรมการแก้ไขปัญหาของสมัชชาคนจน กรณีการร่างกฎหมายว่าด้วยความปลอดภัยทางชีวภาพแห่งชาติ

16. ผู้ทำงาน คณะทำงานแก้ไขปัญหาของสมัชชาคนจน กรณีการร่างกฎหมายว่าด้วยความปลอดภัยทางชีวภาพแห่งชาติ
17. กรรมการผู้ทรงคุณวุฒิ คณะกรรมการอาหาร ตั้งแต่ 2544

สมาชิกภาพ

สมาคมวิทยาศาสตร์แห่งประเทศไทย

Japan Chemical Society

The Society of Bioengineering (Japan)

สมาคมเทคโนโลยีชีวภาพแห่งประเทศไทย

ผลงานวิจัยที่ได้รับการตีพิมพ์

1. Activity self-controllable enzyme-calmodulin hybrid by Ca^{2+} information - An approach towards the regulation of a molecular device which breaks chemical structure, Miwa, T., **Damrongchai, N.**, Shinohara, H., Ikariyama Y., and Aizawa, M., *J. Biotechnol*., 20, 141-150 (1991)
2. Coordinated function of different proteins in surface membrane, Aizawa, M., **Damrongchai, N.**, Kobatake, E., and Ikariyama, Y., *Membrane Symposium*, 4, 89-92 (1992)
3. Calcium responsive two-dimensional molecular assembling of lipid-conjugated calmodulin, **Damrongchai, N.**, Kobatake, E., Haruyama, T., Ikariyama, Y., and Aizawa, M., *Bioconjugate Chemistry* 6 (3), 264-268 (1995)
4. Two-dimensional molecular assembling of calmodulin-melittin at the air-water interface, **Damrongchai, N.**, Kobatake, E., Ikariyama, Y., and Aizawa, M., *Langmuir*, 12 (5), 1321-1325 (1996)
5. Protein Supramolecular Systems for Molecular Information Processing, Aizawa, M., **Damrongchai, N.**, Kobatake, E., Supramolecular Science, 3, 149-155 (1996)
6. Self-assembling of glutathione S-transferase/ calmodulin fusion protein on chemically modified gold surface, **Damrongchai, N.**, Kanno, S., Kobatake, E., and Aizawa, M., *Journal of Biotechnology*, 55 (2), 125-133 (1997)
7. Cellular Responses to Chitosan In Vitro: The importance of deacetylation, Prasitsilp, M., Rachaneeporn Jenwithisuk, R., Kongsuwan, K., **Damrongchai, N.**, and Watts, P., Journal of Material Science: Materials in Medicine, 11, 773-778 (2000)

ผลงานอื่น ๆ

1. Paper **"Implementing Biosafety Regulations in Thailand: The Role of BIOTEC"** at ISNAR's Course on "New Technologies for Agricultural Research: Managing Biotechnology in a Time of Transition", 8-20 November 1999, The Philippines. A report is now available on the internet at http://www.isnar.org/isnar/projects/ibs/update3a.htm
2. Paper **"Status of Genetically Modified Food in the World with Emphasis in Asia"** at the American Soybean Association (ASA) Symposium on Food Biotechnology: Risks and Benefits of Genetically Modified Products and Foods, 16 December 1999. EDSA Shangrila Hotel, Manila, Philippines.
3. Research paper **"Public Perception of GMOs in Thailand"** presented at 9th International Conference The Greening of Industry Network Bangkok, Thailand. January 21-25, 2001.

4. Research paper "**Stakeholder Dialogue in GM Debate: A Stepwise Approach Toward Consensus**" presented at 10th International Conference of the Greening of Industry Network: Corporate Social Responsibility - governance for sustainability in Göteborg, Sweden, June 23-26 2002.
5. รายงานสถานภาพ genetically modified organisms (GMOs) ในประเทศไทย, ก.ย. 2542 - ม.ค. 2544
6. จดหมายข่าวด้านเทคโนโลยีชีวภาพ "InsightBio", ธ.ค. 2542 - (เดิมชื่อ Policy Update)
7. "GMOs ข้อมูลทางวิทยาศาสตร์เกี่ยวกับผลกระทบต่อสิ่งแวดล้อมและการบริโภคอาหารและข้อเสนอแนะเชิงนโยบาย", ธ.ค. 2542
8. "สถานภาพ GMOs ในประเทศไทย ฉบับประชาชน", เม.ย. 2543
9. "GMOs ในบริบทการค้าโลก และการเตรียมพร้อมของไทย", Chulalongkorn Review, ปีที่ 12 ฉบับที่ 47 เมษายน – มิถุนายน 2543
10. "GMOs มหัศจรรย์หรือมหันตภัยแห่งสหัสวรรษ" โดย มูลนิธิบัณฑิตยสภาวิทยาศาสตร์และเทคโนโลยีแห่งประเทศไทย, เม.ย. 2543
11. "โคลนนิ่ง เทคโนโลยีสะท้านโลก" โดย มูลนิธิบัณฑิตยสภาวิทยาศาสตร์และเทคโนโลยีแห่งประเทศไทย, มิ.ย. 2544
12. "จีโนมิคส์ ภาษาแห่งชีวิต" โดย มูลนิธิบัณฑิตยสภาวิทยาศาสตร์และเทคโนโลยีแห่งประเทศไทย, พ.ย. 2545

โครงการวิจัยที่ดำเนินอยู่ในปัจจุบัน

1. การศึกษายุทธศาสตร์วิจัยด้านจีโนมมนุษย์ ในคณะทำงานแผนกลยุทธ์การวิจัยสุขภาพ กลุ่มการวิจัยปัญหาสุขภาพ ร่วมกับ ศ. ดร. ประพนธ์ วิไลรัตน์ ภายใต้โครงการทบทวนและปรับเปลี่ยนแผนกลยุทธ์การวิจัยสุขภาพของประเทศไทย (Research Project : Review Strategic Plan for Thailand Health Research)

   ศาสตราจารย์เกียรติคุณ ดร. ณัฐ ภมรประวัติ ..... ที่ปรึกษา
   โครงการวิจัยและพัฒนาวัคซีน มหาวิทยาลัยมหิดล
   ศาสตราจารย์ น.พ.สมอาจ วงษ์ขมทอง .....หัวหน้าโครงการ
   สถาบันพัฒนาการสาธารณสุขอาเซียน มหาวิทยาลัยมหิดล
   ผู้ช่วยศาสตราจารย์ ลินดา วงศานุพันธ์ ..... นักวิจัยประจำโครงการ
   บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล

2. การศึกษาวิเคราะห์สถานภาพ และขีดความสามารถการวิจัย พัฒนา และนวัตกรรมของภาคมหาวิทยาลัยและสถาบันวิจัยในประเทศไทย : กรณีเทคโนโลยีชีวภาพ (Analysis of current status of universities and public research institutes on research, development and innovation on biotechnology in Thailand) ร่วมกับสมาคมเทคโนโลยีชีวภาพแห่งประเทศไทย, ศ. ดร. อมเรศ ภูมิรัตน คณะวิทยาศาสตร์ มหาวิทยาลัยมหิดล และสำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ
3. การศึกษาขีดความสามารถทางเทคโนโลยีในภาคเอกชน : กรณีศึกษาอุตสาหกรรมอาหารทะเลแช่แข็ง (Policy Research on Thailand's Science and Technology Research Capability: A case of frozen food

industry) ร่วมกับรศ. ดร. ศักรินทร์ ภูมิรัตน สมาคมวิทยาศาสตร์และเทคโนโลยีทางอาหารแห่งประเทศไทย และสำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ

4. การศึกษาผลกระทบทางเศรษฐกิจของถั่วเหลือง GMOs ร่วมกับคณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
5. การศึกษาวิจัยเชิงนโยบายเรื่อง National Innovation System ร่วมกับฝ่ายวิจัยนโยบายและนวัตกรรม สำนักงานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ
6. การศึกษาวิจัยเชิงนโยบาย เรื่อง การกำหนดนโยบายวิจัยสาขาเกษตร ภายใต้โครงการพัฒนาระบบวิจัยของประเทศ ดำเนินการโดยมูลนิธิสาธารณสุขแห่งชาติ และสนับสนุนโดยกองทุนสนับสนุนการวิจัย (สกว.)
7. โครงการจัดทำแผนแม่บทสถานภาพภาพฉายอนาคตและแผนที่นำทางการพัฒนาเทคโนโลยีชีวภาพของประเทศไทย

ที่ ทม 0812/ 3659

คณะสังคมศาสตร์และมนุษยศาสตร์
มหาวิทยาลัยมหิดล ศาลายา
อ.พุทธมณฑล จ. นครปฐม 73170

15 สิงหาคม 2545

เรื่อง ขอความอนุเคราะห์เก็บข้อมูล

เรียน ผู้จัดการฝ่ายประชาสัมพันธ์ บริษัท ซีอาร์ซี เอโฮลด์ จำกัด

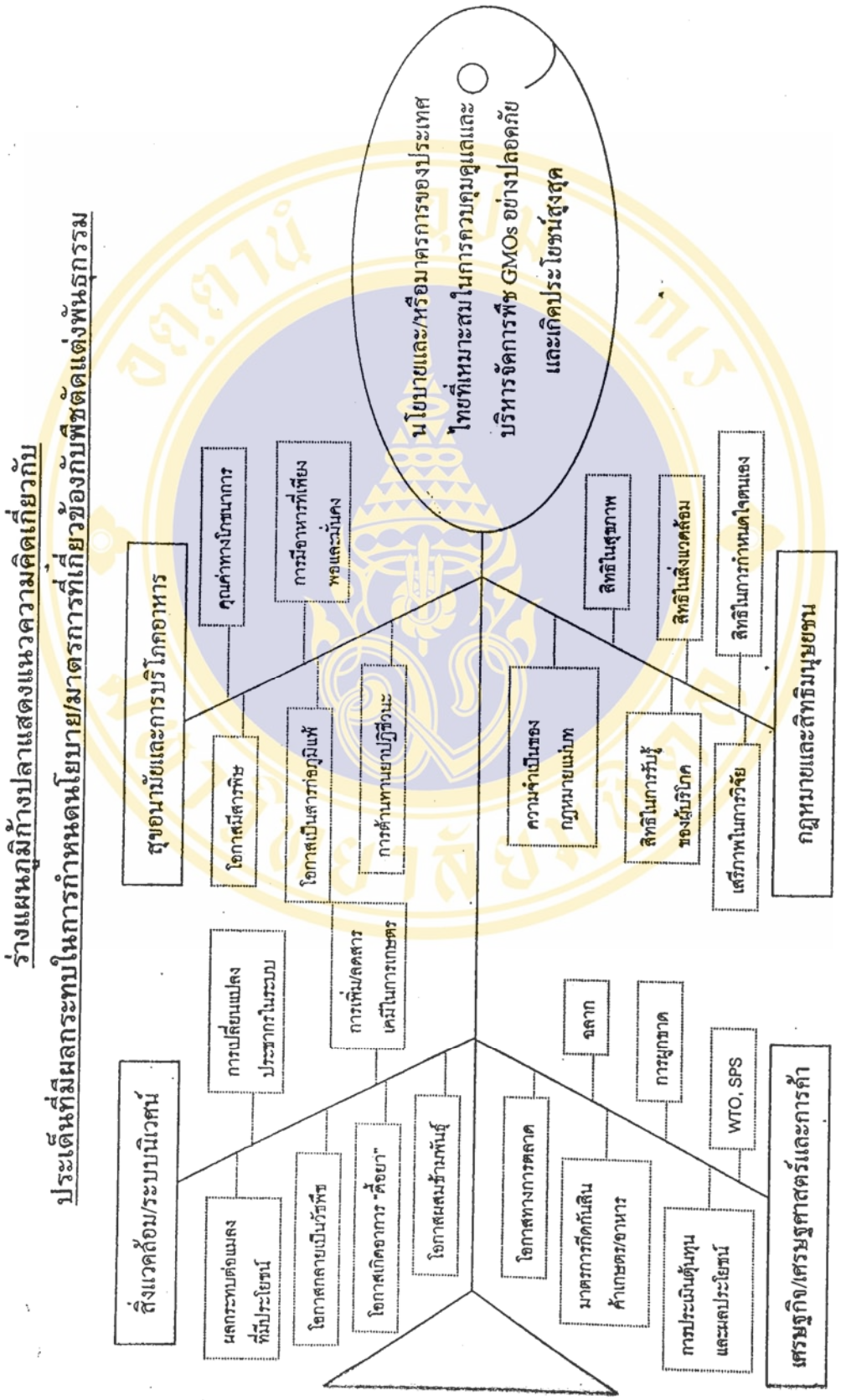
ด้วย นางสาวประพันธ์ ศรีสวัสดิ์ นักศึกษาปริญญาศึกษาศาสตรมหาบัณฑิต สาขาวิชาสิ่งแวดล้อมศึกษา (ภาคพิเศษ) คณะสังคมศาสตร์และมนุษยศาสตร์ มหาวิทยาลัยมหิดล กำลังทำวิทยานิพนธ์เรื่อง การรับรู้และเจตคติต่อผลิตภัณฑ์สิ่งมีชีวิตที่ดัดต่อพันธุกรรม (GMO_s) ของผู้บริโภค : กรณีศึกษาแม่บ้านในเขตกรุงเทพมหานคร โดยมี อาจารย์ ดร. ภัทรบูรณ์ พิชญไพบูลย์ เป็นอาจารย์ผู้ควบคุมวิทยานิพนธ์ ในการนี้ นักศึกษามีความประสงค์ใคร่ขอความอนุเคราะห์ขอเข้าทำการเก็บรวบรวมข้อมูลโดยขอเข้าสัมภาษณ์ (ใช้แบบสัมภาษณ์) กับผู้บริโภคที่มาซื้อสินค้าใน ร้านท็อป ซุปเปอร์มาเก็ต จำนวน 6 สาขา คือ สาขาลาดพร้าว , สาขาปิ่นเกล้า , สาขาพระราม 3, สาขาสีลม , สาขาวังบูรพา และสาขาบางแค ระหว่างวันที่ 24 สิงหาคม – 31 ตุลาคม 2545 เวลา 10.00 – 20.00 น. เพื่อนักศึกษาจักได้นำข้อมูลที่จะได้ไปประกอบในการทำวิทยานิพนธ์ต่อไป

คณะสังคมศาสตร์และมนุษยศาสตร์ จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์แก่นักศึกษาดังกล่าวด้วย จักเป็นพระคุณยิ่ง

ขอแสดงความนับถือ

(รองศาสตราจารย์จิราพร จักรไพวงศ์)
รองคณบดี
ปฏิบัติราชการแทนคณบดีคณะสังคมศาสตร์และมนุษยศาสตร์

สำนักงานคณบดี
โทร. 0-2800-2840-79 ต่อ 1016 0-2354-0999
โทรสาร 0-2441-9738



BIOGRAPHY

NAME	Miss.Prapan Srisawad
DATE OF BIRTH	29 March 1972
PLACE OF BIRTH	Phatthalung, Thailand
INSTITUTIONS ATTENDED	Prince of Songkhla University, 1994: Bachelor of Arts (Social Development) Mahidol University, 2003: Master of Education (Environmental Education)
POSITION&OFFICE	Thai Labour Supply Co., Ltd., Bangkok, Thailand Position : Overseas Manager