



Consumers' Food Safety Risk Perception of and Consumption Decision-making Behaviour

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ABSTRACT

In recent years, the frequent occurrence of food safety incidents has brought great impact on consumers' confidence in food safety, which has caused the food problem to become an important livelihood issue that needs to be improved and solved. The essence of food safety incidents is the market failure caused by the asymmetry of food safety information. Therefore, by taking the food safety as object of study, this paper firstly adopts the questionnaire research method to investigate the consumer's food safety risk perception. Besides, according to the theories such as consumer behaviour decision-making and asymmetric information etc., the model of consumer decision-making behaviour based on a rational model was constructed, and the factors that affect consumer decision-making behaviour were studied. The results show that consumers are more concerned about the safety issues of food quality, but the satisfaction of the government's supervision and food producer's control on food quality is not high; consumers' information recognition of food safety, risk perception, and consumer's expectation all will directly or indirectly affect consumer decision-making behaviour. Finally, it proposes the suggestions and countermeasures for improving China's food safety supervision as well as strengthening consumers' food safety awareness, which is expected to help reduce consumer perception of food safety risks and restore their confidence in food safety.

Key Words: Food Safety, Risk Perception, Decision-making Behaviour

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205

Introduction

Food safety issue is not only related to the health of each of us, but also affects the social stability (Safety, 1990). Therefore, it is the key responsibility of the government and enterprises to ensure the food safety and provide safe food for the people. However, in recent years, some unscrupulous enterprises have triggered a series of food safety problems driven by profits (Galaverna *et al.*, 2009). E.g., "melamine-tainted milk powder", "false eggs" and "industrial salt" etc. have caused a wide range of social concerns. According to statistics, in 2005-2015, there emerged more than 50 food safety incidents on average every day in our country. Meat, fruits, drinks and beverages etc. are all foods that are

closely related to the daily lives of consumers (Brewer *et al.*, 2008), but these food safety incidents have led to the crisis of people's confidence in food production and regulatory system. In addition, the problem of environmental pollution is also deteriorating, which will further bring hidden dangers to food safety issues, e.g., pesticide residue, excessive heavy metals and so on, will directly threaten the consumers' safety and health (Miraglia *et al.*, 2009; Boxstael *et al.*, 2013).

Also, with the economic development, food choices have been diversified, facilitated and advanced. In this background, people's consumption concepts have been also gradually changing, and people's food safety and health

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awareness been also growing, so it is an inevitable trend in the future for the pursuit of high quality food (Zanoli *et al.*, 2002; Harper *et al.*, 2002; Krystallis *et al.*, 2005). In order to ensure food quality, the government has also issued relevant laws and regulations to improve the food safety supervision system. However, food safety issues are still commonplace (Hnj *et al.*, 1998). From the economics management point of view, the essence of food safety issues is market failure caused by asymmetry in food safety information (Lobb *et al.*, 2007; Amin *et al.*, 2013). Food from production to consumption is mainly related to the three parties: producers, government departments and consumers, where the consumers are disadvantaged only as food information receivers, thus leaving room for the food producers to hide important safety information or transmit false information (Fazil *et al.*, 2008). Therefore, it requires the government supervision departments to further improve the regulatory system and provide food safety information sharing.

By taking food safety as object of study, this paper firstly applies the theories such as consumer behaviour decision-making and information asymmetry etc. to analyse and study consumer's concern for food safety and health, and then analyses the factors that affects consumer behaviour decision-making based on the rational model (Liang, 2010). Finally, related suggestions for promoting food safety are proposed.

Theoretical review

Related concepts

Food safety: The concept of food safety is a dynamic process that is updated with the specific time and social development. The initial food safety just meant to maintain the sufficient food for human health. With social and economic development, food safety, in addition to guaranteeing sufficient quantity, also ensures that food will not harm the health of consumers. Therefore, the concept of food safety has become more and more complete so far, where two major aspects should be highlighted: food quantity and food quality, which are interrelated indispensable.

Organic food: Organic food refers to natural food without pollution. It is a high-quality food that represents nature, environmental protection, safety and nutrition. Organic foods have strict standards and requirements for

production bases and production processes, e.g., chemical pesticides and genetic technology are not allowed to be used in the production process. According to the studies, organic food has far fewer pesticide residues than ordinary food, and vitamins are also much higher than ordinary food. Besides, it can greatly reduce the damage to the environment, which is conducive to the sustainable development of agriculture.

Consumer psychology

Consumer psychology is a branch of psychology. It mainly focuses on the psychological phenomena that consumers generate in marketing activities. This field involves the disciplines of psychology, economics, marketing, and metrology etc., and studies the issues such as consumer psychology control, decision models, consumer policy, and consumer information etc. Based on the research results of consumer psychology, demand and motivation are the key steps in the effective consumption process. According to Maslow's demand theory, people always meet the most important and urgent demands at first. In the current food safety environment, pursuing the quantity of food is no longer the current major demand, whereas, seeking more nutrition, better quality, safe and healthy foods are the main attributes of food that consumers are currently concerned about.

Consumer behaviour theory

Consumer decision-making process: As one branch of decision making, consumer decision-making refers to the process for the consumers during the consumption to make the rational evaluation and comparison for the brand and service of a product according to its own demands, and eventually purchase a certain product or enjoy one certain service at a relatively high price/performance ratio. Consumer behaviour is the most important part of the decision-making process. Without decision-making behaviour, there will be no final consumption behaviour. The process of decision-making is shown in Figure.1 below.



Figure 1. Consumer decision-making process

Table 1. The comparison of different type products

Product Attributes	Access to Product Information	Information Asymmetry Degree
Search Goods	Advertising, field observation	Low
Experience Goods	Product trials, use	High
Trust Goods	Brand, authoritative certification, word of mouth	Very High

Consumption decision-making is a complex process that can be affected by many factors, such as personal characteristics, emotions, information, and cognitive styles etc., as shown in Figure.2.

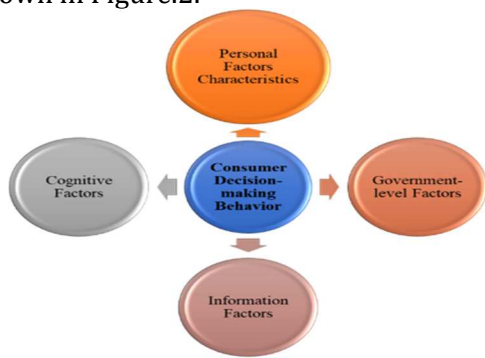


Figure 2. The influence of consumer decision-making behavior

Information asymmetry theory: The theory of information asymmetry was first proposed by American economists. It refers to the phenomenon of uneven information distribution between two transaction parties: one party is called the information superiority party, and the other is called the information inferiority party. Consumers, as buyers of products, receive less information about the product than the producer of the product, so they are in a weak position in the market. Based on the consumer's information identification ability about the product, the products were divided into search goods, experience goods, and trust goods in this paper. For the search goods, the consumer can understand the basic information about the product before buying; for the experience goods, the consumer cannot understand the quality of the product before buying, and it can be perceived through their own perception only after use; for the trust goods, it has very high information asymmetry, because the consumers can't judge their quality attributes even after use, regardless of pre-purchasing or post-purchasing behaviour (Table 1).

If sellers use information asymmetry to make long-term bullying of buyers and seek maximum profits, the phenomenon of "defective expulsion of good products" will emerge in the market, so as to cause a sharp decline in the

quality of goods on the market. Besides, the consumers will adopt different behaviours such as information search, information recognition, and risk-perception to reduce the purchase of products with poor quality, ultimately leading to market failure. Therefore, the government and producers must take the following measures to mitigate the information asymmetry and win the trust of consumers. (Figure 3.)

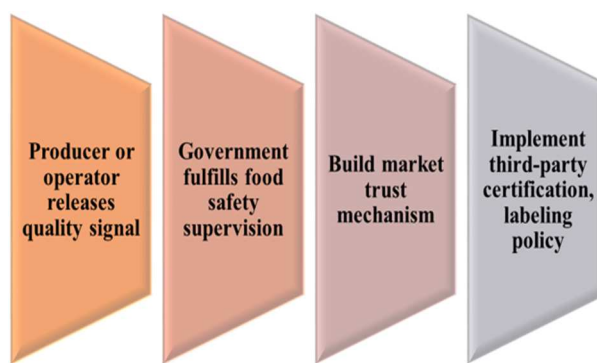


Figure 3. The measures of mitigating information asymmetry

Consumers' food safety risk perception

Risk perception

Risk refers to the probability distribution of the outcome of one certain event, with uncertainty of gain or loss. The uncertainty of food safety risks is relatively high, because the consumers cannot understand the impact of foods on their health in a timely and accurate manner. The asymmetry of this information poses challenges to consumers' perception of food safety risks. The risk perception of consumer food safety means the uncertainty of the consumer's perception of the unfavourable consequences of the purchased food, which is an important factor that affects the consumer's purchase of food. Due to the information asymmetry, the average consumer will only rely on perception and experience to make judgments rather than relying on scientific facts. This will often deviate from the actual food safety situation. E.g., consumers may overreact to food safety emergencies such as bird flu and melamine etc., even if the probability of these incidents is extremely low, as the low-level risk; however, some food safety incidents that are actually serious and have high risks are ignored,



Table 2. The sample statistics

Item	Options	No. of Samples	Proportion (%)
Gender	Male	220	45.6
	Female	252	54.4
Age	Below 30	120	25.4
	30-49	280	59.3
	Above 50	72	15.3
Education	Below junior High school	12	2.5
	High school	150	31.7
	University or above	310	65.8
Household Income	Below 5000	52	11.0
	5000-10000	320	67.8
	Above 10000	100	21.2
Child Status	No child	190	40.2
	One child or above	282	59.8

for example, the long-term intake of many fried foods is easy to cause cancer and etc. Thus, there is a large deviation between the consumers' perceptions and facts.

Consumer food safety risk perception

People's concerns about food and their own health will promote their perception of food safety risks. Therefore, in this paper, the questionnaires and statistical methods were adopted to explore the consumer perception of food safety risk. A total of 500 questionnaires were distributed and 472 were recovered. The statistics of the respondents are shown in Table 2 below.

Consumer attitudes towards food quality and safety: Consumers' concerns about food quality and safety issues can reflect their perception of food safety risks and the need for high-quality foods to a certain extent. The results based on questionnaires are shown in Fig.4. Fig.4 (a) shows the consumer's concerns about China's food safety, where 84% of consumers are highly concerned about the quality and safety of food, only 16% consumers are generally concerned or unconcerned, and no consumer 0% is extremely concerned. In Fig.4 (b), it shows the degree of consumers' concerns and worries about China's food safety, where, more than 50% of consumers are very worried about China's food quality and safety, and only less than 2% of consumers are not worried.

The reasons for this series of results may be related to frequent food safety incidents in China. With the impact of food safety incidents, consumers' perceptions of food safety risks have changed significantly. Confidence and trust in food safety cannot be restored immediately. Only by the effective improvement and governance

measures of the government and enterprises, the consumer confidence in food safety can be gradually restored.

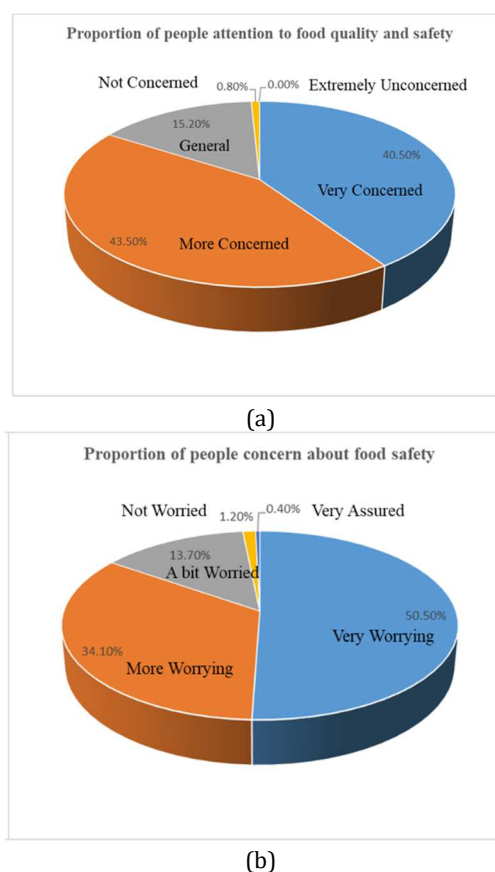


Figure 4. Consumers' evaluation of food quality and safety

Consumers' evaluation of government food safety supervision effect: The government is also one extremely important part in the management process of food safety. Whether or not the government's related food regulatory system is perfect concerns the food safety of each citizen. Therefore, consumers' perception of the



government behaviour is reflected in the following several aspects: (1) The government's supervisory and executive capacity of food safety; (2) Whether the government's handling of food safety incidents is timely and comprehensive; (3) Whether the government's follow-up and improvement of the incidents are in place. The consumer trust degree in food safety largely depends on the trust in the government. The consumer attitudes toward food safety can be indirectly understood through the evaluation of the government's food safety regulation effects. The results of the questionnaire are shown in the Fig.5 below.

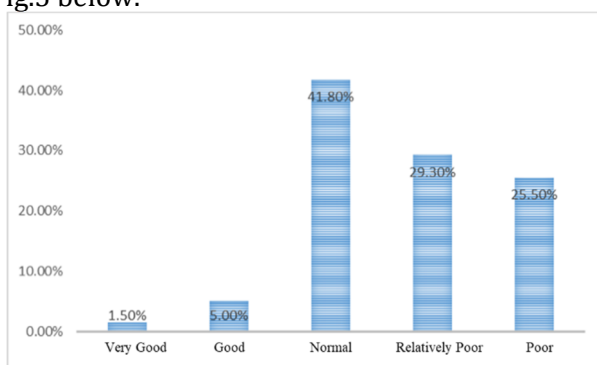


Figure 5. Consumers' evaluation of government food safety supervision effect

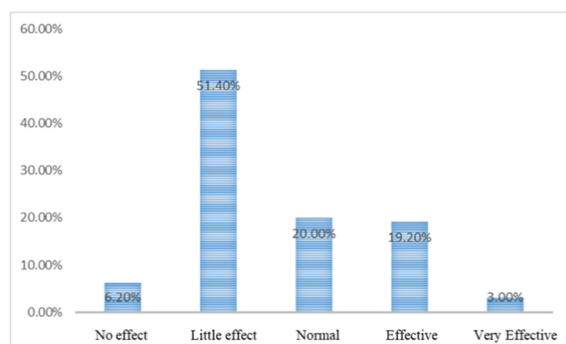


Figure 6. Consumers' evaluation of the effect of manufacturer-controlled behavior

Through the analysis of statistical results, it's found that consumers' attitudes toward food safety are not optimistic. More than 50% of consumers feel that the government's food safety supervision effect is normal, and less than 10% of consumers are very satisfied. Such results may be due to the lack of confidence of consumers in the regulatory role of the government after food safety incidents. The government should take related measures and spend some time rebuilding the consumers' confidence. For example, the government should not only

disclose those enterprises with quality problems, but also carry out reforms in food safety management by improving relevant laws and regulations.

Consumers' evaluation of producer control effect: Food producer is the output of food information. It has a series of activities such as production, processing and storage of foods, as the source of the food quality. Therefore, the consumers evaluation of the producer's control effect can also reflect their attitudes towards food safety. Figure.6 shows the results of the questionnaire statistics, where only about 22% of consumers believe that the quality control of producers is effective, and about 60% of consumers believe that there is no effect. This is because consumers have lost confidence in the food safety of the producer or even the entire industry after the food safety incident occurred in this producer. For example, after the melamine incident, Chinese consumers lost confidence in the dairy industry in China so as to seek for other options, such as purchasing expensive imported milk powder; even several years later after this melamine incident, the consumer confidence of Chinese milk powder industry still hasn't been rebuilt.

Factors affecting the consumers' food safety risk perception

Consumer perception is the psychological evaluation or tendency of one certain thing or event. It will be affected by some factors. This paper classified the influencing factors on consumers' perception of food safety risk factors into different types as shown in Fig.7: (1) Consumers' personal characteristics, including age, gender, family income, and education level. Generally, female consumers are responsible for the family's diet, and they are more sensitive to food safety; high-income and highly educated consumers are also aware of food safety in the more extensive and comprehensive manner; (2) Consumer attitudes towards food safety/quality issues and deep understanding of food safety incidents. In general, the deeper the understanding of the incident, the richer the food safety knowledge, the more aware of the risks; (3) Consumer attitudes towards government and producers in handling food safety incidents.



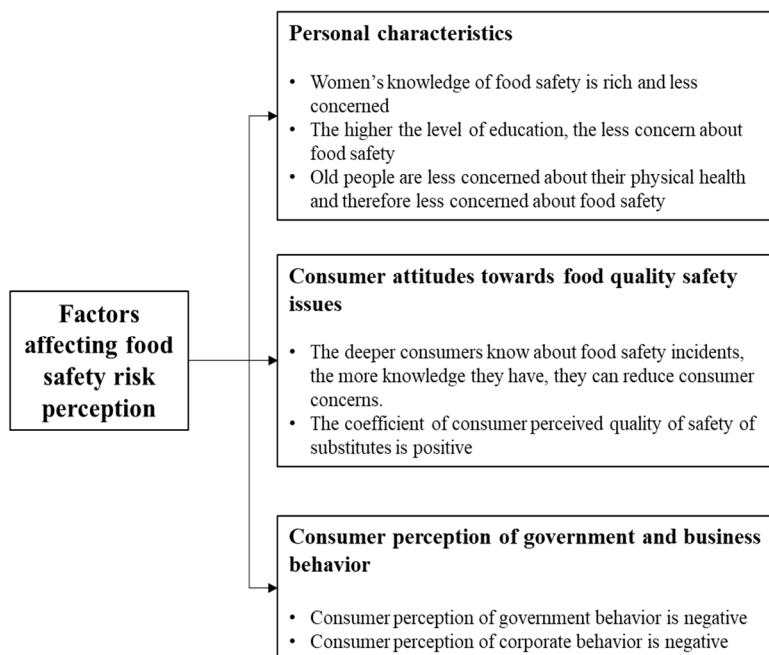


Figure 7. Factors affecting food safety risk perception

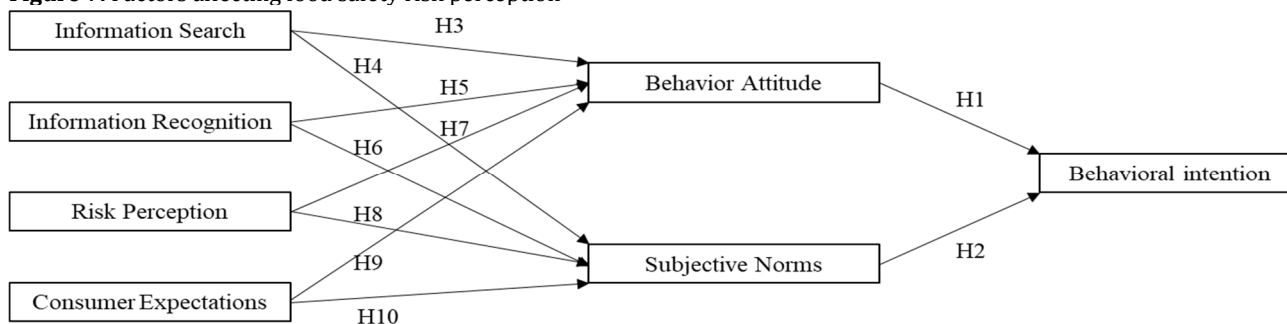


Figure 8. Consumer food safety consumption decision behavior hypothesis model

Consumer food safety decision-making behaviour model and its influencing factors

Model construction and hypothesis

According to the reference, this paper constructs one model of consumer food safety decision-making behaviour based on rational behaviour model, and then conducts empirical research. It starts with the information asymmetry that causes the food safety problem, which are decomposed into four independent indicators; by studying the subjective norm and behavioural attitude that affect consumers, their influence on consumer behaviour decision-making is indirectly judged. The specific model is shown in Fig.8.

In this model, in combination with the research results of other scholars, the research hypothesis from H1 to H10 was proposed, assuming that information search, information recognition, risk perception, and consumer expectations have a positive influence on consumption behavioral attitudes and subjective

norms; consumer behavioral attitudes and subjective norms also have a positive impact on consumption safety behaviour decision-making.

Consumption decision behaviour model

This paper uses Fishbein's rational behaviour model to analyse consumer's consumption decision-making behaviour. In this model, the consumer's behavioral intention is mainly determined by two factors, which are expressed as:

$$B - BI = [A_{act}]w_0 + [SN] w_1 \quad (1)$$

$$A_{act} = \sum_{i=1}^n B_i E_i \quad (2)$$

$$SN = \sum_{j=1}^m NB_j MC_j \quad (3)$$

where, B is behaviour, BI is behavioral intention, and A_{act} is consumer attitude: as a long-term affection tendency towards certain



thing, it has a direct impact on consumers' decision-making behaviors, and it can be positive or negative, like or dislike, which is expressed by the consumer's belief for one certain result B_i and the evaluation for the result E_i . The SN represents the subjective norm of the consumer. The consumer's subjective behavior is influenced by the community, tending to be constantly changed subtly, which is represented by the normative belief NB_j and the motivation for the total expectation MC_j . w_0 and w_1 are weights, i.e., proportions.

After the model was constructed, the fitting degree of the hypothesis was verified by the fitting test of the structural equation model, i.e., calculation of the fitting index. If the fitting degree is high, it means that the hypothesis is valid; otherwise, it means that the hypothesis is inconsistent with the actuality. In the fitting results, only one hypothesis test in the fitting result was not valid, that is, information recognition has a positive influence on consumer safety behaviour attitude; the other nine hypotheses achieved the expected results of the data support model.

Results analysis and suggestions

Consumers' decision-making behaviour is positively related to their concerns about daily food safety, and it is easily influenced by the consumption opinions and behaviors of friends and family members etc. The more consumers learn about food safety information, the less affected by other consumers, and the highest level of trust in the food safety information released by government platforms, thus overturning the hypothesis of H5. In addition, the stronger the consumers' perception of food safety risks, they'll be more concerned about food safety issues and more inclined to choose safe foods, including organic foods, pollution-free foods, and natural foods. After consumers understand the product information and market conditions, their reasonable and rational expectations for the safe food will also significantly influence their consumption decisions and strengthen the ability to receive high-price attributes of safe food. Based on the model verification results above, the specific improvement measures have been proposed in terms of government supervision, information disclosure, and consumer safety awareness training, as shown in Fig.9 below.

Give full play to government functions	Improve consumer safety awareness	Improve supervision system and improve law enforcement
<ul style="list-style-type: none"> Establish a food safety information sharing network Implement food safety information release responsibility system Safeguard food safety information disclosure system 	<ul style="list-style-type: none"> Expand Consumer access to food information Strengthen consumer food safety education Improve consumer food safety awareness 	<ul style="list-style-type: none"> Establish a complete food safety supervision system Enhance the enforcement of functional departments Strengthen the construction of food safety monitoring system

Figure 9. Suggestions and countermeasures for improving food safety

Conclusions

By taking the food safety as object of study, this paper applies the theories such as consumer behaviour decision-making and information asymmetry etc. to study the consumer's concern and risk perception for food safety and health, and then analyses the factors affecting the consumer decision-making behaviour based on rational model. Finally, the conclusions have been drawn as follows:

Questionnaire survey method was adopted to investigate the consumers perception of food safety risks. The results show that consumers are more concerned about the safety issues of food quality, but the satisfaction of the government's supervision and food producers' control on food quality is not high. This may be related to the frequent occurrence of food safety incidents. Thus, the government and enterprises should take related measures to restore the consumer confidence.

Based on rational model, the consumer's behavioral decision model for food safety was constructed, the influencing factors on consumer decision-making behaviour was then studied, and finally the influence of behavioural attitudes and subjective norms on consumer decision-making was discussed. As a result, it has been found that consumers' information recognition, risk perceptions, and consumer expectations of food safety can directly or indirectly affect consumer decision-making behaviour.

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