INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 15, Issue 5, (2025) E-ISSN: 2222-6990

Ethical Decision-Making on Genetically Modified Foods in China from a Dynamic Balance Perspective

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v15-i5/25173 DOI:10.6007/IJARBSS/v15-i5/25173

Published Date: 25 May 2025

Abstract

Genetically modified foods are a hot topic in the world. The ethical decisions on genetically modified foods are also entirely different based on national conditions. China is a major agricultural country with a population of 1.4 billion and a civilizational country with thousands of years of culture. Genetically modified food has caused three significant issues: the conflict between the large population countries and the supply of food, the impact of conservative culture and advanced technology, and the conflict between the interests of farmers and the commercial economy. Therefore, China's ethical decision-making on genetically modified foods is critical. Due to the public's prejudice against GMO foods, GMO foods have their unknown risks. Coupled with the issue of unclear responsibilities for genetically modified foods, China's ethical decision-making on genetically modified foods is challenged. To optimize the moral decision-making of Chinese genetically modified foods, it is necessary to popularize the public with more popular, engaging, and life-oriented scientific popularization. Only by establishing a correct understanding can the public promote the government to develop an ethical management mechanism to avoid risks in the development of genetically modified foods. At the same time, multiple subjects are encouraged to participate in rule formulation to brainstorm and take into account the interests of all parties. In addition, we insist on the coexistence of the gradual commercialization of genetically modified foods and the supervision mechanism and clarify the strict accountability system. While actively welcoming advanced technology and controlling risks within a reasonable range.

Keywords: Dynamic Balance, Genetically Modified Foods, Technology Ethics, Ethical Decision-Making

Introduction

Currently, GM soybean oil, GM rapeseed oil, and GM papaya have entered the homes of ordinary people. However, when faced with genetically modified or traditional food, the

public still prefers to buy traditional food. Influenced by Confucianism and culture, the dispute over genetically modified food in China mainly concentrates on natural and artificial debates and doubts about the safety of genetically modified foods (Teng, 2008). China is a major agricultural country with a population of 1.4 billion. Due to the particularity of national conditions, China's ethical decisions on genetically modified foods differ from those of other countries. On the one hand, due to the unknown risks of genetically modified foods, China's attitude towards genetically modified foods has become more conservative. On the other hand, in the face of advanced technological products such as genetically modified foods, China has adopted many positive strategies. Overall, China's ethical decisions on genetically modified foods are in an intermediate mode (Kjeldaas et al., 2023).

The importance of research on ethical decision-making in GM foods stems from its presence at the intersection of multiple modern tensions. Under the dual wave of globalization and technological revolution, genetically modified technology has surpassed the scope of pure agricultural technological innovation and evolved into a complex social issue involving food sovereignty, cultural identity, and the reconstruction of ethical order. According to data from the Food and Agriculture Organization of the United Nations, 702 million people still face severe food insecurity, and climate change has increased the risk of traditional agricultural production cuts by 1-5% each year. Against this background, GMO technology has attracted much attention as a potential solution, but its global promotion has encountered ethical doubts among consumers in developing countries. As the world's largest food consumer, China is the second largest investor in biotechnology research and development and the core carrier of Eastern civilization. Its ethical decision-making model pioneers technical governance and is typical of societal conflicts. It not only bears the heavy responsibility of providing food safety guarantees for 24% of the world's population but also faces structural contradictions between the traditional small peasant economy and the modern biotechnology industry. This unique situation makes China an excellent sample of the "global-locconcernsal" interaction mechanisms for analyzing technological ethics. Existing research is mainly limited to the risk-regulation binary framework, which fails to reveal the role of cultural traditions and social structures in shaping technical ethics. It lacks theoretical refinement of dynamic balance strategies in developing countries. By constructing a three-dimensional analysis model of "population-culture-economics," this study can not only fill the theoretical gap in technical ethics research in non-Western contexts. The progressive commercialization path and cultural adaptation mechanism proposed by it can provide practical references for emerging economies facing similar difficulties and help build a more inclusive global science and technology governance system.

The primary research in social science on genetically modified food is on genetically modified food ethics, economics, and genetically modified food systems. The relevant research results are abundant and comprehensive (Karlsson, 2003). However, most of these studies are based on the global topic of genetically modified foods and pay less attention to the development and future of genetically modified foods in China. Therefore, this article is based on Chinese characteristics and explores the ethical decision-making of Chinese genetically modified foods, which is a combination of universality and particularity. This article aims to break through the binary perspective of "technical risk-policy supervision" in existing research and deconstruct the complex mechanism of ethical decision-making of genetically modified foods from the multi-dimensional interaction between China's local culture, social structure, and economic

transformation (Konstantinov et al., 2010). Innovation focuses on two points: First, for the first time, the structural role of the farmers' group in ethical disputes is systematically demonstrated, and the deep connection between traditional agricultural ethics and technological substitution contradictions is revealed. The second is to propose a practical path that parallels "gradual commercialization" and "cultural adjustment" to provide an operable solution for localizing technical ethics (Toft, 2012). By analyzing the Chinese case and redefining the "middle path" of technological ethics in the non-Western context, its experience can provide theoretical reference for emerging economies facing similar cultural conflicts while inspiring interdisciplinary discussions on the coexistence of technological globalization and cultural diversity (Basaran et al., 2004).

Literature Review

The ethical decision-making issues of genetically modified foods have sparked widespread discussion in the global academic community. Previous studies have analyzed from the perspectives of technical risks, cultural differences, policy supervision, etc. This provides an essential theoretical framework for this study. In the research on the theoretical basis of the ethics of genetically modified food safety, ethical disputes in modern biotechnology can be traced back to the proposal of Responsibility Ethics. In "Ethics of Responsibility: Ethics Exploration in the Age of Technical Civilization," Hans Jonas pointed out that technological development's core ethical problem lies in its potential risks' irreversibility (Jung, 1986). Especially in areas involving life transformation, the "preventive principle" must be followed. When technology can seriously threaten human society or the ecological environment, restrictive measures should be taken even if sufficient scientific evidence is lacking. This theory provides a basic framework for ethically evaluating genetically modified foods. Risk social theory further deepens this discussion. Ulrich Beck emphasized in "Risk Society" that the "uncertainty risk" of modern technology has exceeded the controllable scope of traditional risks (Boyd, 1992). Because of its intervention at the genetic level, genetically modified technology may trigger unforeseen ecological chain reactions, and it is necessary to balance risks and benefits through institutionalized risk assessment and public participation. Paul Slovic's "risk perception theory" explains the public's concern about genetically modified foods. Technical complexity and information asymmetry amplify risk perception, affecting public acceptance of ethical decision-making (Slovrc, 1986). In the study of the shaping effect of cultural values on ethical decision-making, cultural differences play a key role in the ethical disputes about genetically modified foods. In "High Technology·High Thinking," John Naisbitt pointed out that Eastern culture's awe of "natural order" sharply contrasts with Western technological optimism. Policy choices directly reflect this difference (Naisbitt et al., 2001). For example, the "harmony between man and nature" in Confucian culture emphasizes the harmonious coexistence between man and nature. GMO technology is regarded as an overreach of natural laws, and this cultural characteristic is particularly prominent in the conservative attitude of the Chinese public. Intercultural ethics research further reveals the influence of values on technology acceptance. In "Civilization Was Tested," Arnold Toynbee proposed that the disputed nature of technical ethics is the conflict between "instrumental rationality" and "value rationality" (Toynbee & Arnold, 1948). Although genetically modified technology can improve production efficiency, its subversion of traditional agricultural ethics may trigger a social rupture. This view is confirmed in the Chinese context. As practitioners of conventional agriculture, farmers face livelihood crises caused by technological substitution, aggravating the complexity of ethical decision-making.

In the international comparative study of policy supervision models, the global supervision model of genetically modified foods showed significant differences. The United States adopts the "substantial equivalence principle" and believes that there is no significant difference in the ingredients of genetically modified foods from traditional foods (EMY & Philosophy, 1996). No unique identification is required, and its ethical logic is based on "scientific evidence first." The EU follows the "preventive principle" and requires that genetically modified foods undergo strict environmental and health assessments before launch. It is mandatory to identify them, reflecting the importance of the public's right to know (Nagel, 2008). Developing countries mainly adopt the "intermediate model" to balance food security with technological risks. Robert Paarlberg analyzed in "GMO Politics: The Future of Global Agriculture" that China, India, and other countries have policies to support the research and development of genetically modified crops to cope with food shortages. In addition, ecological risks are avoided through identification systems and planting restrictions. This "gradual commercialization" strategy reflects the pragmatic tendency in ethical decision-making (Avila & Yeganiantz, 2001). However, Manuel Castells pointed out that the spread of globalization may lead to "bottom-to-bottom competition" of regulatory standards, weakening the ethical autonomy of developing countries (Castells). In the research on the democratization of public participation and ethical decision-making, the focus has shifted to the democratization of ethical decision-making in recent years. In "Democracy and Experts: Rethinking Policy Science," Frank Fischer emphasized that the controversial nature of GM technology is the battle for "cognitive authority." The breakdown of trust between scientists, policymakers, and the public needs to be bridged through "negotiable governance" (Brennan & Engagement, 2011). James Rosenau's "decentralized governance theory" argues that multi-subject participation in rulemaking can enhance the legitimacy and execution of decisions. For example, citizen journals can collect diverse interests (Jamil & Administration, 2004). However, there are still gaps in existing research. First, there is a lack of in-depth analysis of the ethical decision-making mechanism under China's unique cultural background. Second, there is insufficient attention to protecting the rights and interests of vulnerable groups such as farmers and consumers. Third, a comprehensive "risk-return" assessment model suitable for developing countries has not yet been built. This study will explore the path of localization of ethical decision-making based on China's national conditions.

This article mainly reveals the particularity and internal logic of ethical decision-making in GM foods. We will explore building an ethical governance framework that conforms to national conditions by analyzing the triple conflicts between population, culture, and economy. The possible innovation point is to combine the "harmony between man and nature" in Confucian culture with modern scientific and technological ethics, propose a "dynamic balance" decision-making model, and emphasize the pursuit of adaptive paths between technological progress and social conservatism. As the world's most significant food consumer and traditional culture carrier, China's ethical decision-making model is related to domestic food security and scientific and technological development and provides a unique cultural governance sample for developing countries to deal with technological shocks.

The Specificity of Ethical Decision-Making on Genetically Modified Foods in China

The Conflict between a Large Population and Food Supply

The development of genetically modified food technology in China concerns food security. "Food is the most important thing for the people." As a country with a large

population, China has special national conditions on food security issues, which also determines the particularity of China's ethical decision-making on genetically modified foods. Food security means everyone can buy and afford sufficient, safe, and nutritious food anytime to meet the dietary needs and consumption preferences needed for an active and healthy life. To ensure food security, we need to solve the problem of supply and demand balance between food and pay attention to the quality of food production. In the 1960s, China suffered consecutive natural disasters, resulting in national famine. Famine brings a profound warning, and we must make every effort to ensure the safety of food production. China is a big country with a population of 1.4 billion. To ensure food security, China has formed a "three-legged" situation where central grain reserves, local grain reserves, and temporary grain storage. However, grain reserves alone are not enough. We must improve the efficiency of grain production and annual grain output to solve the food problem for the 1.4 billion people. Due to many force majeures, grain cultivation is susceptible to pests, weather disasters, etc. Using genetically modified technology, crops have resistance and tolerance. They can better meet human needs in terms of taste and nutrition. It can be said that the emergence of genetically modified technology is beneficial for a country like China, a large population. However, because China has a large population, the application of genetically modified foods needs to be more cautious. The absolute safety of genetically modified foods cannot be answered positively (Kjeldaas et al., 2023). However, from a particular perspective, promoting genetically modified food technology is conducive to population growth. It is more conducive to achieving a balance between supply and demand. However, it is still unknown whether the use of genetically modified food technology will have unpredictable risks in the future. If genetically modified crops are promoted on a large scale, excessive interference will be made in nature. Making human health unrelated will also affect the sustainable development of nature. This is a kind of destruction of the ecology and does not meet the requirements of "intergenerational justice." Therefore, how can genetically modified food technology be used correctly to solve the food problem of 1.4 billion people? China's ethical decision-making must be carefully considered to benefit future generations (Karlsson, 2003).

The Conflict between Conservative Culture and Advanced Technology

In ancient China, Confucianism had long dominated, leading the Chinese to form cultural traits that differed from those of Westerners. Faced with advanced technological products such as genetically modified foods, it is difficult for Chinese people to have a real sense of identity with them. The reason is that genetically modified foods have changed the growth state of all things in nature, which is a violation of the way of heaven and a destruction of nature. Chinese people's attitude towards genetically modified foods ultimately tends to be conservative. There are many discussions on "harmony between man and nature." For example, "The sky is filled with clouds and rains heavily, and the seedlings will prosper." For example, "Those who are optimistic protect the world, and those who are afraid of heaven protect their country," this is a kind of awe for "Heaven." In "Theory of Rites," Xunzi also pointed out, "Heaven and earth are combined and all things are born, yin and yang are connected, and change arise, and nature and position are combined, and heaven and earth are governed." Dong Zhongshu of the Han Dynasty pointed out in "The Spring and Autumn Dew: Li Yuanshen": "Heaven, Earth, and Man are the foundation of all things. They are born, nourished by the earth, and made by man." This further points out a connected relationship between "Heaven," "Earth," "Man," and "All Things." From this, we can see that Confucian traditional culture pursues harmonious coexistence between heaven, earth, and all things

(man). All things are born between heaven and earth, and heaven and earth constitute the living space of all things. Although Confucian arguments about the relationship between heaven and man serve the arguments of "ritual." But this idea also subtly influences how people know the world (Konstantinov et al., 2010). At present, genetically modified foods are a violation of the growth laws of crops. The genetic improvement of crops by genetically modified foods violates the "way of heaven." Therefore, the bold gene modification technology is challenging to accept in the Chinese cultural tradition. China is a major agricultural country with a tradition of intensive farming that has existed since ancient times. When making ethical decisions on genetically modified foods, the opinions and voices of the general public need to be considered. Under the profound influence of Confucian culture, the moral decision-making of Chinese genetically modified foods has its characteristics (Toft, 2012).

The Conflict between Farmers' Interests and Commercial Economy

China is a well-cultivated agricultural country, and the number of farmers always accounts for the majority. In recent years, due to industry development, "farmers moving to cities" has become a trend, which has left many problems for China. For example, the issue of left-behind children in rural areas and the problem of large-scale abandonment of arable land. As a vulnerable group, farmers do not have an advantage in the wave of industrialization. The development of genetically modified technology is undoubtedly another heavy blow to farmers after the wave of industrialization. First, in traditional intensive farming agricultural activities, crop planting is adapted to local conditions, and different climates and soil conditions give different crops their advantages. For example, rice can be early, medium, and late, and their sowing time differs. For instance, the situation of "southern oranges and tangerines in the north" has been caused due to climate differences. It is because of this difference that farmers have accumulated rich planting experience. Genetically modified technology has changed the genetic structure of crops, making crops resistant and reversible, and is no longer restricted by climate, soil, and other conditions (Basaran et al., 2004). After this particularity was canceled, farmers' advantages were replaced by high technology, which triggered conflicts of interest. Secondly, genetically modified technology can achieve high yields and bumper crops, so large-scale cultivation is necessary. In large-scale cultivation, farmers need to have sufficient knowledge of genetically modified crops and experience in land management and mechanized production, which is out of reach for most farmers. After farmers are no longer farmers, the employment problem of farmers becomes a social problem. Finally, genetically modified technology makes crops more satisfying human preferences for taste, nutrition, etc., so traditional seeds will inevitably be eliminated. In conventional agricultural cultivation, farmers' seeds are left from the fruits of the previous season of crops, with almost no seed costs, and such seeds can also adapt to the local natural environment. Culturing genetically modified seeds requires scientific and technological investment to gene-edit traditional seeds. The high price of genetically modified seeds has increased farmers' farming costs and caused many farmers to give up land cultivation. China has a long history of agricultural culture, so ethical decisions on genetically modified foods must also consider the vital interests of most farmers. China's unique national conditions determine this (Thompson, 2021).

China's Ethical Decision-Making on Genetically Modified Foods: Challenges Ahead

Public Prejudice

Whether genetically modified foods harm human health has once been a considerable controversy. Although the United Nations stated in August 2002 that no scientific literature has been found to show that eating these foods hurts human health. However, with the overwhelming publicity of various media in recent years and the emergence of many rumors, people who do not have enough knowledge of genetically modified foods have begun to question the safety of genetically modified foods repeatedly. The controversy over genetically modified food has gone from a scientific debate to a struggle for interests. People's anxiety about genetically modified foods is mainly caused by various misleading, which brings serious challenges to the ethical decision-making of genetically modified foods in China. First of all, "GMO food causes cancer" is a rumor that can be traced back to the "mad cow disease" in Europe. At the beginning of the 21st century, "mad cow disease" was very popular in Europe. People who have eaten "crazy beef" will be crazy, which makes Europeans live in fear all day long. Meanwhile, European meat is contaminated by the strong carcinogen dioxin. French pathogenic Listeria contaminates meat products incident. Flex and mouth disease incidents of British livestock, etc., have made Europeans very cautious. GMO foods that were popular during this period were naturally opposed by Europeans, and various articles, parades, speeches, etc., against GMO foods emerged one after another.

In 2012, in the European campaign against genetically modified foods, an article by Gilles-Eric Seralini entitled "The Long-term Toxicity of Roundup Herbicides and Roundup Herbicide-resistant GM corn has become increasingly opposed to GM foods. This article shows that a genetically modified corn NK603, which is resistant to Roundup herbicide, suffered obvious liver necrosis and kidney damage in rats for 2 years, the mortality rate increased greatly, and cancerous tumors appeared. Although many researchers have criticized this article, it has thus denied this conclusion (Abushal et al., 2021). However, a group of rumor-mongers used CCTV's reports to publicize the harm of genetically modified foods, which led to the rumors that "genetically modified foods cause cancer." Secondly, the Chinese public's lack of scientific and cultural literacy is one reason for the prevalence of various genetically modified foods. For example, among the calls for opposing genetically modified foods, there is a saying that genetically modified foods make people lose their descendants. This statement believes that genetically modified crops will transfer the genes in the crop into the human body, which will harm the human body and lead to infertility. This is without scientific basis. According to correct scientific common sense, exogenous genes in genetically modified crops cannot be absorbed and utilized by human cells after being consumed by humans. This shows the absurdity of these rumors. In the view of genetically modified foods, the threat to human health is a major concern. The destruction of the ecological environment by cultivating genetically modified foods is another focus. Some people believe that planting genetically modified crops impacts the natural evolution of species and will have unpredictable consequences on the ecological environment. For example, Canadian genetically modified rapeseed is a threat to superweeds. Canadian genetically modified rapeseed continues to grow in farmlands and becomes a super weed that resists more than three herbicides, seriously destroying biodiversity. In addition, cross-species infection of genetically modified food crops increases the future risk coefficient of genetically modified foods and makes people doubt about genetically modified foods. It can be seen that the popular prejudice of genetically modified foods has external reasons and the reasons for genetically modified

foods. In the ethical decision-making of Chinese genetically modified foods, the prejudice caused by "genetically modified foods cause cancer" can be overcome through the popularization of scientific knowledge. Genetically modified food crops' damage to the ecological environment is still very challenging to ethical decision-making (Teng, 2008).

Future Risks

Genetically modified technology started late in China and has been less than forty years. The largest genetically modified crop in China is insect-resistant cotton, while the planting area of rice, wheat, corn, potatoes, etc., that are resistant to insects is small. Therefore, the risks that genetically modified foods will face in the future still need to wait for further testing. In addition, much progress has been made in research on genetically modified technology in developed countries worldwide. However, its industrial planting is mainly concentrated in downstream processing raw materials for cash crops, and there is no commercial planting of genetically modified rice as a staple food. It can be judged that people still have doubts about genetically modified foods. Genetically modified foods are directly ingested in the human body, so their safety factor is also the most worrying. Judging from foreign experience, the comprehensive promotion of genetically modified foods still faces many challenges. During the experiment on genetically modified foods, the risks of genetically modified foods are usually considered to reduce food nutrition, produce drug resistance, and trigger allergic reactions. In January 1994, Pioneer Seeds, a Brazilian nut-encoding gene that encodes protein 2Salbumin into soybeans, thereby improving the nutritional quality of soybeans (Abushal et al., 2021). However, after testing, it was found that people allergic to Brazil nuts are also allergic to this genetically modified soybean. Moreover, studies have shown that marker genes may be transferred to human or animal microorganisms, reducing antibiotics' effectiveness in clinical treatment. In addition, after changing the original gene combination, genetically modified foods may reduce the nutritional content of the food. US experiments on genetically modified soybeans have shown the content of isoflavonoid hormones in genetically modified soybeans resistant to grass. However, these accidents and risks of genetically modified foods are controllable and negligible. However, so far, it is not possible to indicate that there are no potential future risks for genetically modified foods, nor can it be pointed out the absolute safety of genetically modified foods (Thompson, 2021).

From the perspective of rights and freedoms, the risk of genetically modified foods lies in whether they interfere with the public's right to free choice. Traditional crops may be eliminated when genetically modified crops are planted on a large scale. Just like during the Industrial Revolution, the invention of the steam engine played an important role. However, there is no way to find the same steam engine when internal combustion engines and steam turbines appear. The proliferation of genetically modified foods will make it impossible for people who still have a special liking for traditional crops to have the right to choose. As for the dispute over whether genetically modified foods are "natural" or "unnatural," it more directly reflects the future ethical risks of genetically modified foods. Before the emergence of genetically modified technology, crops relied on natural reproduction or adopted hybridization technology, and their interference with nature was still within a specific limit. After genetically modified technology emerged, plants and animals could combine genes across races, which is humans' destruction of natural laws (Devos et al., 2008). Opinions against genetically modified foods show that plants and animals involved in genetically modified technology have more vigorous vitality and competitiveness. This allows them to

better fight against natural enemies and take advantage of the ecological chain, thus leading other animals and plants to become endangered. There is even a view that the pollen of genetically modified crops allows them to hybridize with traditional crops and allows the surrounding traditional crops to have strong resistance and tolerance, thus threatening the ecological balance. From this point of view, the future risks of genetically modified foods are not limited to many issues, such as endangering human health, threatening biodiversity, ecological destruction, and hindering rights and freedoms. Due to the uncertainty of future risks, ethical decision-making of GMO technology is not easy.

Accountability and Responsibility

Generally speaking, technology is load-valued and, therefore, requires technical responsibility. The so-called "technical responsibility" refers to the obligations that the technical subject should bear for the negative consequences of technological invention and application. Genetically transgenic technology is the recombination of genes, not the recombination of tangible objects. The complexity of its technology and the limitation of human cognitive ability determine that genetically modified technology cannot be perfect. How to be responsible for GMO technology is also a complex issue. At present, some chaos has occurred in applying genetically modified technology. This chaos is not only caused by the defects of GMO technology itself but also involves the misuse and abuse of GMO technology by people. To prevent the adverse consequences of genetically modified foods and play a punitive role in preventing unethical behavior, it is necessary to clarify the responsibilities for the research development and application of genetically modified foods promptly. This is also an important issue that needs to be considered in the decision-making process regarding GM's ethical ethics (Ciliberti & Molinelli, 2005). In December 2012, Hunan's "Golden Rice" incident attracted attention. For example, "Beta-carotene in "Golden Rice" is equally effective in supplementing vitamin A in children." To test whether the carotenoids in "Golden Rice" and β-carotene capsules can supplement vitamin A for children in poor areas, the "Golden Rice" was brought into the country without reporting to China. He conducted human experiments on "golden rice" on 24 children in a primary school in Hengyang, Hunan. It is reported that the 24 children became subjects of the trial without their knowledge. This behavior violates the subject's right to know and choose and is considered immoral. Regarding scientific research integrity and scientific and technological ethics, researcher Tang Guangwen must be responsible (Abushal et al., 2021).

Due to the unknown risks of genetically modified foods, they need to undergo strict approval and supervision in China. Conducting illegal testing, planting, and operating agricultural genetically modified products is unlawful. In February 2023, the Ministry of Rural Agriculture reported six violations of genetically modified technology. This involves the issue of a company in Sichuan and Hainan engaged in agricultural genetically modified environmental release experiments without authorization. An issue of a Jiangxi operator and a store selling genetically modified soybeans in violation of regulations, and an issue of a Beijing company conducting genetically modified corn tests in breach of rules. The same reports have also appeared in Wuhan, Songzi, and other places in Hubei. In April 2005, Wuhan City, surrounding areas, and Songzi City were already selling and planting a genetically modified rice seed called "Insect-resistant Shanyou 63". The seed was illegally sold without national security approval. In 2004, at least 950 to 1,200 tons of genetically modified rice in Hubei had flowed into the market, and local farmers were unaware they were growing genetically modified rice. From

an economic perspective, responsibility for genetically modified foods also involves the technical monopoly of genetically modified foods. Behind GMO technology is a battle of substantial commercial interests. Some illegal organizations that attempt to monopolize GMO technology have used GMO technology to make high profits on the grounds of protecting the intellectual property rights of GMO seeds. Take Monsanto, for example, which always says that genetic manipulation is a means of patenting, and that's its real purpose. Monsanto's abuse of patent rights is manifested in banning farmers from leaving genetically modified seeds and only purchasing Rongda and licensed wholesalers to sell high proportions of Monsanto products. Only by being responsible for genetically modified technology and establishing a good market order can we oppose the technological monopoly of genetically modified foods and better protect the interests of farmers.

Practical Implementation of Ethical Decision-Making on Genetically Modified Foods in China

The so-called "ethical decision-making" refers to the process of ethical analysis, judgment, and selection of decision-making plans based on moral standards under a specific cultural background, thereby improving decision-making ethics. When studying ethical decision-making in engineering, scholars Gu Jian and Gu Xianglin proposed an ethical decision-making model (Figure 1). From the perspective of the definition and model of ethical decision-making, ethical decision-making is a complex process. When making ethical decisions, we often face the problems of "good" and "evil" and right and wrong. Instead, we must make ethical decisions based on a specific social and cultural background and make certain ethical principles. Therefore, different subjects of decision-making, various standards for moral judgment, or other factual standards may result in two completely different ethical decision-making.

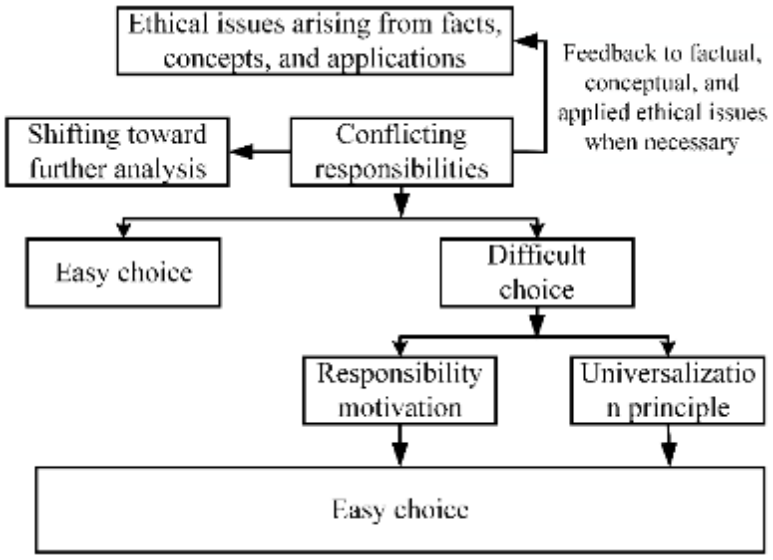

Figure 1 Ethical Decision-Making Model.

Ethical decisions on genetically modified foods are more complicated than other ethical issues. GMO food itself is very controversial, and there is currently no research that can determine whether GMO food is healthy, so there is a lack of sufficient scientific evidence for the ethical decision-making of GMO food. In the ethical opinions of genetically modified foods, the ethical evaluation perspectives held by opponents and agreeers differ, and the concerns of ordinary people and the government differ. Opponents are more concerned

about the future risks of GM foods and emphasize the intergenerational impact of GM foods. Those who agree with this focus on the issues of genetically modified food and hunger, believing that genetically modified food can bring richer nutrition to poor areas. In addition, for overall considerations, the government will inevitably have a different attitude towards genetically modified food than ordinary people. China's food and clothing problem has been solved, and people's demand for food is more healthy and nutritious. Therefore, the background of ethical decision-making regarding genetically modified foods is constantly changing, which requires that the ethical decision-making of genetically modified foods be judged promptly and that the characteristics of the times and the needs of the people be grasped (Ciliberti & Molinelli, 2005).

Currently, the management of genetically modified foods has become a consensus among countries worldwide, and many international organizations have formulated consensus documents on biosecurity. Due to different countries' cultures, the specific methods of treating genetically modified foods differ. Still, they can generally be in line with the international community. When classifying the management model of genetically modified foods, they can be roughly divided into the US, EU, and intermediate models. The United States has adopted a loose policy on genetically modified foods, believing there is little difference between genetically modified foods and non-genetically modified foods, and its supervision is based on products. The EU model treats genetically modified foods cautiously and adopts stringent standards for regulating genetically modified foods. Although research methods have not proven that GM foods are harmful, the EU model would instead question the technique rather than believe in GM foods. The intermediate model is a compromise between the two extremes of the US and EU models, which many developing countries adopt.

China is a major agricultural country with a large population. Under the influence of Confucianism and culture, the Chinese people's acceptance of new things has become more conservative. Under such national conditions, China's ethical decisions on genetically modified foods have their particularity. China's research and development of genetically modified technology began with 863 high-tech research in the 1980s. In 2002, China established the National Genetically Modified Biological Safety Committee. 2004, China established the National Technical Committee on Standardization of Agricultural Genetically Modified Biological Safety Management. 2005, China successfully built several GMO safety inspection and testing institutions (Mampuys & Brom, 2015).

China will carry out pilot work on the industrialization of genetically modified corn and soybeans in the scientific research experimental field in 2021. By 2022, the pilot will be expanded to farmers' fields in Inner Mongolia and Yunnan. By 2023, the scope of the pilot will be further developed, involving 20 counties in five provinces and regions: Hebei, Inner Mongolia, Jilin, Sichuan, and Yunnan, and seed production work will be carried out in Gansu. During the pilot work, genetically modified corn and soybeans showed good insect-resistant herbicide resistance, and their yield increased by 5.6%-11.6%. To strictly supervise agricultural genetically modified technology, relevant Chinese departments have strictly cracked down on illegal behaviors in all aspects of genetically modified technology. These regulatory measures are mainly based on the Seed Law, Food Safety Law, and Agricultural Genetically Modified Biological Safety Management Regulations.

In addition to research and development, piloting, and issuing corresponding laws to ensure the safety of genetically modified foods, China has thoroughly evaluated the safety of genetically modified foods. The research and development unit of agricultural genetically modified organisms needs to apply for the farming genetically modified organism safety certificate from the Ministry of Agriculture and Rural Affairs. Obtaining this certificate requires a safety assessment of agricultural GMOs. China has adopted a mandatory labeling system in managing genetically modified foods to protect the public's right to know. Genetically modified soybean and rapeseed oil sold on the market need the standard words "GMO" on the packaging. It can be seen that China's current regulatory policies for genetically modified foods are relatively sound, and they cover the entire process of genetically modified foods, from research and development and production to sales.

Optimizing Strategies for Ethical Decision-Making on Genetically Modified Foods in China

Establishing Correct Public Awareness

Understandably, the public has an exclusion mentality of genetically modified foods due to insufficient scientific and cultural literacy. At present, the massive controversy over genetically modified foods has caused many short video media platforms to achieve traffic growth through them, and the public can easily passively "brainwash." Therefore, it is necessary to popularize genetically modified foods scientifically promptly. Currently, the scientific popularization of genetically modified food in China is not limited to books, newspapers, news reports, expert Q&A, etc. These popular science contents are scientific, but they are not creative and engaging, are far from the public's life, and cannot resonate with the public. The ethical decision-making of genetically modified foods needs to come from the masses and go to the masses. When popularizing science to the public, we must be rigorous and scientific and always put the public's interests first. Moreover, we must be close to the public's daily life and solve the confusion in the public in an easy-to-understand way.

Multi-Stakeholder Participation in Rulemaking

Ethical decisions about genetically modified foods require brainstorming. Multiple subjects participating in rulemaking can make ethical decisions more perfect. First, ethical decisions regarding genetically modified foods mainly protect people's interests. Therefore, listening to people's voices is the most critical link in the ethical decision-making process regarding genetically modified foods. Since genetically modified foods have many unknown risks, the public must express their opinions. Show your attitude towards genetically modified foods and participate in formulating management rules for genetically modified foods. Secondly, GM food experts are forward-looking in their views on GM foods, so experts are in the ethical decision-making of GM foods. The possible risks of genetically modified foods should be clarified, and other entities should be guaranteed a correct understanding of genetically modified foods to make proper ethical decisions. Finally, GM food operators have sufficient knowledge of the market. Hence, they need to comment on the commercialization of GM foods, GM foods, and market orders to assist in making reasonable ethical decisions. Multiple subjects participate in the formulation of rules, allowing the government to combine different opinions so that the interests of each subject can be fully protected and the ethical decision-making of genetically modified foods can be optimized.

Gradual Commercialization with Concurrent Oversight Mechanisms

Technology is a double-edged sword. In the face of advanced technology, we must neither be self-supporting nor be overly aggressive, but we should grasp the principle of moderation. GM foods are beneficial in solving hunger problems, meeting nutritional needs, and increasing food production, so gradual commercialization is a feasible measure. However, at the same time, the future risks of genetically modified foods are not limited to ecological damage, health risks, etc. Therefore, genetically modified foods must be strictly supervised. At present, the genetically modified foods on the market in China include genetically modified soybean oil, genetically modified rapeseed oil, genetically modified papaya, etc. There are fewer types of genetically modified foods, and they need to be further relaxed in the future under the premise of scientific verification. At the same time, the existing supervision mechanism for genetically modified foods mainly adopts legal and administrative means to deal with some unethical behaviors that do not violate the law. For example, the "demonization" of public opinion incitement of genetically modified foods, the small and inconspicuous font of genetically modified foods, etc., have caused some people to exploit loopholes. Therefore, when supervising genetically modified foods, timely adjustments should be made based on the reality of genetically modified foods, and measures to prevent chaos in genetically modified foods should be formulated if necessary.

Clear and Strict Accountability System

The commercialization of genetically modified foods will inevitably face problems such as technology misuse and abuse. The accountability system for genetically modified food involves research and development experts, market operators, publicity media, growers, consumers, etc., of genetically modified food. The existing accountability system for genetically modified food in China is mainly based on the "Seed Law," "Food Safety Law," and "Agricultural Genetically Modified Biological Safety Management Regulations." These laws can play a role in punishing the chaos in genetically modified foods. However, relying solely on legal and administrative means, treating genetically modified foods is relatively simple, and the prevention effect is insufficient. Therefore, it is necessary to adopt diversified strategies in addition to the management methods of GMO foods to make the management of GMO foods more effective. On the one hand, we can adapt the technique of an apology letter to create behaviors that do not violate the law but are immoral to be made public and accept condemnation from society. For example, suppose some bad media promotes the conspiracy theory of genetically modified food without evidence, which has adverse effects on society. In that case, they can adopt the method of an apology letter. On the other hand, criminals in genetically modified food incidents can act as supervisors of genetically modified foods and accept public supervision. This will make the parties recognize their mistakes and reduce the regulatory costs of genetically modified foods. In short, the accountability system for genetically modified foods is constantly being improved in development, so problems need to be discovered promptly and solutions are found.

Research Conclusions and Outlook

This study examines the internal logic of ethical decision-making in China's genetically modified food through a dynamic balanced perspective, revealing triple structural contradictions. There is tension between population size and food security, the value game between traditional culture and scientific and technological rationality, and the conflict of rights and interests between small peasant economy and industrial capital. The study found

that China's GMO ethical decision-making shows the practical characteristics of "conservative innovation". Adopt a gradual commercialization path at the technical application level, emphasize the ecological ethics of unity between man and nature at the cultural identity level, and build a government-led multi-subject collaboration mechanism at the governance framework level. This decision-making model differs from the "efficiency priority" logic under Western technological hegemony and the passive defense strategy in the postcolonial context but forms a "third path" with local adaptability. Research innovatively transforms Confucian ethics's "time" wisdom into a dynamic balance model and proposes a three-dimensional adjustment mechanism for technical governance. Establish an intergenerational compensation system for risk evolution in the time dimension, define planting prohibited areas for ecologically sensitive areas in the spatial dimension, and build a transformation channel between traditional agricultural proverbs and biosafety standards in the value dimension. Empirical analysis shows that the peasant group plays the dual role of "traditional guardian" and "technical beneficiaries" in ethical disputes, and its livelihood model transformation constitutes an important observational indicator for the localization of technology ethics. The research has further verified that converting technological risks into ethical consensus through cultural adaptation strategies can reduce the cost of social resistance. This provides a new paradigm for developing countries to deal with technological shocks. This study still has some limitations, and quantitative indicators of dynamic equilibrium models have not been established. There is insufficient diachronic tracking of farmers' technical cognition. The correlation between cultural variables and technical acceptance requires a more extensive sample verification. Future research can be deepened in these aspects.

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