

Research on the Current Situation and Causes of Food Additives Problem in China

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Abstract: In recent years, the food additives problem in China remains serious although it has been alleviated, which inevitably triggers public concern. In this study, 216 citizens' knowledge of food additives was investigated using a combination of literature research method and questionnaire survey to systematically research the current situation, causes and impacts of the food additives problem in China. The results indicate that China's current food additive standards to a large extent take the GRAS (Generally Recognized As Safe) of the United States for reference. However, the results of sampling tests still reveal severe food additives problems, especially the common problem of illegal additives by enterprises. Besides, the public's knowledge of food additives is limited. Thus, their concerns focus on color and taste additives, whereas their acceptance of functional additives is higher. The industry uses additives mainly to save costs and improve the taste. However, weak regulation is a key factor leading to the problems. Moreover, the public believes that food additives have both advantages and disadvantages, with the advantages being improved taste and quality, and the disadvantages being possible psychological dependence and health hazards. Most people believe that the disadvantages outweigh the advantages. Finally, considering the major problems of food additives in China, the public's general concern and the causes of the problems, this paper puts forward suggestions for solving the problems of food additives in China.

1 Introduction

Food additives problems have become a common concern in recent years due to the frequent food safety issues. For the food both sold by supermarkets and sold online, its packaging will always indicate that the food contains a variety of food additives, some of which may harm the human body. In order to improve the color and taste, some food producers add food additives excessively or even add illegal additives, threatening the safety and lives of the consumers. For example, in the horrifying melamine addition incident of Sanlu milk powder, more than 80,000 infants were hospitalized for kidney stones because of the illegal addition of melamine to the milk powder, and a number of infants died as a result of the incident. In 2024, a catering company in Inner Mongolia has been found to have illegally added aluminum to its deep-fried dough sticks, and Shanghai's sampled turbot contains nitrofurans metabolites... The frequently found food additives problems have had negative impact on people's lives and reduced the public's trust in China's food safety. As of 2021, a survey by China Central Television's Weekly Quality Report found that 70% of the Chinese citizens still

dare not buy domestic-produced milk. Even if the Chinese Government has issued the "National Food Safety Standards for Food Additives" and also strengthened the food additives control, the problems remain serious. Therefore, the current situation of food additives and what lead to the frequent occurrence of food safety problems even under prohibition are worth extensive attention from the practical and academic circles.

Some studies have paid attention to food additives problems. These studies focus on the importance, hazards and preventive solutions of food additives. Among these aspects the importance of food additives has been mostly discussed, for example, Wang Heng and Shi Shanbo (2011) believe that the safety food additives usage directly determines the food safety. Especially for the direct users of food additives, enhancing their knowledge of food additives will help with the legitimate use of food additives. Zhao Aixue (2012) believes that food additives have a significant impact on food production, while the future development of food additives is promising and needs to be investigated. Food additives problems also impact on society harmony. Jiao Xitao et al. (2023) believe that the use of food additives is closely related to society harmony. However, the food additives problems

still occur frequently because of the insufficient regulatory management and the excessive additives usage conducted by food producers. Based on these observations, Jiao et al. put forward a number of solutions and recommendations. Moreover, a large number of studies focus on the possible hazards of food additives. Sun Jinyuan and Sun Baoguo (2013) found that due to the frequent occurrence of food safety problems, food additives have become a concern for the public. They believe that the reasonable use of additives in appropriate quantities not only does not harm the human body, but also extend the food quality guarantee period by preventing it from being mildewed and going bad. However, excessive use and excessive addition of food additives can lead to a serious food safety problems. According to Trasande et al. (2018), increasing scientific evidence proved that synthetic chemicals used as food additives may adversely affect children's health, including chemicals intentionally added to food during processing (direct) and chemicals used as part of packaging or manufacturing in materials that may contaminate food (indirect). Wilson and Bahna (2005) found that a large number of food additives are widely used in the food industry. However, there are few studies concerning adverse reactions to additives, which may be under-diagnosed because people seldom suspect the food additives. Long-term consumption of food additives can lead to some of the adverse symptoms, and the causal relationship between food additives and their negative effects needs to be further demonstrated. Carocho et al. (2014) hold that despite considerable advances in food additives, some remain controversial. This controversy is fueled by the lack of uniformity in laws regarding additives worldwide and the conflicting results of many studies. Considering safety and toxicity, the study analyzed the most important preservatives, nutritional additives, colorants, condiment, texturizers and other additives. It is found that certain additives were indeed controversial. Based on the findings, the study briefly introduces the technologies related to edible coatings and films, which can help to overcome some of the drawbacks of the additives, but the technologies still have some shortcomings. There are also some studies advise improving public awareness of food additives. Qin He (2016) suggests that public awareness of food additives and food safety perceptions need to be improved, which requires improved means of publicity and suitable publicists.

Although some studies have investigated food additives problems, however, they focus on the aspects about importance, hazards, and raising public awareness, ignoring the current situation of the use of food additives and the causes. Insufficient discussion and investigation on the current situation and causes of food additives problems may lead to a lack of public awareness of the problem. Therefore, the public tend to paid attention food additive problems only when there is an outbreak of such problem. Moreover, insufficient discussion and investigation on causes makes it impossible to solve food additives problems fundamentally. Based on literature research and survey research, this study aims to

investigate the food additives problem in China and its causes from the perspectives of producers, consumers, and regulation, hoping to provide theoretical guidance for reducing or even eliminating the food additives problem in China.

2 Research

2.1 Research Methodology

2.1.1 Research design and method

This study adopts the literature research method and questionnaire survey method to refine the study into six research parts: (1) GRAS standards for food additives, (2) the current situation of food additives in China, (3) the public awareness of food additives, (4) the public's concern about food additives, (5) analysis of the causes of food additives problems, and (6) the impacts of food additives. Among them, part 1 and part 2 were investigated by studying the literature to obtain food additive standards and summarizing their current status. Questionnaires were used to study parts 3-6. Data were collected by online questionnaires, and then processed and analyzed to draw research conclusions.

2.1.2 Data Statistics Methods

This study mainly uses Excel, Spss software for data analysis. Excel is mainly used for the data exported from the Questionnaire Star online platform for data organization, pre-processing and plotting of some of the graphical presentation of the research results. Spss is mainly used for statistical verification. Specifically, descriptive statistical analysis was used for the third research part "the public's awareness of food additives", the fourth research part "the public's concern about food additives" and the sixth research part "the impact of food additives", while regression analysis was used for the fifth research part "analysis of the causes of food additive problems".

2.2 Research Procedures

2.2.1 Material preparation

The research material was self-administered questionnaire. The demographic variables was first considered in the questionnaire, including gender, age and education. Secondly, questions were designed for public perception of food additives safety, public concern about food additives, analysis of the causes of food additives problems, and the effects of food additives, respectively. In order to quantify the subjective feelings of the respondents, this study used a five-point Likert scale, with 1-5 representing "strongly disagree" to "strongly agree". Here is an example question: Do you think the excessive use of food additive is serious in China? Some of the research questions were set up as single-choice and

multiple-choice questions, such as "The following are descriptions of the safety of food additives, which do you think most closely matches your perception?". These questions allow the respondents to single out the description that best fits their perceptions, so that we can understand their perceptions of food additive safety.

2.2.2 Data Collection

The researchers firstly enters the prepared research questionnaire into Questionnaire Star online platform, and then released it. Because the requirement for respondents are set to be Chinese citizens, many acquaintances like the family members, friends and classmates of the researchers can be the respondents, who also helped the number of samples to snowball sufficiently. The researcher posted the questionnaire link on the Moments (the online community on the social media WeChat), which enables peer-to-peer push notification to their family members, classmates and friends. Then the acquaintances share this link to more people to attract more respondents and obtain more research data. Moreover, because this study aims to research the problem in national scope, the researchers deliberately shared and posted the link to more respondents from different regions across the country.

2.3 Sample Characteristics

A total of 216 samples were obtained in this study, snowballed using the WeChat, as shown in Table 1. Among the valid samples obtained, in terms of gender, there are more female respondents (156 people, accounting for 72.22%) than male respondents (60 people, accounting for 27.78%). In terms of age, the group of 41-50 years old was dominated (93 people, 43.06%), followed by 31-40 years old (72 people, 33.33%), 51-60 years old (17 people, 7.87%), relatively few people under the age of 18 years old (12 people, 5.56%) and 18-25 years old (25 people, 11.58%), and the fewest number of respondents over the age of 60 years old (only 3 people). In terms of education, undergraduate or junior college respondents are the majority (110, 50.92%), followed by those with high school degree and below (73, 33.79%), and there were fewer postgraduates and above, 33 in total. The reason for the higher percentage of females respondents is related to their higher tendency to know about food additives and their higher interest in the study. The age distribution was dominated by the middle-aged group of 31-50 years old, which may be due to the fact that residents in this age group are more concerned about food-related topics, and consequently, they were more likely to be forwarded and get involved with the questionnaire.

Table 1 Sample Characteristics

Variables	Group	Frequency(times)	Frequency(%)
Gender	Male	60	27.78%
	Female	156	72.22%
Age	Under 18	12	5.56%
	18-25 years old	13	6.02%
	26-30 years old	6	2.78%
	31-40 years old	72	33.33%
	41-50 years old	93	43.06%
	51-60 years old	17	7.87%
	Over 60 years old	3	1.39%
Education	Junior high school or below	38	17.59%
	High school and post-secondary education	35	16.20%
	Junior College	41	18.98%
	Undergraduate	69	31.94%
	Postgraduates or above	33	15.28%

Note: n=216.

3 Results and Discussion

3.1 GRAS Standards for Qualified Food Additives

At present, most of the globally accepted food additive standards refer to the GRAS (generally recognized as safe) standards of the United States, and the current food additive standards in China are mostly based on this standard (Min Zhang, 2024). In 1958, the U.S. Congress passed the *Food Additives Amendment*, which provide definition for food additives, pointing out that any substance intentionally added to food is a food additive and is subject to pre-market approval by FDA (U.S. Food and Drug Administration) unless the use of the substance is generally recognized as safe. This amendment not only

defined the concept of "food additive", but also indirectly introduced the concept of "Generally Recognized as Safe" (GRAS). Since then, a "GRAS Panel" of scientists and experts has been established to scientifically evaluate the safety of food additives. After continuous improvement, this act was finally incorporated into Title 21 of the *Code of Federal Regulations*, and became an important standard for the classification of food ingredients. GRAS standard enjoys a high reputation worldwide. It is not only an important reference for the approval of new food ingredients in China, but also an important basis for new food ingredients recognition in the international market (Shi Xiaowei, 2009).

The declaration and notification of food additives need to cover seven main points. In this paper, the GRAS notification submitted to the Center for Food Safety and Applied Nutrition (CFSAN) of the U.S. Food and Drug

Administration (FDA) for use in human food is used as an example to show the content of these documents in detail. The first section requires signed declarations and certifications, including the name and address of the declaring organization, confirmed by the signature of the relevant person in charge. Besides, it is necessary to list the name of the notified substance and describe its intended conditions of use, such as the types of food to which it applies, the amount of the substance to be used in these foods and its purpose for usage. The second section is related to the characteristics of the notified substance, the production process, the quality criteria, and the physical or technical effects of the substance. The scientific data and relevant information used to identify the notified substance should also be provided. The third section is the dietary exposure part, which requires relevant data and information on the possible intake of the substance by consumers. The fourth section is the self-restricted use level. It requires specifying the maximum allowable usage of the substance. The fifth section deals with experience based on extensive use in food prior to 1958. If the legal basis for the GRAS status is derived from such experience, extensive historical data demonstrating that the substance was widely consumed prior to January 1, 1958 needs to be provided in this section. The sixth section requires a detailed statement of the basis for the GRAS conclusion, explaining why the data and information in the notification can be supportive evidence for the safety of the substance used under the intended conditions. Section 7 requires a list of the supporting data and information in the GRAS notification, identifying which data and information are widely publicized and which are not generally available.

3.2 Current status of food additives sampling in China

As of 2023, 107,000 food manufacturers have gained market access for quality and safety, while 2,675 food manufacturers received authentication under Hazard Analysis and Critical Control Point (HACCP). However, there is still a significant gap between China's food safety level and the consumers' expectations. As major food safety accidents still occur from time to time, the public's sense of security in food sanitation is still insufficient, and the overall food safety situation is still challenging and not optimistic.

3.2.1 Pathogenic microorganisms and chemical contamination: main threats to food safety

In 2016, there are 411 batches of China's exported food products notified by foreign countries due to microbial exceedance, accounting for 26% of the total notifications. The problem of pesticide and veterinary drug residues occupied the second place, accounting for 18%. At present, the illegal production, sale and use of pesticide and veterinary drugs still exists in China, and some cases are serious. For example, despite the fact that China banned the production and use of the pesticide hexachloroethylene (HCEL) as early as 1983, the

pesticide is still openly used in certain regions, leading Japan to once threaten to suspend the import of Chinese ginger. According to the continuous monitoring of the contamination of pathogenic bacteria in raw meat, cooked meat, milk and dairy products, aquatic products and vegetables in some provinces and cities across the country from 2018 to 2019, microbial food poisoning still tops the list, accounting for 39.62%, while chemical food poisoning accounts for 38.56%, and plant and animal poisoning and unexplained food poisoning each account for about 10%.

3.2.2 Illegal addition of food additives by food enterprises

A small number of unscrupulous people illegally use food additives in food production and processing. In 2019, the Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) conducted special sampling inspections of 223 batches of milk-containing beverages produced by 160 enterprises in 18 provinces. The results showed that 35% of milk-containing beverages illegally used glycine to replace milk powder. In a sample test of 57 batches of bulk chili pepper products conducted in marketplaces in major chili pepper production and sales areas such as Sichuan, Chongqing, and Guizhou, 60% of the products were found to contain Sudan I (a carcinogen). In 2019, the country censused 448,153 food processing enterprises, of which 223,297 (49.8%), had incomplete permits, while 164,149 (36.6%) had no permits or licenses.

3.2.3 New Food Safety Hazards brought by New Products and Materials

Some new food types, such as convenience foods and health products, have increased rapidly and have been put on the market for sale in large quantities without risk assessment. At the same time, the widespread use of chemicals in food additives, packaging materials and preservatives, and the increasing number of chemical substances used directly in food or indirectly in contact with food often give rise to new food safety risks.

3.2.4 Steady rise of China's food sampling inspection pass rate

Comprehensive results of national supervision and sampling inspections over the past ten years show that the average pass rate of food sampling inspections before 2010 was low, while the overall pass rate has steadily risen after 2016, but there is still room for improvement. The results of the 2008 sampling inspections of 50 categories of food, such as wheat flour, rice, edible vegetable oils, dairy products, and condiments, showed that the average pass rate was only 67%. Among them, there were serious quality problems in soy sauce, candied fruit, pickles, milky beverages, jelly, infant formula, vegetables, ice cream and wheat flour. The pass rate of some products was even only 20-30%. AQSIQ conducted supervision and sampling of food products produced by 700,000 enterprises nationwide, and the average pass rate hovered

around 60%. In 2009, supervision and sampling of 60,085 enterprises producing five types of food products, namely rice, noodles, oil, soy sauce and vinegar, showed that the average pass rate was only 59.9%. Hopefully, by 2016, the pass rate of food sampling was raised to 80%, with the national food state supervision and sampling pass rate at 77.9%. In the first half of 2017, the pass rate of food-specific state supervision and sampling reached 85.1%. Overall, the level of food quality and safety has remained relatively stable.

3.3 Public awareness of food additive safety

In order to know about the public awareness of food

additives safety, this study conducted a hierarchical survey, and the results are shown in Figure 1. According to Figure 1, most of the respondents (115/216) had a little knowledge of food additives, but were not aware of they are safe or not. Some of the respondents (55/216) were only aware of food additives, and were not aware of the specific harmful substances. A few of the respondents (25/216) were not aware of food additives at all, while the number of respondents who were aware of safe additives (3/216) and the number of respondents who were aware of the harmful ingredients of safe additives (18/216) were relatively small. It is evident that most of the public's knowledge of food additives was superficial, and little was known about their safety standards and specific hazards to people.

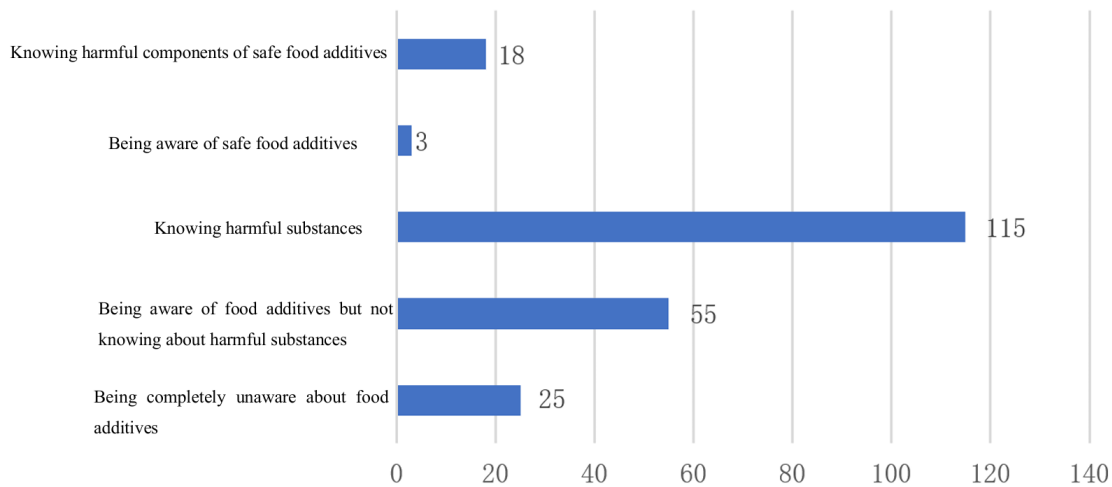


Figure 1 Public awareness of food additives

To further quantify the public's awareness of the safety of food additives, a five-point scale was used to measure the question "Do you know which food additives are safe and which are harmful?". The mean score of 216 respondents was 2.94, which was lower than the median score of the five-point scale of 3. The results seem to further indicate that the public has some awareness of the safety of food additives, but the awareness is not high.

The public may have some degree of concern about food additives. In order to understand the public's concern about food additives, this study used a five-point scale to investigate the degree of public concern. The results showed that the rating score of the respondents' concern about food additives in China reached 3.98, which was higher than the median score of 3 on the five-point scale, indicating that the public's concern about food additives is high.

3.4 Public Concerns about Food Additives

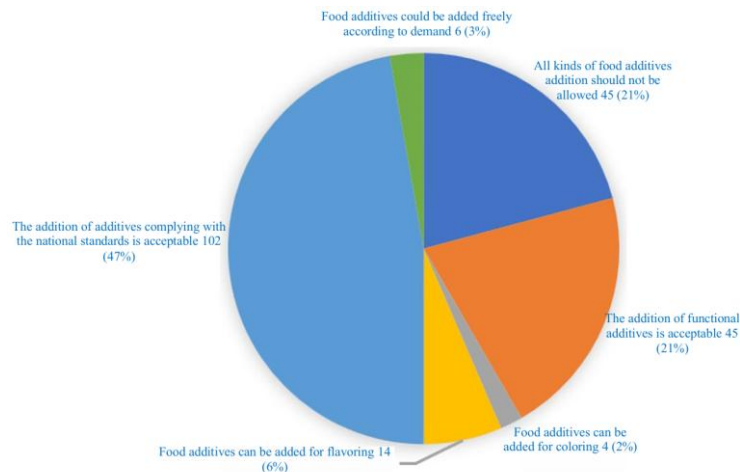


Figure 2 Public Concerns about Food Additives

To further illustrate the public's attitude towards food additives, this study used a graded questionnaire to investigate the public's attitude, and the results are shown in Figure 2. As shown in Figure 2, nearly half of the respondents (102/216) held that the addition of additives complying with the national standards is acceptable, while some of the respondents (45/216) held that the addition of functional additives (such as preservatives) is acceptable. Some others (45/216) held that the addition of all kinds of food additives should not be allowed. A few respondents (14/216) thought that food additives can be added for flavoring, and a smaller number of respondents (6/216) thought that food additives could be added freely according to demand, and only 4 respondents (4/216) thought that food additives for coloring could be added. Evidently, the public holds high acceptance of food additives that meet national safety standards, and functional food additives have the highest acceptance. On the contrary, some respondents choose not to add any food additive, while flavorful and colorful additives have lower acceptance.

3.5 Analysis of the causes of food additive problems

There are certain causes of food additive problems. This study investigated the causes of food additive problems from producer perspective, consumer perspective and regulatory perspective. The results are shown in Table 2. As shown in Table 2, from the producer perspective, cost saving ($\beta=0.17$, $p<0.05$), better taste after adding food additives ($\beta=0.38$, $p<0.001$) have a significant impact on food additive problems. From the consumer perspective, neither for appearance ($\beta=0.13$, $p>0.05$) nor taste ($\beta=0.02$, $p>0.05$) was the main cause of food additive problems. The results of regulatory perspective showed that weak safety regulation ($\beta=0.41$, $p<0.001$) had a significant impact on food additive problems. The results seems to indicate that the main causes of food additive problems can be attributed to the producers' purposes for taste improvement and cost saving, and weak regulation by relevant authorities.

Table 2 Regression analysis of causes of food additive problems

	M1	M2	M3	M4
Controlled variables				
Gender	-0.11	-0.03	-0.01	0.06
Age	0.16**	0.11*	0.11*	0.06
Education	0.05	0.02	0.02	-0.03
Producer Perspective				
Cost Saving		0.17*	0.16*	0.11
Color Improvement		0.05	0.04	-0.03
Taste Improvement		0.38***	0.29**	0.16
Consumer Perspective				
Appearance Improvement			0.13	0.07
Texture Improvement			0.02	-0.02
Regulatory Perspective				
Weak Safety Regulation				0.41***
Weak Penalty				0.10
R^2	0.046	0.426	0.439	0.556
ΔR^2	0.046	0.38	0.013	0.117
F	3.35	25.72	20.13	25.53

Note: * represents $p<0.05$, ** represents table $p<0.01$, and *** represents $p<0.001$.

3.6 Impacts produced by food additives

Food additives can have certain impacts. This study used a graded questionnaire to investigate the impacts of food additives, and the results are shown in Figure 3. According to Figure 3, most respondents believe that food additives can have negative impacts. According to the respondents, the predominant impacts include health hazards (190/216 people), a crisis of trust (159/216

people), and the development of a psychological dependency (117/216 people). About half of the respondents thought that food additives could bring positive effects, with taste improvement (97/216) dominating, followed by quality improvement (76/216). Very few people (4/216) thought that food additives would have no impact. The results seems to indicate that the public generally believes that food additives have both advantages and disadvantages, but the disadvantages outweigh the advantages.

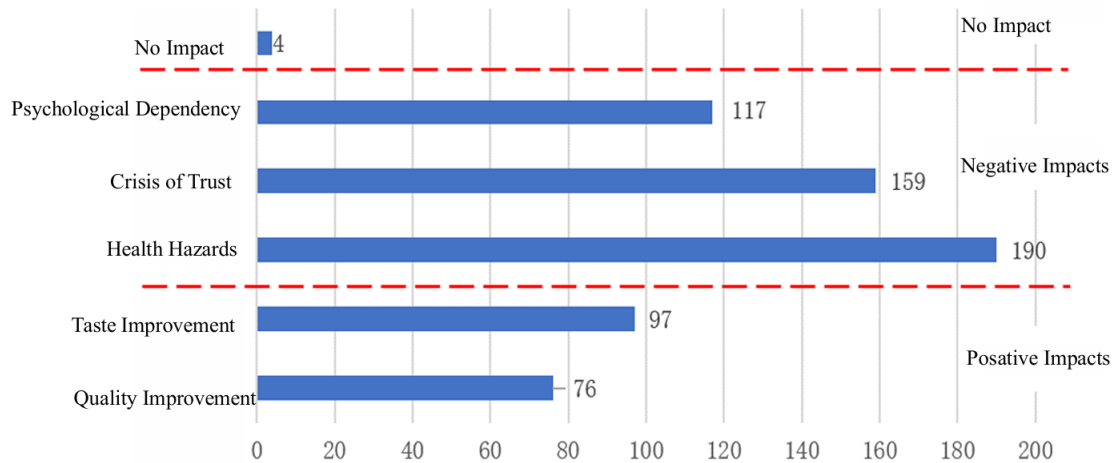


Figure 3 Impacts produced by food additives

4 Conclusions

The current situation and causes of food additives problems in China were systematically investigated by literature research and questionnaire survey. According to the results of literature research, China's food additive standards mainly refer to the GRAS standard of the United States, but the results of food safety sampling are still severe, and the illegal addition of food additives by food enterprises is still common. The results of the questionnaire showed that most of the public's awareness of food additives remained superficial, and little was known about their safety standards and specific hazards to people, while there are people who almost have no understanding of food additives. The public's concerns about food additives focus on the coloring and flavoring additives. The public tend to trust the additives that meet national standards, and have relatively high acceptance of functional additives. However, some people also hold that any addition of food additives should not be allowed. As for the causes of food additives, from the perspective of producers, cost saving and taste improvement are the main influencing factors. From the consumers' perspective, the addition of food additives for appearance and taste improvement will not have a significant impact on the problem of food additives. From the perspective of regulators, the weak safety supervision is a significant factor leading to the problem of food additives. In terms of the possible impact of food additives, the public generally believes that there are advantages and disadvantages. The advantages are taste and quality improvement. The disadvantages lie in psychological dependency, trust crisis and the harm to health. Moreover, the public believes that the use of food additives has more disadvantages than advantages.

5 Recommendations

5.1 Practical Recommendations

5.1.1 Reducing excessive food additives use by

strengthening moral and legal value guidance for enterprises

The results of the literature research in this paper show that the illegal use of food additives in China is frequent, and the sampling results are not satisfactory. The results of the questionnaire survey indicated that the main reasons for enterprises' excessive use of food additives are cost saving and taste improvement. Thus, to alleviate the food additives problems in China, it is essential to reduce the excessive use of food additives by the producers. For example, the enterprises that violate the laws and regulations due to excessive use of food additives should be given severe economic penalties and possible criminal prosecution, so as to warn the producers. Laws and regulations concerning food additives should also be regularly updated and revised to ensure that they can adapt to new food safety challenges and scientific developments. Enterprises themselves should also be self-disciplined and strengthen the moral and legal value guidance. They can establish an intra-industry self-regulatory mechanism to formulate some self-regulatory norms through industry associations, and promote mutual supervision and standard enhancement among their members.

5.1.2 Food Safety Knowledge Popularization and Public Awareness Enhancement

The study results show that although the public is very worried about food additives, and even 21% of the respondents expressed their wish to ban the use of all additives. However, the public's knowledge of food additives is still superficial, and they are not clear about the national safety standards for the use of additives and which additives are harmful to the human body. Therefore, there is an urgent need to enhance the popularization of food additives knowledge so as to raise public awareness of food additives. For example, popularization lectures in the community, schools and other public places, or online live broadcasting can help the public know about the common food additives and their reasonable additive amount, the types of food additives and their harmful effects. These activities can also answer the questions

about food additives that the public may encounter in daily life, increasing people's understanding of food additives. Besides, the popularization activities can also help the consumers know about the common methods of testing food additives, for example, melamine in milk powder can be measured by putting test paper into the milk powder water. Moreover, food packaging can be improved, such as adding QR codes to obtain information about the role and effects of different additives added in the food. Increasing consumers' understanding of food additives can reduce the purchase of the food that use excessive food additives, which may further make enterprises reduce the use of food additives.

5.1.3 Related laws and regulations improvement and strengthening supervision

From the regulatory perspective, weak safety supervision is the main factor leading to food additive problems. Compared with foreign countries, China's food safety supervision is less, and many food products with excessive food additives directly get access to the market without testing. Besides, even if the addition of each kind of food additive is complied with China's law and regulations, the addition of dozens of additives in the product also raise people's concern. According to a food engineer working in meatball processing, he would not allow his child to eat the meatballs even the legal addition of food additives is confirmed during product processing, in which a variety of additives help to bind the minced meat and broken bones together into meatballs. The regulation of the use of food additives in China is still weak and imperfect. In the future, it is recommended that the regulations concerning the use of food additives in the current *Food Safety Law* should be revised and refined to enhance their applicability. At the same time, it is necessary to strengthen the supervision of food additive manufacturers, formulate regulations on the use of food additives, and strictly supervise their behavior in accordance with national standards. The regulators can set up relevant departments to specialize in supervision, and can be more open and transparent so that the public understands and participates in food supervision.

5.1.4 Quality Sampling Strengthening and Exposure of Enterprises with Food Additive Excessive Use

This research found that the food additives problems in China has been alleviated in the past ten years, however, the sampling results are still alarming, and the problem of excessive and illegal addition of food additives is still very serious. The excessive and illegal addition of food additives not only harms the health of the citizens, but also lead to psychological dependency and crisis of trust. In the future, quality sampling can be strengthened, such as increasing the proportion and improving the coverage of random sampling. Meanwhile the sampling process can be recorded and disclosed to the public when necessary, so as to ensure that the public is clear about the addition and functions of the food additives contained in the food products they brought. For enterprises who found illegal

addition in sampling test, it is recommended that the regulators should revoke their business licenses, prohibit them from continuing to engage in food production and processing industry, investigate for criminal responsibility of the corporate legal person, and disclose these enterprises and punishment policy. These actions can triggers the alarming effect for the food producers. Only strict regulation and supervision of food additives problems can raise the producers' attention to food additives problems, eliminating the excessive use of food additives from the source.

5.2 Improvements and Suggestions for Future Research

5.2.1 Comparative Research related to International Studies on Food Additive Problems

This paper systematically investigates the food additive problem and its causes in China, and provides some theoretical and practical guidance for alleviating the food additive problems in China by discussing the qualified standards of food additives, the current situation of sampling and testing, the public's awareness and concern of the food additive safety problem, and the causes and impact of the food additive problem. However, food additives problem has been a long time. The regulations, standards, management mechanisms and practical applications of food additives are different among different countries, while some European and American countries have already had some mature experiences to learn from. Future research can compare and analyze different countries' food additive standards, declaration process, sampling results and unqualified treatment to improve the research on food additive safety. For example, the roles of the U.S. FDA and the Food and Flavor Manufacturers Association (FEMA) and their functional changes can be compared with China's food additive regulatory institutions and management.

5.2.2 Research data collection from a multi-dimensional perspective

When investigating the causes of the food additive problem, this paper explored the causes of the food additive problems from the producer perspective, the consumer perspective and the regulatory perspective. The findings of the study are highly instructive for viewing the food additive problem from a multidimensional perspective. However, due to the limitation of research resources, the data source of in this study was consumers. It studied the possible reasons for producers behavior and the regulatory situations from the consumer perspective. Future research could be based on this study by obtaining data from both the producer perspective, the consumer perspective, and the regulatory perspective. For example, the study can collect a sample of producer and research 30 entrepreneurs, then research a regulatory sample, conducting interviews and research with the Food Regulatory Authority. Data from multi-dimensional

perspectives can reduce homogenous variance on the one hand, and on the other hand, it can increase the credibility of the research results and enhance the robustness of the research results.

5.2.3 Solutions to the food additive problem

This study systematically studied the problems and causes of food additives in China, and the investigations of the causes can provide targeted guidance and suggestions for reducing the problems of food additives in China. If regulation is found to be insufficient, then suggestions to improve regulation can be made. However, these practical suggestions are made for the reasons found, and their effectiveness and specific implementation methods have to be further verified by the research. Future research can further investigate the solution to the food additive problem, which can be studied in terms of improving technology and innovation as well as promoting international cooperation. For example, government can support the food industry to increase investment in science and technology innovation, introducing advanced technology and equipment to promote the safe use of food additives. Meanwhile, it can also keep in touch with the food regulatory agencies of other countries to understand and learn from the advanced experience and technology of foreign countries in the management of food additives, so as to continuously optimize China's food regulations. Only the systematic investigation of solutions can guide to more effective ways to solve the food additive problem practically.

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