

Research on Risk Behavior Choice of Food Supply Chain Enterprises

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Received: 11 August 2019; Accepted: 02 September 2019

Citation: Haishui Jin, Yongsheng Liu. Research on Risk Behavior Choice of Food Supply Chain Enterprises. Food Sci Nutr Res. 2019; 2(3): 1-7.

ABSTRACT

Food supply chain risk behavior refers to all the behaviors of enterprises or enterprise employees who violate the regulations or operate in order to maximize their own profits under certain social and economic conditions, thus leading to the safety risks of food supply chain. It includes food supply chain enterprise risk behavior and food supply chain enterprise employee risk behavior. There are two main factors affecting the risk behavior of food supply chain: subjective factors and institutional factors. This paper constructs a risk behavior selection model for food supply chain enterprises from the perspective of cost-effectiveness and analyzes it. The research results show that in order to reduce or even avoid the risk behavior of food supply chain enterprises, the government should increase the punishment for food supply chain enterprises to produce by risk behavior, and maximize the production and operation behavior of food supply chain enterprises.

Keywords

Food supply chain, Enterprise risk behavior, Risk behavior choice.

Introduction

In recent years, China has introduced a series of food safety laws and regulations, strengthened the supervision of food safety, and consumers' awareness of safety has also increased, but food safety incidents still occur frequently. Food supply chain security risks have become the focus of attention of the whole society. The food supply chain safety risk is a risk factor that jeopardizes the normal operation of the entire supply chain due to the hazard of the appearance and intrinsic quality of the food. Food safety in the food supply chain involves all aspects of the food supply chain and the transmission and superposition of food safety risks in the supply chain and is linked to various internal and external factors in the supply chain. Exploring the causes of food supply chain security risks and then proposing corresponding countermeasures has become an important issue in academia and industry.

The end consumers in the food supply chain are in an information disadvantage. Once a food safety incident occurs, consumers cannot identify the truth of the incident and thus have a sense of distrust of the entire industry. According to the 2012 Food Safety Confidence Index Research Report published by China Zero Research Consulting Group, 84.8% of consumers believe that food

companies have the most responsibility, and 80.8% of consumers believe that government departments have the most responsibility. Industry associations, media, and consumers are also considered to have certain responsibilities, but the proportion is relatively small, 17.7%, 10.9%, and 5.2%, respectively. It can be seen that the responsibility of China's food supply chain security risks lies mainly in enterprises and governments.

Overview of Food Supply Chain Security Risk Research

Given the importance of food safety and the complexity of food supply chain security risks, academia and government regulators have conducted extensive research on the main links, influencing factors, and prevention and control of food supply chain safety risks. Studies have shown that food supply chain safety risks are mainly generated in food processing, planting and breeding, and processing preparation. The sources of risk of food production enterprises can be divided into internal factors and external factors, among which external factors involve important supply chain links such as procurement and circulation. In addition, factors in the structure of the supply chain, such as the degree of cooperation and vertical integration, complexity and contract model, as well as institutional factors such as laws and regulations, industry regulation and self-discipline, corporate governance and internal control are also important food supply chain security risk factors. Effective prevention of food supply chain safety risks

should be achieved through the establishment of a prevention and control mechanism coordinated by the government, industry self-discipline, and social supervision.

Most of the existing literatures are aimed at the food supply chain structure, and analyze the factors that cause safety risks in the food supply chain from the system, management and technology levels, and propose corresponding countermeasures. It is rare to combine the research results of psychology and sociology with the research on the causes of food supply chain security risks from the perspective of behavior. Hirschauer et al. used behavioral analysis theories and methods in economics to analyze violations in the food supply chain. They believed that multi-objective and opportunistic behaviors were the motives of food producers for deliberate violations of food safety rules. Yongsheng Liu et al. used the relevant theory of behavioral economics to conduct a normative analysis of the micro-mechanism of food supply chain security risk formation. From the actual situation, most of China's major food safety incidents are caused by human factors, not technical factors. Therefore, it is necessary to study the relationship between the safety risk perception of food supply chain enterprises and the formation of food supply chain security risks, and then propose prevention and control measures for food supply chain safety risks. This is meaningful for all stakeholders in the supply chain to strengthen food supply chain safety risk management and improve the overall food supply chain safety level.

Risk behavior in the food supply chain

The occurrence of food supply chain risks is largely due to the lack of professional ethics and loss of social conscience in enterprises such as food production and supply, processing and manufacturing, and circulation. In order to facilitate the research, we define the food supply chain enterprise or enterprise employees to operate in violation of laws and regulations in order to maximize their own profits under certain socio-economic and technological conditions, thus causing all the behaviors of food supply chain risks to be food supply chain risk behaviors. According to the different risk actors, the food supply chain risk behavior can be divided into two categories: food supply chain enterprise risk behavior and food supply chain enterprise employee risk behavior.

Food supply chain enterprise risk behavior

According to the theory of behavioral science, an organization's values influence its current and future behaviors, work attitudes, and ethical standards of behavior. In the real society, enterprises often hold economic values, that is, focus on effective benefits, emphasize utilitarianism, and pursue economic interests. In pursuit of the goal of maximizing profit, food supply chain enterprises tend to pay attention to factors such as cost and profit in the production and operation process, while ignoring various factors affecting food safety, only paying attention to economic benefits and neglecting food safety. This will lead to the occurrence of risky behavior. The risk behavior of food supply chain enterprises is mainly reflected in the following three aspects:

- **Lack of strategy:** At the strategic level, food supply chain companies have not raised the risk management of food

supply chain to the strategic level of enterprises, lacking a sound internal risk management system and food supply chain risk emergency management plan. These companies do not specifically set up food safety risk management departments in the organization, which relaxes the risk management of food supply chain and the education of food safety risks. Even enterprise managers acquiesce to employees illegally doping harmful substances or using additives.

- **Tactical slack:** At the tactical level, food supply chain companies are overly dependent on one or a few food material suppliers, and the inspection of raw materials is not strict. These companies did not regard personal morality, responsibility and past bad behavior as important selection indicators in employee recruitment. Enterprises have insufficient investment in food safety and cannot conduct food safety risk management training as planned.
- **Weak operation:** At the operational level, food supply chain enterprises purchase unqualified raw materials, procurement of additives is not strict, the awareness of obtaining quality certificates is weak, and raw materials are improperly disposed. There are unreasonable or illegal operation in the production process, the sanitary condition is not up to standard, the work environment is safe and comfortable, and the employee's work intensity is high. The storage method and detection method before the product is sold improperly.

Food supply chain enterprise employee risk behavior

According to the psychological point of view, human behavior is very complicated, not only restricted by consciousness and emotion, but also by objective environment, physiological mechanism, social factors and so on. The risky behavior of illegally doping harmful substances or using additives involves the individual's professional ethics, depending on the level of personal responsibility and corporate responsibility. Therefore, every employee in a food supply chain enterprise may make certain risk behaviors that directly or indirectly lead to food supply chain risk accidents. The risk behaviors of employees in the food supply chain are mainly reflected in the following four aspects:

- **Work condition is sloppy:** At the working level, employees lack work enthusiasm, lack of concentration, and sometimes lead to work failures.
- **Responsibility is not strong:** At the level of job responsibility, employees' work is insufficient, sloppy, organizational discipline is poor; lack of team spirit; cleaning of food production and processing equipment is not complete.
- **Lack of skills:** At the level of work skills, the food technology standards and standards system of food supply chain enterprises are insufficiently enforced, and violations or operational errors occur sometimes.
- **Moral deficiency:** At the professional ethics level, employees abuse additives and even illegally use chemical additives and hazardous substances. Their own health and sanitation is not up to standard. In the dry powder product area, employees do not wear protective clothing such as jumpsuits, gloves, hair nets, etc., and do not regularly clean labor protection supplies as required.

Factors affecting the risk behavior of food supply chain

Because the food supply chain risk behavior is essentially an illegal and illegal operation in the process of pursuing the maximization of its own income, the influencing factors can be mainly attributed to the main factor and the institutional factor.

The subjective factors of risk behavior in food supply chain

From a stakeholder perspective, the main players involved in food supply chain risk behavior are food supply chain companies, food supply chain employees, consumers, and government regulators. Each type of economic entity has its own interests and the tendency of demand preference. Therefore, in economic activities, the behavior of these subjects may deviate from social norms due to excessive pursuit of their own interests. Or because of misunderstanding of other subjects, the economic entity's oversight of its own misconduct leads to the occurrence of risk behavior in the food supply chain. Specifically, the subjective factors that influence the risk behavior of the food supply chain include:

Expected goal

Each type of economic entity has its own specific expectations when engaged in economic activities. The "economic man" hypothesis theory believes that the subject pursues the maximization of self-interest or the maximization of utility in economic activities, while the altruistic theory believes that the subject can satisfy his own utility through the altruism of the behavior. When analyzing the risk behavior of food supply chain, we do not consider altruistic behavior, only consider self-interested behavior. This is because under the condition that there is no constraint, the subject's self-interested behavior may be transformed into the risk behavior of the food supply chain.

Currently, the goal of food supply chain companies and their employees is to obtain as much economic benefits as possible from food production and management activities. Driven by the pursuit of economic interests, food supply chain companies and their employees have the impulse to reduce costs. When they think that the illegality is not perceived or the penalty cost after the incident is low, there may be illegal acts such as counterfeiting, shoddy, cutting corners, and abusing additives. These illegal acts may develop into food supply chain risk behaviors.

Most consumers are pursuing the maximization of consumer utility in the process of food consumption. Therefore, when the information of the search product, the experience product, and the trust property attribute of the food cannot be effectively transmitted, the consumer is more willing to purchase the specific food at a lower price if the food quality is considered to be equivalent. Even in the face of foods with artificial, known, and real problems, consumers will still buy if they don't know the actual situation. This consumer's pursuit of maximizing utility provides a soil for the breeding of risk behaviors in the food supply chain when food safety information is difficult to trace effectively and government departments fail to punish the perpetrators.

Similarly, the government has its own interests. The supervision of food supply chain risk behavior involves the administrative department of industry and commerce, the food and drug supervision and management department, the health management department, and the food inspection and quarantine department. Under the premise that all departments can seriously perform their duties, each department has different interests. Regulatory capture theory believes that regulatory agencies can be gradually captured by controlled objects through means and methods of transporting benefits. This means that government departments are likely to be captured. Therefore, in reality, the government's investment in food supply chain risk behavior supervision is often stretched. Even in the face of the exposed food supply chain risk behaviors, individual local governments want to take the approach of dealing with small things and small things.

Preference tendency

Economic subjects have many preferences, and different preferences have different tendencies, and different subjects have different preferences. However, subject preferences have the potential to be used by other subjects. In the field of food supply chain, this situation is ubiquitous and contributes to the risk behavior of food supply chain to a certain extent.

Food supply chain companies use local governments to develop local economies, increase employment and fiscal revenue preferences, and there is an impulse to make companies larger. Once a food supply chain risk event occurs, local governments tend to have partiality behaviors due to the contribution of large-scale enterprises, that is, they do not treat or symbolically deal with enterprises. This has contributed to the occurrence of risk behavior in the food supply chain to a certain extent.

In the face of foods with insufficient disclosure of quality information, consumers often consider factors such as food price and appearance, and less consider whether food is harmful to health. According to this preference, food supply chain companies provide price-competitive foods to the market on the one hand, and improve the appearance of foods on the other hand to strengthen the search characteristics of foods and increase the market share of enterprises. Food supply chain companies lacking sufficient attention to food quality and safety issues that cause harm to consumers, lead to frequent occurrences of known food supply chain risk behaviors.

Behavioral motivation

Motivation triggers behavior. The risk behavior of food supply chain is inseparable from the behavioral motives of all subjects in the market. From the perspective of consumer motivation, frequent food safety incidents are also closely related to the limited spending power of most consumers. Consumers have the lowest hard demand for food consumption. Due to the pressure of spending, consumers are bound to search for relatively low-priced foods from the market. Although low-priced foods are not the same as unsafe foods, there are always some reasons for the low price of food, and the reasons are mostly related to lower product quality.

The motivation for consumers to buy low-priced foods provides an opportunity for food supply chain risk behavior.

There are many related companies in the food supply chain, and these companies and their employees have their own performance expectations when they are engaged in food production and management activities. Under the ideal goal path, there is a strong positive correlation between food supply chain companies and their employees' compliance and dedication, and their performance. Only relying on scientific and technological progress, scientific management, and a good quality assurance system can the food supply chain enterprises have greater and better development. However, factors such as regulatory oversight and institutional failure have caused some counterfeit and shoddy food supply chain enterprises in the market not only to be punished as they should, but to become more popular and profitable, leading to the phenomenon of bad money expelling good money. The emergence of these problems will undoubtedly contribute to the risk behavior of the food supply chain.

The government is the main body of economic activity with power needs, achievement needs and vesting needs, so its market supervision motivation is not unique. The government can reflect its power needs in fulfilling its supervisory duties, but such power needs to be accompanied by a regulatory act that may evoke normal social functioning, or a regulatory act that may cause social dysfunction. When the government prefers economic interests and the interests of its own departments, the government may disregard the needs of the people. At the same time, the government can meet its success needs by pursuing higher economic indicators, but the satisfaction of its power needs may lead to the supervision of social dysfunction. In this case, even if food safety regulation is in a high-pressure situation, food supply chain risk behavior will still occur frequently.

Institutional factors of risk behavior in food supply chain

The institutional factors affecting the risk behavior of the food supply chain are mainly the regulatory system, the structural environment, and the food safety cultural environment.

Regulatory system

In a certain sense, the imperfect food regulatory system in China is the source of all food safety problems. First of all, the institutional arrangement of multi-party supervision in China gives the relevant institutions food safety supervision rights. However, due to the lack of necessary communication and restraint mechanisms, the respective political phenomena are more common, which can easily lead to the regulatory chaos of "favorable management, no profit, no one to ask". Secondly, most of China's current food safety regulations were formulated in the 1980s and 1990s, which is not consistent with the actual situation, so the implementation effect and intensity of food safety regulations are not satisfactory. Third, the penalties for violations of laws and regulations are still relatively light, and deterrence needs to be strengthened. Take the new Food Safety Law as an example. Although the law clarifies that food supply chain enterprises that produce food that does not

meet food safety standards or that distribute foods that do not meet food safety standards cause damage to consumers' interests, not only need to pay losses to consumers, but also pay corresponding compensation. However, the maximum amount of such punitive damages is only ten times of the price of food or three times of the loss of consumers, which is significantly lower. All of this may indirectly contribute to the risk behavior of the food supply chain.

Structural environment

The structural environment affecting the risk behavior of food supply chain mainly involves food supply chain structure, supply chain enterprise organizational structure, and supply chain enterprise ownership structure. The more complex the food supply chain structure, the longer the chain, and the more complex the member companies, the more difficult it is to control the risk behavior of supply chain companies. When food safety issues are difficult to find out, the food supply chain companies and their employees are more likely to risk behavior. The organizational structure of a supply chain enterprise is a system of division of labor and coordination for achieving the goals of a supply chain enterprise. Whether the food supply chain has a clear division of labor, its own functions, and smooth communication structure will directly affect the success or failure of risk management. The division of labor is not clear, the overlapping of responsibilities, and the organizational structure of management chaos will inevitably open the door to the risk behavior of food supply chain enterprises. There are various forms of ownership structure in the supply chain, such as the ownership structure of the state or the country as the main investor, the ownership structure of the legal person or the legal person investor, and the ownership structure of the individual or the individual investor. Relevant theoretical research and empirical analysis show that enterprises with different ownership structures have different stakeholder orientations, so the influence of different supply chain enterprise ownership structures on supply chain risk behaviors is completely different.

Food safety culture environment

Corporate culture involves factors such as corporate structure, corporate habits, employee beliefs and values, and behavioral norms. Any enterprise and its employees are in a certain corporate culture environment, so the behavior of food supply chain enterprises and their employees is inevitably affected and restricted by the food safety culture environment of the enterprises. With the rapid development of social economy, the social and cultural environment is constantly optimized, and the awareness of corporate food safety culture is constantly strengthening, but enterprises or individuals pursuing value by individualism, money worship, and opportunism are still prevalent. In particular, in a period of time, the society has experienced the trend of "the honesty loses, the untrustworthy profit", "the offender gains, and the compliance loses", which to some extent weakens the "good faith" Chinese business tradition. Although the whole society hates the act of dishonesty and has the confidence to solve the problem of the lack of integrity in society, it requires a process that can only be solved step by step. We can foresee that in the coming period, the problem of lack of integrity will continue to exist,

and the food safety culture environment of enterprises needs to be gradually purified. Therefore, the risk behavior of food supply chain is difficult to eradicate in the short term.

Food Supply Chain Enterprise Risk Behavior Choice

The risk behavior of food supply chain enterprises is also the speculative behavior of food supply chain enterprises to reduce food quality and safety. That is, food supply chain enterprises may adopt some misconduct and violations, and obtain additional benefits by lowering food quality and safety standards. The main criterion for the implementation of risk behavior in food supply chain enterprises is whether the behavior can bring benefits to enterprises. The profit of the food supply chain enterprise is mainly realized by the difference between the price of the product purchased by the consumer and the production cost of the product. Therefore, the difference between the price and the cost is a direct influencing factor for whether the food supply chain enterprise implements the risk behavior. In order to improve food safety, food supply chain companies need to increase investment in food safety, conduct personnel training, and regulate production operations, which will increase the production costs of enterprises. On the contrary, if the food supply chain enterprises do not increase the input of food safety guarantees, or even adopt risk-based behaviors for food production, the production cost of food will be lower, but the risk of government fines may be borne by this. In this case, if the cost increase brought by the government's risk of confiscation is not enough to offset the low-quality food production costs, the company will still make a profit.

In the following, in order to deeply analyze the risk behavior choice of food supply chain enterprises, this study will construct a risk behavior selection model for food supply chain enterprises from the perspective of cost-benefit. The model uses food prices, corporate capital strength (represented by total assets), coefficient of productivity variation, food safety investment, and government food safety penalties as the main variables in food supply chain companies' choice of whether to produce food in a risk-based or regulated manner.

Basic assumption

The food market in which food supply chain companies are located is a non-competitive, non-monopoly, non-oligarchic market with a demand for a certain food, and the food produced by the food supply chain can be sold at an appropriate price. The price of the food under the standardized production mode is P_1 , and the price of the food under the risk behavior production mode is P_2 ; The production materials market is a completely competitive market, in which the labor wage is w , the capital cost rate i ; The total assets of the food supply chain enterprises are A , of which food safety investment is I_{fs} ; Food supply chain companies use labor L and capital K for production and operation activities; When changing from a regulated production mode to a risk behavior production mode, the coefficient of change in productivity is T (Since the unit output of food under the standardized production mode is usually lower than the unit output of the risk behavior production method, it is set $T > 1$); Food supply chain enterprises aim at maximizing

profits, which F_1 , F_2 respectively represent the profits that food supply chain enterprises can obtain under standardized production methods and risk behavior production methods. P_1 indicates the market price of food when the food supply chain enterprise chooses to regulate the production mode and produce the food critical point. P_2^* indicates the market price of food when food supply chain companies choose risk behaviors to produce food critical points. F^* indicates the profit at the critical point when the risk behavior mode produces the unit product.

The production function of the food supply chain enterprise during the standardized production operation is the Douglas scale constant production function: $Q = L^\alpha K^{1-\alpha}$; When production is conducted in a risk-behavior manner, the production function is adjusted to: $Q = TL^\alpha K^{1-\alpha}$. The government's fines for the food supply chain companies to produce food in a risk-based manner are τ ; At the same time, suppose that the government's fines for food supply chain enterprises to produce food in a risk-based manner can be greater than, equal to or less than the food safety investment of food supply chain enterprises, which is $0 \leq \tau \leq I_{fs}$ or $0 \leq I_{fs} \leq \tau$. (For research convenience, it is assumed that the food safety investment of the food supply chain enterprises under the risk behavior mode is 0).

$$Q = L^\alpha K^{1-\alpha} \quad (1)$$

$$\text{Max} F_1 = QP_1 - (Lw + Ki + I_{fs}) \quad (2)$$

$$\text{s.t.}: Lw + Ki + I_{fs} \leq A \quad (3)$$

When food supply chain companies produce in a risk-based manner:

$$Q = TL^\alpha K^{1-\alpha} \quad (4)$$

$$\text{Max} F_2 = QP_2 - (Lw + Ki + \tau) \quad (5)$$

$$\text{s.t.}: Lw + Ki + \tau \leq A \quad (6)$$

When $F_2 > F_1$, food supply chain companies choose to produce food in a risk-based manner.

Model solving

When the food supply chain enterprise conducts the standard production operation, it is solved by formula (1), formula (2), and formula (3):

$$\begin{aligned} F_1^* &= \left[\frac{\alpha(A - I_{fs})}{w} \right]^\alpha \left[\frac{(1 - \alpha)(A - I_{fs})}{i} \right]^{1-\alpha} P_1 - \left[\frac{\alpha(A - I_{fs})}{w} \right] w - \left[\frac{(1 - \alpha)(A - I_{fs})}{i} \right] i - I_{fs} \\ &= (A - I_{fs}) \left[\frac{1 - \alpha}{i} \right]^{1-\alpha} \left[\frac{\alpha}{w} \right]^\alpha P_1 - A \end{aligned} \quad (7)$$

When food supply chain enterprises produce by risk behavior, they are solved by formula (4), formula (5) and formula (6):

$$F_2^* = T(A - \tau) \left[\frac{1 - \alpha}{i} \right]^{1-\alpha} \left[\frac{\alpha}{w} \right]^\alpha P_2 - A \quad (8)$$

When a food supply chain company chooses a risk behavior to produce food, ie $F_2^* \geq F_1^*$:

$$T(A - \tau) \left[\frac{1 - \alpha}{i} \right]^{1-\alpha} \left[\frac{\alpha}{w} \right]^\alpha P_2 - A \geq (A - I_{fs}) \left[\frac{1 - \alpha}{i} \right]^{1-\alpha} \left[\frac{\alpha}{w} \right]^\alpha P_1 - A \quad (9)$$

Simplify the formula (9):

$$P_2 \geq \frac{1}{T(A-\tau)(A-I_f)} P_1 \quad (10)$$

When the equal sign is established, it is the critical point for the profit optimal conditions on which the food supply chain enterprises choose whether to produce food in a risk-based manner.

$$\frac{P_2^*}{P_1^*} = \frac{1}{T(A-\tau)(A-I_f)} = \frac{1}{T(1-(\tau-I_f)(A-I_f))} \quad (11)$$

$$F^* = \left(\frac{1}{T(1-(\tau-I_f)(A-I_f))} - 1 \right) P_1^* \quad (12)$$

Take the logarithm of the two sides of the formula (11), you can get:

$$\begin{aligned} \Delta P &= \ln\left(\frac{P_2}{P_1}\right) = \ln(P_2) - \ln(P_1) = \ln\left(\frac{1}{T(1-(\tau-I_f)(A-I_f))}\right) \\ &= \ln\left(\frac{1}{T}\right) + \ln\left(\frac{1}{1-(\tau-I_f)(A-I_f)}\right) \end{aligned} \quad (13)$$

Model analysis

According to formulas (11) and (13), the conditions for food supply chain enterprises to choose to produce food by risk behavior are: the price ratio (P_2/P_1) of food produced by risk behavior and by standardized production is at least equal to the time of the productivity change impact value ($1/T$) and the penalty ($1/(1-(\tau-I_f)(A-I_f))$) for the production of food by the risk behavior. At the same time, the food price change ($\Delta P = \ln(P_2) - \ln(P_1)$) is decomposed into the effect of the production efficiency change ($\ln(1/T)$) and the risk behavior of the food production penalty ($\ln(1/(1-(\tau-I_f)(A-I_f)))$).

When producing food in a risk-based manner, food supply chain companies can get better returns by selling more food because of productivity gains. As the total assets (A) of the food supply chain companies increase, the food safety guarantees (I_f) decrease, and the government increases the penalty for the risk behavior of the food supply chain companies, the critical point (P_2) for the food supply chain enterprises choosing producing food by risk behavior will be improved. Food supply chain companies will only choose to produce food in a risk-based manner if they have access to a greater profit incentive (F^*). If the government increases the penalty (τ) for the risk behavior of food supply chain companies to $A - (A - I_f)/T$, ie, $F^* = 0$, the food supply chain enterprises will produce food without risk of additional profit, which will inhibit the occurrence of risk behavior.

Conclusion

The factor of productivity change ($\ln(1/T)$) affecting the decision-making of risk behavior of food supply chain enterprises is the coefficient of change of productivity (T). The greater the coefficient of change of productivity (T) of food production by risk behavior (the higher the unit yield of food), the lower the price incentive is needed to encourage food supply chain companies to make risk-

making behaviors in the production of food decisions.

The factors affecting the penalty effect of producing food by risk behavior include three aspects: one is the scale of the food supply chain enterprise; the other is the size of the food safety guarantee input; and the third is the government's penalty level for the production of food by risk behavior. For food supply chain companies, the size of their size is an important factor affecting their decision-making in risk-based behavior. The larger the scale of food supply chain enterprises, the smaller the investment in food safety guarantees, and the higher the level of government's penalty for the production of risk behaviors, the more the food supply chain enterprises lack the impulse to produce food by risk behavior. Therefore, in order to reduce or even avoid the risk behavior of food supply chain enterprises, and thus effectively prevent and control food supply chain risks, the government should increase the penalties for the production of risk behaviors in food supply chain enterprises.

The total effect of factors affecting the risk behavior decision-making of food supply chain enterprises is composed of the effect of fluctuations in production efficiency and the penalty effect of producing foods with risk behaviors. Among them, the effect of production efficiency change is the main component of the total effect of factors, and it is an important factor affecting the profit of enterprises when producing food by risk behavior. It is also the key point for inducing food supply chain enterprises to carry out irregular production and illegal operation.

The ultimate goal of the construction of the food supply chain risk prevention and control system should be to optimize the production and operation behavior of food supply chain enterprises at the micro level. Only by clarifying the key factors affecting the risk behavior of food supply chain enterprises, and implementing effective and complementary policy combinations, can we finally build a effective safety barrier to prevent and control food supply chain risks.

Acknowledgment

This paper is one of products of the research "Study on the economics of food quality information traceability and its control mechanism" supported by the 2016 Beijing Social Science Fund Project (No. 10GLB022).

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