CONSUMER PERCEPTION OF FOOD SAFETY RISKS AND COPING STRATEGIES

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Abstract
This paper probes deep into the consumer perception of food safety risks, aiming to develop effective coping strategies for food safety incidents. Taking the melamine incident as an example, the author carried out several surveys on consumers about their understanding and perception of food safety risks. Then, a logit mode was adopted to study how the consumers perceive and cope with the risks. In addition, questionnaires were released to collect data on the changes in consumer trust and its influencing factors. The results show that how consumers perceive food safety risks is influenced by their trust in the public management ability of the government, their understanding of the risks, as well as the time of survey. On this basis, several coping measures were put forward to maintain consumer trust in the government and enterprises, and to stabilize the food consumption market. The research results provide the evidence for the government to formulate sound policies on food safety.

Key words: Food Safety, Risk Perception, Risk Communication, Coping Behavior.

INTRODUCTION
Food safety risks are ubiquitous and crucial, which seriously affect people’s life and national stability. Food safety incidents with severe hazards and serious impacts at home and abroad still occur frequently, such as bird flu, foot-and-mouth disease, German poisonous cucumber Incident, mad cow disease incidents, and melamine incidents in China in recent years (Cope, Frewer, Houghton et al., 2010). It is an important part of food safety management to effectively deal with the impact of food safety crisis.

With the income of Chinese residents increasing, their awareness of related food safety has also been strengthened, and the food safety has become increasingly important (Frewer. 2000). In recent years, the Chinese government has made fruitful work on the two aspects of food safety legislation and standard system construction, which greatly improve the domestic food safety situation (Ma, Wu, Hu et al., 2017). Based on the domestic research, the causes of food safety problems can be summarized into two categories: the uncertain use of new technologies or new processes; the morally corrupt behavior of food producers. The former type of food safety problems can be solved by the continuous improvement of food safety risk analysis and control systems, while the latter depends on the perfection of food regulatory systems (Dreyer, Renn, Cope et al., 2010; Gandit, Kouabenan, & Caroly, 2009).

In view of the above, taking the melamine incident in China as an example, this paper aims to study the consumers’ risk perception of food safety, their coping behaviors, and related influencing factors on the changes of the consumer trust. Finally, effective risk communication of food safety was proposed to reduce consumer food safety risk perceptions. This shall provide relevant evidence for the government to formulate emergency
management policies for food safety incidents, and also enrich research on consumer consumption behavior.

**SURVEY ON CONSUMER PERCEPTION OF FOOD SAFETY RISK**

**Description of statistical analysis**

The melamine incident in China was taken as an example. The questionnaire surveys were conducted to analyze this food safety crisis about the quality problem of the milk powder. Table 1 lists the basic information of the respondents in this study: the male to female ratio of the respondents was about 1: 1; they were mainly under 44 years of age; 50.3% had a college education level or above, of which 31.75% had graduate education experience. In addition, the question “what is your concern about the quality of current milk powder?” was designed in the questionnaire to reflect the consumers’ risk perception of food safety and their response to this safety problem. It’s rated on a 3-point scoring method, 1=not worried, 2=a little worried, and 3=very worried, as shown in Table 2.

The survey statistics in Table 1 showed that for this food safety incident, a large number of consumers had serious concerns about the safety of various milk powder brands, while some consumers had no worry about melamine incident and expressed the confidence in domestic milk powder brands. So, it’s the mask task of the government offices on how to respond to consumers’ concerns about food safety.

Another survey was conducted on the consumer perception of the safety of milk powder in more than half a year after the melamine accident. The analysis results showed that after a period of time, the people still had great concerns about the safety of milk powder. Among them, 41.96% said that the milk powder sold in the market still were not safe, another 46.27% said that they did not have too much confidence in the milk powder sold in the market, and only 11.75% thought that the milk powder sold in the market had no quality problem (Table 2). This indicates that even if the government has immediately launched the Class I emergency response mechanism for food safety accidents immediately after the toxic milk powder incident, consumers’ confidence in food safety still cannot be restored quickly.

Also, over a period of time after the melamine incident, domestic media released that Dumex and other milk powders also had certain quality problems. The statistical survey showed that 65.2% of the respondents were aware of this incident, and 34.8% were not. Of the respondents who had heard of this incident, only 10.96% thought the report was not accurate enough, because the government has taken positive measures to ensure food safety; another 43.32% said this was the continuation of the melamine milk powder incident, and the government has not worked hard enough to ensure food safety. This indicates that consumers are often pessimistic about the outcome when facing food safety issues.

The melamine incident is a very serious food safety incident in China. With the popularity of the Internet, consumers' awareness of food safety has been enhanced, and the resulting consequences have been even worse (O’Neill, Brennan, Brereton et al., 2015). According to the statistical results in Table 3, most of the respondents indicated that they understood the causes and hazards of the melamine incident and knew that relevant measures needed to be taken in case of the crisis. The previous way of deceiving consumers by hiding information is no longer feasible in today’s We-media era (Veeck, Veeck, & Zhao, 2015). And in recent years, the information exchange platforms such as Weibo

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**Table 1. Sample feature**

| Sex     | Sample size | proportion | Age    | Sample size | proportion | Educational level | Sample size | proportion |
|---------|-------------|------------|--------|-------------|------------|------------------|-------------|------------|
| male    | 130         | 50.98      | <30    | 112         | 43.91      | Below high school | 12          | 5.2        |
| female  | 125         | 49.02      | 31~44  | 92          | 36.07      | high school      | 34          | 12.93      |
|         |             |            | 45~59  | 35          | 13.72      | university       | 127         | 50.3       |
|         |             |            | >60    | 16          | 6.26       | graduate student | 80          | 31.75      |

**Table 2. Consumers’ perception of the quality and safety of milk powder**

| Respondents’ perception of food safety | Sample size | Proportion (%) |
|---------------------------------------|-------------|----------------|
| no worry                              | 38.5        | 15.38          |
| A little worried                      | 117         | 46.35          |
| Very worried                          | 97          | 38.51          |
launched by major online e-commerce companies have increased the speed and scope of information dissemination (Hu, 2004).

Setting of measurement model
The ordered measurement model was used as the measurement method. Consumers perceived the food safety based on continuous latent variables: B for the assessment level of food safety risk, and T for the consumers’ perception of milk powder quality and safety after the food safety incident; T=1 means that consumers are not worried about milk powder quality at the B0 level, T=2 means that consumers have some concerns at above the B0 risk level and below the Br level, and T=3 indicates that the consumers are very worried about the quality above the Br risk assessment level (Rheinländer, Olsen, Bakang et al., 2008). Combined with the probability derivation method, the following probability statistics are given as:

\[ P(T = 1) = P(B < B_0) = F(\alpha' + \beta' + x'B_0) \] (1)

\[ P(T = 2) = P(B_0 \leq B < B_r) = F(\alpha' + \beta'Z + x'B_r) - F(\alpha' + \beta' + x'B_0) \] (2)

\[ P(T = 3) = P(B \geq B_r) = 1 - F(\alpha' + \beta'Z + x'B_r) \] (3)

where, \( F(\cdot) \) is a probability distribution function index. And the above probability model can also be transformed into a Logit model for further measurement.

RESULTS ANALYSIS AND DISCUSSION
Comparison of consumer risk perception for milk powder at two time points
For the respondents surveyed, the ratio of these respondents to men and women is close to 1:1, and their age is mainly distributed below the age of 44; 51.75% of them have received university education and 26.32% have graduate education (Akompab, Bi, Williams et al., 2013); 65.57% of them have children under the age of 14 or over 60 years of age; 51.08% often buy dairy products; the monthly per capita income of their families ranges from 1,000 to 4,000 yuan. Among the survey respondents, 12.48% of the monthly per capita income was below 1,000 yuan, and 11.18% of the income was above 4,000 yuan (Lópezvázquez & Marván, 2003). Through the statistical survey, the comparison was made for the respondents’ risk perception of milk powder between two time points.

Model estimation results and analysis
A Logit model was constructed to quantitatively analyze the key factors that influence consumer’s risk perception of food safety. In addition to economic variables, the trust factor is the main cause. When the government keeps its words, consumers shall trust the government and prefer to buy consumer goods; when it doesn’t, consumers' purchasing power will be reduced. Based on the related analysis of Logit model, the multivariate logistic regression analysis was performed on the surveyed data using stata10.0 statistical software. The analysis results are shown in Table 6.

Statistical results showed that at least one variable in this model has a significant statistical significance for its explanatory variables. There is a significant negative correlation between the impact stage of food safety hazards and consumers' perception of food safety risks. The results of the regression analysis can explain that the consumer's perception of food safety caused by the melamine incident is constantly tending to be negative, and the occurrence of this incident has caused consumers' perception of food safety risks to deteriorate continuously.

Although consumers have gradually forgotten
the details of food incidents over time, the negative impact of such incidents on consumers cannot be fundamentally changed. And if the government’s response mechanism is not recognized by consumers after the food safety incident, the negative emotions of consumers will continue to deteriorate. In the long run, in case of food safety incidents, the government should first ensure the response measures to be recognized by consumers, and then gradually achieve the goal of changing the perception of consumer food safety risks through transparent risk information of food safety incident.

Changes in consumer trust and the related influencing factors

In order to analyze in depth the changes in consumer’s trust in food safety before and after food safety incidents and the key influencing factors on food safety, the questionnaire survey was conducted randomly in Suzhou (mainly including Pingjiang District, Canglang District, Jinjiang District, Xiangcheng District, Wuzhong District, as well as Kunshan City, Zhangjiagang City, Changshu City, Wujian City, and Taicang City under its jurisdiction) on urban and rural consumers. The survey locations were mainly selected in large and medium-sized chain supermarkets in various districts, counties and cities.

The sampling point of this survey was China Resources Supermarket in Suzhou. China Resources has a total of 126 chain stores and 3 hypermarkets in Suzhou; there are more than 8 large supermarkets in each district, county and city of Suzhou. In order to avoid duplication of samples during the survey, the survey team conducted information collection in each district by taking three China Resources supermarkets or hypermarkets selected in the county or city as samples according to the Pinyin ordering of the names for these supermarkets. A total of 500 questionnaires were distributed in this survey, and 486 questionnaires were collected. After excluding those questionnaires that failed to answer key information or with logical contradictions, a total of 478 valid questionnaires were obtained.

The analysis results from the statistical questionnaire survey showed that only 10.48% of those surveyed said that they would not reduce the purchase of domestic milk powder, 29.48% said that they would purchase less than half of domestic milk powder, and 36.25% would never buy this again. This indicates that the melamine milk powder safety incident has made most domestic consumers no longer accept the quality of milk powder, and then attempt to avoid the risks brought by milk powder purchase by the means of reducing the amount of purchase. It’s also found that about 71.34% of consumers would choose other products such as imported milk powder, soybean milk, soy milk powder, etc. to replace the current milk powder.

Thus, after the melamine incident, consumers’ trust in China’s food safety has declined significantly, while their trust in the previous inspection-free products and major brand products of our country has also decreased sharply. Melamine incident severely affected consumers’ trust in food safety. Before the melamine incident, the country’s relevant institutional trust and the enterprise’s competence trust were the key factors affecting the degree of consumer food safety trust. However, the impact of these two trusts after the melamine incident was not significant enough. The government and enterprises’ post-measures taken have become a core factor affecting consumer food safety trust. Therefore, after domestic food safety incidents, it is best for governments and enterprises to provide transparent and objective food safety response measures. Only through specific safeguards and aftercare measures can consumers’ trust in the country and businesses be restored.

Table 5. Comparison of consumer risk perception for milk powder at two time points

|                     | More unreliable | Commonly | More reassuring |
|---------------------|----------------|----------|----------------|
| Survey data analysis in 2009 | Sample size   | 106      | 119            | 31  |
|                     | Proportion (%) | 41.95    | 46.27          | 11.75 |
| Survey data analysis in 2011 | Sample size   | 117      | 60             | 23  |
|                     | Proportion (%) | 57.7     | 30.34          | 11.93 |
Table 6. Model estimation results

|                          | Coefficient | dy/dx  | P value |
|--------------------------|-------------|--------|---------|
| Sex                      | 0.091       | 1.098  | 0.638   |
| Age (31-44)              | 0.222       | 1.251  | 0.334   |
| Age (45-59)              | 0.478       | 1.613  | 0.13    |
| Age (>60)                | 1.17        | 3.19   | 0.002   |
| high school              | -0.604      | 0.548  | 0.145   |
| University               | -0.056      | 0.943  | 0.878   |
| Graduate student         | -0.022      | 0.978  | 0.958   |
| Degree of understanding of melamine incident | 0.402 | 1.495  | 0.251   |
| Impact stage             | -0.525      | 0.59   | 0.013   |

Table 7. Changes in consumption of dairy products after three melamine incidents

| Change in purchase quantity | Not reduced | Less than half | Cut more than half | No more purchase |
|-----------------------------|-------------|----------------|--------------------|------------------|
| Sample size                 | 61          | 137            | 114                | 166              |
| Sample proportion           | 10.48       | 29.48          | 23.75              | 36.25            |

CONCLUSIONS

(1) The survey results showed that after food safety incidents, consumers trust in the government and enterprises would be at a lower level. Compared with the survey results in six months after the melamine food safety incident, it’s found that consumer perception of food safety risk has improved significantly, and consumers are more rational about food safety and tend to buy goods in a reasonable manner; also they are less subjected to external influence, and consumption levels are gradually recovering over time.

(2) Under the impact of food safety incident, the consumers have attempted to avoid food safety risks by changing brands, reducing consumption, or adopting some other comprehensive strategies. Consumers with higher risk perception are more inclined to adopt coping behaviors to avoid food safety risks.

(3) Only when governments and enterprises formulate appropriate methods and measures for avoiding food safety risk aversion and effectively protecting consumers' rights and interests is it the key method to deal with the impact of food safety incidents. Despite some differences in the formulation of relevant measures in different regions, the fundamental interests of consumers should be effectively maintained, and then the consumer confidence can be restored, so as to promote the economic development. The research results have a positive effect on food safety risk perception.

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