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SYMMETRY AND ASYMMETRY MECHANISM OF DIFFERENT TRUST DIMENSIONS IN FOOD SAFETY MANAGEMENT AND THE CAUSES

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ABSTRACT
In recent years, the frequent occurrence of food safety issues has not only harmed the health of consumers, but also severely influenced the development of food industry; moreover, people begin to distrust food safety and government's relevant management. At present, food biotechnology (such as food additives, pesticides and genetically modified food) is the focus of people's attention as well as researches in terms of food safety. Therefore, we researched on the symmetry and asymmetry mechanism of different trust dimensions in food safety management. Through variance analysis, we concluded that in food safety management, relational trust is symmetrical, while calculative trust is asymmetrical; specifically, in the field of food additives and pesticides, relational trust is symmetrical, awareness of government's behavior and familiarity are asymmetrical; in the field of genetically modified food, relational trust and government's behavior and quality are symmetrical, awareness of government's behavior is asymmetrical.

1. Introduction

It is said that hunger breeds discontentment, while food safety comes first. As a global problem, food safety not only relates to our health and lives, but also concerns the operation of economy, government's credibility as well as our national image (Qijun, 2010). The management of food safety issues is closely connected with the construction of a harmonious society (Fischer Arnout et al., 2006).

According to Ge Wu's survey, it could be concluded that 86% of the interviewees considered inadequate government supervision as the cause of food safety problems. Patil's research indicated that government's regulatory measures and the implementation of relevant laws and policies could effectively enhance consumers' trust in food safety (Patil et al., 2005). In the view of Kathariou, trust of government had positive influence on food safety trust (Kathariou, 2002). Franz pointed out that market failure in trading and government's regulation failure led to the lack of trust in dairy (Franz et al., 2004). In addition, other researches also proved that government's regulation and information exchange affected the trust in quality standard (QS) certification of food enterprises (Wilcock et al., 2004); the trust in food safety system or management was an important part of food safety trust, corresponding to government behavior (Piggott and Marsh, 2004); government behavior significantly affected consumers' trust in food safety (Shan et al., 2015). At present, the public is relatively trustful to the government; the people with higher education level have less faith in scientists; and the people with higher

social status show more trust to government (Miraglia et al., 2009). The research conclusions above reveal that the improvement of trust in food safety management is significant to improving consumers' trust in food safety which can promote the development of food industry and the prosperity and stability of society. Therefore, we did a research on the trust in food safety management in order to improve people's trust in food safety and promote the economic development in food industry.

2. Materials and methods

2.1. Materials

Aiming at food additives, pesticide and genetically modified food, the measurement of trust in food safety includes eight aspects: moral, care, impartiality, openness, perceived ability, reliability, familiar and controllability. Considering that education level, professions, location and income level could affect people's perception of risk and trust in government, we conducted extra measurement based on these aspects.

2.2. Research Methods

In this study, we analyzed the symmetry and asymmetry of different trust dimensions in food safety management with empirical methods. Before the interviewees received the information, we measured their general trust in seven levels (from complete distrust to fully trust); afterwards, we measured the acceptance levels (also seven levels, from fully unacceptable to fully acceptable) of food additives, pesticide and genetically modified food; after the interviewees received relevant information, we measured their general trust again in seven levels (from complete distrust to fully trust). In addition, aiming at food additives, pesticides and genetically modified food, we measured the trust from the aspects of moral, care, impartiality, openness, perceived ability, reliability, familiar and controllability in seven levels (from completely disagree to completely agree).

In this study, SPSS 17.0 was applied in descriptive statistics analysis, t test, correlation analysis and variance analysis.

3. Results and Discussions

3.1. Effects on Overall Trust Evaluation

Table 1 lists the effects of information potency and specificity on some overall trust evaluation— general trust after receiving information; overall trust; trust of food additives, pesticides and genetically modified food. Information potency has significant impact on overall trust ($F(1, 168) = 4.408$, $p < 0.05$, $\eta^2 = 0.026$) and the trust in food additives ($F(1, 168) = 3.956$, $p < 0.05$, $\eta^2 = 0.023$), pesticide trust ($F(1, 168) = 4.730$, $p < 0.05$, $\eta^2 = 0.027$) and genetically modified food ($F(1, 168) = 3.614$, $p = 0.059$, $\eta^2 = 0.021$) except on the general trust ($F = 0.985$, $p > 0.05$) after receiving information. Specifically, the degree of negative information to reduce overall trust is higher than the degree of positive information to improve overall trust, which means people are more likely to believe negative information ($M = 4.15$) rather than positive information ($M = 3.77$). Similarly, in terms of the trust in food additives, pesticides and genetically modified food, the average values of trust in negative information are respectively 4.19, 4.23 and 4.03; and the average values of trust in positive information are respectively 3.82, 3.82 and 3.67. Thus we can conclude that the trust in food additives, pesticides and genetically modified food and the overall trust are asymmetrical.

Table 1. The effects of information potency and specificity on overall trust

		SS	df	MS	F	p	η^2
General trust after receiving information	Information potency	0.032	1	3.032	0.986	0.321	0.07
	Information specificity	1.257	1	1.257	0.407	0.523	0.03
	Potency×specificity	1.761	1	1.761	0.573	0.452	0.04

	Error	517.198	167	3.078			
Overall trust	Information potency	6.022	1	6.022	4.407*	0.038	0.027
	Information specificity	2.901	1	2.901	2.123	0.148	0.013
	Potency×specificity	0.777	1	0.777	0.568	0.453	0.004
	Error	229.477	167	1.367			
The trust of food additives	Information potency	5.713	1	5.713	3.957	0.047	0.024
	Information specificity	3.244	1	3.244	2.247	0.137	0.012
	Potency×specificity	0.762	1	0.762	0.528	0.468	0.004
	Error	242.556	167	1.445			
The trust of pesticides	Information potency	7.003	1	7.003	4.731*	0.032	0.028
	Information specificity	3.235	1	3.235	2.186	0.142	0.014
	Potency×specificity	0.157	1	0.157	0.104	0.748	0.002
	Error	248.683	167	1.481			
The trust of genetically modified food	Information potency	5.407	1	5.407	3.615	0.058	0.022
	Information specificity	2.284	1	2.284	1.528	0.217	0.008
	Potency×specificity	1.902	1	1.902	1.272	0.262	0.007
	Error	251.278	167	1.495			

* Refers to $p < 0.05$.

In addition, after the information is received, information specificity has no significant effect on the general trust ($F = 0.408$, $p > 0.05$), overall trust ($F = 2.124$, $p > 0.05$) and the trust in food additives ($F = 2.246$, $p > 0.05$), pesticides ($F = 2.185$, $p > 0.05$) and genetically modified food ($F = 1.527$, $p > 0.05$); interaction effects of information potency and specificity are not significant on general trust ($F = 0.572$, $p > 0.05$), overall trust ($F = 0.569$, $p > 0.05$), trust of food additives ($F = 0.527$, $p > 0.05$), trust of pesticides ($F= 0.105$, $p > 0.05$), trust of genetically modified food ($F = 0.127$, $p > 0.05$) .

In terms of overall trust (general trust, overall trust and trust of food additives, pesticides and genetically modified food) evaluation in food safety management, the results of variance analysis indicate that information potency has no significant effect on general trust after information is received, this might result from people's impression of food safety risks. Different from the risks of earthquake, flood and nuclear industry, food safety risks are not highly lethal (Law, 2012). At the same time, it can be concluded from this study that people trust food safety management to some degree (M = 4.55), which indicates that food safety risks are acceptable to some extent. As was mentioned, for the minor risks, trust is symmetrical (Li and Liu, 2007).

3.2. Effects on the Trust of Food Safety Management

Table 2 shows the effects of information potency and specificity on relational trust and calculational trust in food safety management. The results reveal that information potency has no significant effect on relational trust ($F = 0.421$, $p > 0.05$), and there is no evident difference between negative information to reduce relational trust and positive information to improve relational trust, which proves relational trust is symmetrical. However, information potency has significant effect on calculative trust ($F (1, 168) = 8.714$, $p < 0.01$, $\eta^2 = 0.049$), and the degree of negative information to reduce calculational trust is higher than the degree of positive trust to improve calculational trust. That is, in terms of the calculative trust, people are more likely to believe negative information (M = 3.98) rather than positive information (M = 3.42), which reveals that calculative trust is asymmetrical.

In addition, information specificity has no significant effect on relational trust ($F = 1.842$,

p > 0.05) or calculational trust (F = 1.741, p > 0.05); interaction effects of information potency and specificity with relational trust (F = 0.495, p > 0.05) and calculational trust (F = 0.466, p > 0.05) are not significant.

As for the trust in food safety management, the results of variance analysis show that information potency has no significant effect on relational trust, and there is no significant difference between positive trust improving relational trust and negative information reducing relational trust. Therefore, relational trust is symmetrical. However, information potency affects calculational trust significantly, and negative information reduces calculational trust more greatly than positive information improves calculational trust, which proves that calculational trust is asymmetrical. Here, relational trust reflects people's evaluation of government's quality. Without objective standards, the evaluation is mainly based on the mutual relationship (of consumers and government) and their shared values. As long as they have similar values (even if there is some deviation), the relational trust will not be reduced significantly. Calculational trust reflects people's evaluation of government's behavior and ability in food safety management with objective behavioral standards. Once government's management behavior is not in accordance with people's cognitive standards, calculational trust will decline sharply (Lin et al., 2010).

Table 2. The effects of information potency and specificity on the trust of food safety management

		SS	df	MS	F	p	η^2
Relational trust	Information potency	0.782	1	0.782	0.422	0.518	0.003
	Information specificity	3.428	1	3.428	1.843	0.178	0.012
	Potency × specificity	0.921	1	0.921	0.496	0.482	0.002
	Error	312.476	167	1.861			
Calculational trust	Information potency	12.778	1	12.778	8.715**	0.005	0.048
	Information specificity	2.552	1	2.552	1742	0.187	0.011
	Potency × specificity	0.683	1	0.683	0.467	0.495	0.004
	Error	246.334	167	1.467			

* Refers to $p < 0.05$; ** refers to $p < 0.01$.

3.3. Effects on Trust Dimensions of Food Additives

The effects of information potency and specificity on trust dimensions (relational trust, awareness of government's behavior and familiarity) in food additives are listed in table 3. According to the results, in terms of food additives, information potency has no significant effect on relational trust (F = 0.422, p > 0.05), and there is no evident difference between positive information improving relational trust and negative information reducing relational trust; therefore, relational trust is symmetrical. However, information potency affects the awareness of government's behavior (F (1, 168) = 3.882, p = 0.05, η^2 = 0.023) and familiarity (F (1, 168) = 11.009, p < 0.01, η^2 = 0.061) significantly, and the degree of negative information reducing awareness of government's behavior and familiarity is higher than the degree of positive information improving them, which means people are more likely to believe negative information (averages are M = 4.11 and M = 3.96) rather than positive information (averages are respectively M = 3.72 and M = 3.23). Therefore, it can be concluded that the awareness of government's behavior and familiarity are asymmetrical. Since calculational trust consists of the awareness of government's behavior and familiarity, it can be deduced that calculational trust is asymmetrical.

Table 3. Effects of information potency and specificity on trust dimensions of food additives

		SS	df	MS	F	p	η^2
Relational trust of genetically modified food	Information potency	0.957	1	0.957	0.423	0.518	0.002
	Information specificity	3.355	1	3.355	1.478	0.225	0.008
	Potency×specificity	0.446	1	0.446	0.198	0.656	0.002
	Error	380.898	167	2.268			
Awareness of government's behavior	Information potency	6.545	1	6.545	3.881*	0.04	0.022
	Information specificity	2.358	1	2.358	1.397	0.238	0.007
	Potency×specificity	1.596	1	1.596	0.948	0.333	0.005
	Error	283.248	167	1.685			
Government's behavior and quality	Information potency	22.155	1	22.155	11.008**	0.002	0.062
	Information specificity	6.432	1	6.432	3.195	0.075	0.018
	Potency×specificity	0.012	1	0.012	0.007	0.942	0.000
	Error	338.108	167	2.012	0.423	0.518	

* Refers to $p < 0.05$; ** refers to $p < 0.01$.

In addition, information specificity has no significant effect on relational trust (F = 1.479, p > 0.05), awareness of government's behavior (F = 1.398, p > 0.05) and familiarity (F = 3.196, p > 0.05), and there is no significant interaction effect of information potency and specificity with relational trust (F = 0.197, p > 0.05), awareness of government's behavior (F = 0.947, p > 0.05) and familiarity (F = 0.006, p > 0.05).

As for the three specific food safety issues, the results of variance analysis indicate that information potency has no significant effect on relational trust, and there is no significant difference between negative information reducing relational trust and positive information increasing relational trust, namely, relational trust is symmetrical. In addition, in the field of food additives and pesticides, information potency affects awareness of government's behavior and familiarity significantly, and negative information reduces them more greatly than positive information improves them, namely, awareness of government's behavior and familiarity are asymmetrical. Since calculational trust is composed of awareness of government's behavior and familiarity, we can deduce that the calculational trust is asymmetrical.

3.4. Effects on Trust Dimensions of Genetically Modified Food

Table 4 shows the effects of information potency and specificity on trust dimensions (relational trust, awareness of government's behavior, government's behavior and quality) in genetically modified food. The results reveal that in the field of genetically modified food, information potency has no significant effect on relational trust (F = 0.285, p > 0.05), and there is no significant difference between negative information reducing relational trust and positive information improving relational trust, which indicates relational trust is symmetrical. At the same time, information potency has no significant effect on government's behavior and quality (F= 0.044, p > 0.05) which prove to be symmetrical as well. However, the effects of information potency on awareness of government's behavior (F (1, 168) =9.678, p<0.01, η^2=0.054) are significant, and negative information reduces awareness of government's behavior more greatly than positive information improves the awareness. In brief, people are more likely to believe negative information (M= 3.86) rather than positive information (M= 3.24), this suggests that awareness of government's behavior is asymmetrical. Since awareness of government's behavior is part of calculational trust, to some degree, we can deduce that calculational trust is asymmetrical.

Table 4. Effects of information potency and specificity on trust dimensions of genetically modified food

		SS	df	MS	F	p	η^2
Relational trust of genetically modified food	Information potency	0.684	1	0.684	0.284	0.595	0.003
	Information specificity	5.508	1	5.508	2.287	0.131	0.012
	Potency×specificity	1.492	1	1.492	0.61	0.431	0.003
	Error	404.265	167	2.405			
Awareness of government's behavior	Information potency	15.93	1	15.93	9.679**	0.003	0.055
	Information specificity	1.08	1	1.08	0.663	0.416	0.003
	Potency×specificity	2.003	1	2.003	1.216	0.271	0.008
	Error	276.704	167	1.648			
Government's behavior and quality	Information potency	0.102	1	0.102	0.045	0.832	0
	Information specificity	1.537	1	1.537	0.677	0.413	0.003
	Potency×specificity	2.507	1	2.507	1.101	0.294	0.008
	Error	382.412	167	2.275			

* Refers to $p< 0.05$; ** refers to $p < 0.01$.

In addition, information specificity has no significant effects on relational trust ($F = 2.289$, $p > 0.05$), awareness of government's behavior ($F = 0.662$, $p > 0.05$) and government's behavior and quality ($F = 0.676$, $p > 0.05$); and there are no significant interaction effects of information potency and specificity with relational trust ($F = 0.620$, $p > 0.05$), awareness of government's behavior ($F = 1.217$, $p > 0.05$) and government's behavior and quality ($F = 1.102$, $p > 0.05$).

In the field of genetically modified food, information potency has significant influence on awareness of government's behavior, and negative information reduces it more greatly than positive information improves it, accordingly, awareness of government's behavior is asymmetrical. Since awareness of government's behavior is calculational trust, to some extent, we can deduce that calculational trust is asymmetrical.

3.5. Effects of Previous Attitudes on Symmetry and Asymmetry Mechanism of Trust

Table 5 lists the effects of previous attitudes (general trust and acceptance level before receiving information) on the asymmetry principle of food safety management. It can be observed that after the introduction of previous attitudes, information potency has greater impact on trust measurement. Before receiving the information, people have a low degree of general trust in food safety management and not ready to accept food biotechnology. Due to negative previous attitude, information potency has greater effect on the asymmetry of trust.

Table 5. Effects of previous attitudes on the asymmetry principle of food safety management

	SS	df	MS	F	p	η^2	Original η^2
Overall trust	7.141	1	7.145	6.115	0.015	0.034	0.025
Trust of food additives	7.031	1	7.031	5.677	0.019	0.032	0.024
Trust of pesticides	7.962	1	7.962	6.077	0.014	0.034	0.026
Trust of genetically modified food	6.475	1	6.475	5.078	0.025	0.028	0.022
Calculational trust	14.112	1	14.112	11.127	0.002	0.061	0.048
Food additive 1,	8.375	1	8.373	5.595	0.018	0.031	0.024
Food additive 2	21.821	1	21.821	11.612	0.002	0.064	0.062

Pesticide 1,	8.647	1	8.647	5.358	0.021	0.031	0.027
Pesticide 2,	26.582	1	26.582	16.636	0.000	0.08	0.07
Genetically modified food	17.348	1	17.348	12.584	0.002	0.04	0.053

Note: food additive 1 and 2 respectively refer to the awareness of government's behavior and familiarity in terms of food additives; pesticide 1 and 2 respectively refer to the awareness of government's behavior and familiarity in terms of pesticides; genetically modified food refers to the awareness of government's behavior in terms of genetically modified food.

To sum up, information specificity has no significant effect on all kinds of trust measurements in food safety management. As for overall trust evaluation, information potency has no significant influence on general trust after the information is received, while overall trust and the trust of food additives, genetically modified food and pesticides are asymmetrical and significantly affected. The fact that information potency has no significant effect on relational trust indicates relational trust is elastic and symmetrical; calculational trust is affected significantly and the degree of negative information reducing calculational trust is higher than positive information improving calculational trust, accordingly, calculational trust is asymmetrical. In terms of the three food safety issues, calculational trust is symmetrical. In the field of food additives and pesticides, awareness of government's behavior and familiarity are asymmetrical; in the field of genetically modified food, awareness of government's behavior is asymmetrical, while government's behavior and quality are symmetrical.

3.6.Suggestions for Food Safety Management

Government and managers are expected to formulate and implement corresponding policies so as to maintain and enhance the trust of food safety management as well as the acceptance of food biotechnology. It is also suggested that government should include public expectations in food safety management with righteous attitude to consider multiple opinions, which will improve people's evaluation of government's morality, care and justice (Tompkin, 2001). In addition, more attention should be paid to high-income people's attitudes and suggestions in food safety management.

Government and managers can improve the trust of food safety management by enhancing people's acceptance of food safety issues. In order to improve people's trust in food safety management, the government should constantly strengthen their ability and food safety control; furthermore, they are supposed to improve people's familiarity and reliability evaluation of government's decision content and decision process; at the same time, they need to avoid the generation or deterioration of food safety issues (Liu et al., 2010). What's more, it's also important for government to improve their quality (such as sense of responsibility and integrity) and make a good impression on the public so as to earn better evaluation of relational trust.

4. Conclusions

In this study, we researched on the trust in food safety management, specifically in food additives, pesticides and genetically modified food. The results reveal that the trust in food safety management includes two dimensions: relational trust and calculational trust. The trust of food additives and pesticides both include relational trust, awareness of government's behavior and familiarity; the trust of genetically modified food include relational trust, awareness and quality of government's behavior. In subsequent study, we should expand the types of food safety risks: on the one hand, we can seek the general trust structure in food safety management; on the other hand, we can explore different trust structure of food safety.

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