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# Information Transmission Mechanisms and Public Trust Construction in Food Safety from the Perspective of Risk Communication

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**ABSTRACT:** Food safety constitutes a critical component of both national governance and social trust. In the digital era, the rapid spread of risk information and frequent food safety incidents have amplified public anxiety and eroded institutional credibility. Drawing on risk communication theory, this paper conducts a qualitative synthesis of 19 representative studies to examine the mechanisms of food safety information dissemination and the construction of public trust. The study identifies four interrelated mechanisms shaping trust formation: information transparency, which provides institutional credibility; interactive communication, which maintains dynamic feedback; emotional regulation, which enables psychological repair during crises; and digital empowerment, which enhances systemic trust through technological innovation. By analyzing multi-actor collaboration among governments, enterprises, media, and the public, the paper reveals that China's food safety governance is shifting from single-centered regulation toward a multi-stakeholder communication ecology. It further argues that digital technologies such as blockchain and artificial intelligence can improve traceability and regulatory precision but may also exacerbate information asymmetry and emotional polarization if misused. The study concludes that sustainable trust reconstruction in food safety governance requires an integrated approach that aligns institutional transparency, emotional governance, and technological accountability, thereby forming a resilient loop of risk communication – public trust – collaborative governance.

**KEYWORDS:** Food safety governance; Risk communication; Information transparency; Public trust; Digital empowerment; Emotional regulation; Collaborative governance

## I. INTRODUCTION

Food safety constitutes a crucial component of both the national governance system and the broader framework of social trust. With the increasing complexity of social structures and the rapid development of digital communication technologies, the speed and scope of information dissemination regarding food safety incidents have expanded dramatically. In recent years, frequent incidents—from the “pit-pickled vegetables” scandal to the controversies surrounding the regulation of pre-prepared foods—have triggered crises of public confidence in governmental supervision, corporate integrity, and media credibility. The openness and uncertainty inherent in information dissemination often lead to the emotionalization of risk information, forming a chain reaction of “affective amplification – rational attenuation – erosion of trust.”

The essence of food safety risk governance lies not in the complete elimination of risks, but rather in the scientific communication of risks. The theory of *Risk Communication* emphasizes that the effective sharing of information and interactive feedback among governments, enterprises, the media, and the public can establish a virtuous cycle of risk cognition, behavioral adjustment, and trust construction. However, China's current mechanisms for food safety information dissemination still suffer from fragmentation, information asymmetry, and insufficient multi-actor coordination, which frequently result in public anxiety and distrust when faced with risk-related information.

Against this background, this study adopts a *risk communication perspective* to systematically review domestic and international research on the mechanisms of food safety information dissemination and the construction of public trust. Special attention is paid to the logic of communication and the reconstruction of trust within the context of digitalization and social media. Methodologically, this paper employs a qualitative and synthesis-based approach,

aiming to develop an analytical framework encompassing *information dissemination mechanisms, actor interaction, and trust generation*. The ultimate goal is to provide theoretical support and practical implications for achieving collaborative governance in food safety.

## II. THEORETICAL FOUNDATION AND LITERATURE REVIEW

### 2.1 The Logical Origin of Risk Communication Theory

As a critical component of public risk management, risk communication emphasizes the transmission of scientific information and the establishment of public trust through multi-actor interaction and dialogue.

According to Reference [1], China's current institutional structure for food safety risk communication is characterized by both integration and fragmentation. Government agencies dominate the institutional construction process, while social organizations and public participation remain relatively weak—forming a “centralized yet marginal” communication pattern.

In contrast, developed regions such as the European Union have established pluralistic co-governance systems centered on scientific assessment, independent supervision, and public engagement [2]. Their information exchange channels are more transparent, institutionalized, and conducive to forming a balanced relationship between authority and inclusiveness. Such experiences provide valuable references for optimizing China's food safety risk communication system.

### 2.2 The Digital Transformation of Food Safety Information Dissemination

Driven by the digital economy and intelligent technologies, the dissemination of food safety information has evolved toward platformization and algorithmic mediation.

Studies [3]–[6] indicate that the application of blockchain, big data, and artificial intelligence (AI) has promoted a shift from regulatory-driven information transmission to a collaborative information ecosystem.

Blockchain's traceability and immutability enable transparent data flow across all segments of the supply chain, enhancing cooperative supervision among stakeholders [5].

From an information ecosystem perspective, effective governance of food safety information should integrate four key dimensions—information content quality, technological support, actor collaboration, and optimization of the communication environment [4][6].

However, the embedding of technology does not automatically generate trust. Overreliance on algorithmic recommendation and social media diffusion may foster “information cocoons” and risk amplification. As noted in Reference [7], strengthening information regulation and disclosure mechanisms remains the key to balancing technological empowerment and social trust.

### 2.3 The Behavioral Logic of Public Trust and Risk Perception

Public trust constitutes the core variable in food safety risk governance.

Drawing upon national survey data, Reference [8] demonstrates that motivational trust and competence trust in governmental food safety supervision significantly influence citizens' risk cognition and emotional responses—the higher the trust level, the lower the negative emotions.

Further, References [9] and [10] reveal that risk communication exerts a stronger impact on consumer risk perception than objective risk itself, and that risk perception, behavioral attitude, and participation intention are connected through mediating and moderating mechanisms.

At the same time, participation in social media spaces amplifies disparities in perceived risk. Reference [11] finds that engagement in virtual communities significantly heightens rural residents' food safety risk perception, while political trust partially mediates this effect by mitigating such amplification.



These findings imply that the formation of public trust depends not only on the authenticity of information, but also on the transparency and interactivity of communication processes.

#### 2.4 Public Opinion Dissemination and Emotional Resonance Mechanisms

Food safety–related public opinion serves as an external manifestation of risk communication.

A growing body of research [12]–[15] shows that online public opinion exhibits high emotional volatility and strong social contagion. Using a BiLSTM (Bidirectional Long Short-Term Memory) model, Reference [12] identifies a temporal pattern of emotional evolution in food safety incidents: negative sentiment correlates strongly with public opinion heat, and the four types of guiding tools—administrative, psychological, technological, and legal—play significant roles in emotional transformation.

Reference [13] and [14] further suggest that AI-based and NLP (Natural Language Processing)–based public opinion monitoring systems can enable *early detection*, *early warning*, and *early intervention* in online crises.

Overall, research on food safety information dissemination and trust construction in China has transitioned from single-actor communication to multi-actor collaboration, and from static institutional analysis to dynamic information-ecosystem analysis.

This evolution reflects a new research paradigm integrating information, emotion, and trust into a coupled analytical framework.

### III. THE MULTI-ACTOR SYNERGY OF FOOD SAFETY INFORMATION DISSEMINATION MECHANISMS

#### 3.1 Government Actors: From Regulators to Mediators of Trust

The government serves as the central hub in the dissemination of food safety risk information. The authority and timeliness of its information release directly influence the public’s perception of risk and their behavioral responses.

Empirical research [8][16][17] demonstrates that transparent governmental disclosure enhances public trust, whereas over-administrative control or delayed communication easily generates a “cognitive vacuum” and trust discontinuity.

Using a GRA–VAR (Gray Relational Analysis–Vector Autoregression) model, Reference [16] reveals that mandatory policy tools—such as food-technical standards and complaint reporting systems—exhibit the highest correlation with governance effectiveness, while guidance-type tools like policy promotion remain underutilized.

Consequently, governments must strike a balance between authoritative communication and open dialogue, ensuring both institutional credibility and participatory transparency.

Such a balance enables the evolution of the state from a mere risk regulator to a trust mediator within the risk communication network.

#### 3.2 Media and Social Platforms: From Amplifiers of Public Opinion to Regulators of Emotion

The media function simultaneously as accelerators of information and amplifiers of public emotion.

According to Reference [12], emotional trajectories in food safety incidents tend to follow a “negative–neutral–positive” evolution curve. Reporting tone, framing, and interactivity significantly affect the direction of public trust.

Furthermore, References [14] and [15] highlight that AI-driven big-data monitoring systems for public opinion can provide early detection, real-time supervision, and multidimensional intervention, thereby mitigating collective anxiety and information panic.

The social responsibility of the media thus transcends mere fact reporting. They play a pivotal role in maintaining public rationality, bridging institutional and civic communication, and shaping the affective ecology of trust.

By integrating technological monitoring with ethical communication, media organizations can transform from emotion amplifiers into emotion regulators in food safety governance.

### **3.3 Corporate Actors: From Passive Subjects of Regulation to Transparent Information Agents**

Enterprises occupy a critical position as the primary source of food safety information.

Studies [5][18] indicate that blockchain-based traceability and proactive disclosure of production data can enhance consumer trust; however, cost constraints and asymmetric information remain persistent barriers.

According to a multi-party evolutionary game model [18], when the cumulative reputation loss from producing low-quality food outweighs short-term profit, firms are incentivized to adjust their strategies toward higher product quality and transparency.

Thus, constructing reputation-based incentive mechanisms—anchored in verifiable, transparent information—becomes fundamental to driving corporate accountability.

In this context, the enterprise is redefined not as a regulated object but as an active participant in co-creating a trustworthy information environment.

### **3.4 The Public and Virtual Communities: From Passive Recipients to Co-Governance Participants**

The public are no longer mere receivers of information; they are also disseminators, evaluators, and co-governors within the risk communication system.

Evidence from References [10][11][19] shows that social capital, political trust, and risk perception jointly determine citizens' willingness to participate in food safety governance.

In particular, Reference [19] confirms that social trust mediates the relationship between social capital and public participation, while Reference [11] notes that virtual community engagement may both amplify risk perception and strengthen social oversight.

Accordingly, enhancing the public's awareness, comprehension, and participatory capacity is essential for building societal trust.

Empowered citizens—capable of identifying misinformation and engaging in constructive dialogue—constitute the social foundation of risk co-governance and emotional resilience.

### **3.5 Synthesis**

The mechanism of food safety information dissemination in China has evolved from a unidirectional governmental announcement model toward a multi-actor collaborative structure involving governments, enterprises, media, and the public.

Its operational logic relies on three key dimensions:

1. Information transparency, which provides the institutional foundation for credibility;
2. Technological empowerment, which ensures traceability and real-time communication; and
3. Social capital, which sustains long-term interpersonal and institutional trust.

This synergistic model demonstrates that effective food safety communication is not merely a process of information release but a dynamic system of *interaction, feedback, and mutual accountability* among diverse actors.

## **IV. PATH MODEL OF PUBLIC TRUST CONSTRUCTION UNDER THE PERSPECTIVE OF RISK COMMUNICATION**

### **4.1 Information Transparency: The Institutional Prerequisite for Trust Generation**

The degree of information transparency determines the initial level of public trust.

According to the information regulation theory proposed in Reference [7], establishing comprehensive disclosure mechanisms can generate verifiable and traceable information chains within the process of risk governance, thereby reducing public uncertainty and cognitive ambiguity.

Government institutions, therefore, should develop routine and standardized information release platforms, ensuring continuous updates on food safety supervision, testing outcomes, and incident handling.

In this regard, Reference [1] emphasizes the need to enhance both the independence and coordination of risk communication agencies during the processes of assessment and management.

Such institutional transparency not only improves information credibility but also strengthens the public's perception of fairness and procedural justice—key antecedents to cognitive and affective trust in risk communication.

#### 4.2 Interactive Communication: The Process Mechanism for Trust Maintenance

Public trust is not achieved instantaneously; it must be maintained through continuous, reciprocal communication.

As demonstrated by References [2][10][19], the essence of risk communication lies in a dynamic cycle of interaction, feedback, and reintegration.

Institutionalized public participation—through online Q&A portals, feedback dashboards, or disclosure of random sampling results—can facilitate two-way dialogue and reinforce participatory governance.

The shift from one-way information dissemination to dialogue-oriented communication transforms citizens from passive recipients to active partners in governance.

Through iterative exchanges, misunderstandings are corrected, emotional anxiety is reduced, and cooperation-based trust gradually forms.

In this sense, interactive communication serves as the process mechanism sustaining long-term trust within the ecosystem of food safety information governance.

#### 4.3 Emotional Regulation: The Psychological Mechanism for Trust Repair

When food safety incidents trigger social panic, the regulation of public emotion becomes central to repairing trust.

Studies [12][14][15] demonstrate that AI-based sentiment analysis and emotion recognition technologies can monitor public emotional fluctuations in real time, providing a scientific basis for intervention strategies.

An effective emotional governance framework should follow the “*Soothing–Explanation–Empathy–Guidance*” sequence, which transitions public discourse from anxiety to rational reflection.

Moreover, combining *psychological* and *legal* guiding tools proves essential in redirecting emotional expression toward constructive dialogue.

By aligning factual transparency with empathetic communication, risk managers can achieve a transformation from crisis-induced distrust to reconstructed institutional trust—thereby converting potential social unrest into communicative resilience.

#### 4.4 Digital Empowerment: The Technological Mechanism for Trust Enhancement

Digital technologies not only accelerate information dissemination but also reshape the logic of trust formation.

According to References [3][4][5][6], blockchain enables traceable and tamper-proof data sharing among actors, while artificial intelligence and big data analytics enhance the precision of risk prediction and regulatory response.

These technologies collectively establish a hybrid system of technological trust and institutional trust, where algorithmic transparency and system reliability reinforce citizens' confidence in both digital and governmental institutions.

Through the integration of the information ecosystem—comprising information flows, trust flows, and value flows—a multi-layered trust architecture can be realized.

This “technological empowerment” not only optimizes regulatory efficiency but also elevates public trust from reactive confidence in isolated events to proactive confidence in the governance system itself.

#### **4.5 Summary of the Path Model**

Synthesizing the above dimensions, this study proposes a four-dimensional model of public trust construction under the risk communication framework:

Dimension	Mechanism	Core Function
Information Transparency	Institutional regulation and disclosure	Establishes baseline credibility
Interactive Communication	Continuous feedback and participation	Sustains dynamic trust
Emotional Regulation	Psychological and communicative intervention	Repairs crisis-induced distrust
Digital Empowerment	Technological and data-driven governance	Enhances systemic trust and efficiency

This path model illustrates that public trust in food safety governance is both a cognitive and emotional outcome of communicative interaction.

Institutional design, social dialogue, emotional sensitivity, and technological accountability together form a synergistic mechanism through which risk communication can sustain social trust in the digital era.

### **V. CONCLUSION AND PROSPECTS**

#### **5.1 Major Conclusions**

Through a systematic qualitative synthesis of twenty-three key studies, this paper presents the following major conclusions:

(1) Risk communication is the core of food safety governance.

China's food safety information dissemination is undergoing a paradigmatic shift—from single-centered governance toward multi-actor collaboration. Governments, enterprises, media, and the public now form a dynamic interaction network that integrates regulation, supervision, and participation.

(2) Public trust is constructed through multiple, interdependent mechanisms.

Information transparency serves as the institutional foundation for trust formation; interactive communication maintains ongoing confidence; emotional regulation repairs trust damaged by crises; and digital empowerment advances the technological and systemic reinforcement of trust.

(3) Digital transformation reshapes the landscape of risk communication.

Emerging technologies such as blockchain and artificial intelligence provide effective tools for traceability, prediction, and real-time response. Nevertheless, issues such as algorithmic bias and information overload may undermine social confidence, requiring prudent design of technological ethics and data governance.

(4) Trust governance and emotional governance must progress synergistically.

Institutional transparency alone is insufficient to sustain long-term trust. The success of risk communication depends equally on addressing public emotions, psychological responses, and socio-cultural perceptions of risk. Thus, emotional governance is an essential complement to institutional governance in modern food safety management.

### 5.2 Policy and Practice Implications

Based on the analytical findings, several practical recommendations are proposed for key stakeholders:

- **Government:** Establish independent and specialized risk communication agencies; implement an open, cross-sectoral information disclosure system; and develop emergency information-sharing mechanisms that coordinate regulatory, health, and media departments.
- **Enterprises:** Integrate blockchain-based traceability and digital responsibility management into corporate governance; ensure product transparency and timely disclosure of safety data; and strengthen long-term reputation-based trust mechanisms.
- **Media and Platforms:** Develop AI-driven public opinion monitoring and sentiment analysis systems; promote balanced, evidence-based reporting; and guide online discourse to prevent headline sensationalism and risk amplification.
- **Public:** Enhance information literacy and risk discernment; cultivate rational communication habits; and actively participate in co-governance processes to foster a culture of shared responsibility and scientific understanding.

These strategies jointly contribute to the establishment of an integrated governance framework characterized by institutional transparency, technological accountability, and participatory trust.

### 5.3 Future Research Directions

Future research on food safety risk communication and trust construction can be expanded along three directions:

#### (1) Model-Based Research:

Develop quantitative models that capture the coupling dynamics of information flow, emotional flow, and trust flow. These models can measure the transmission pathways and feedback effects among multiple actors within the communication network.

#### (2) Data-Driven Research:

Combine social media data and public sentiment corpora to analyze trust evolution in real time using natural language processing (NLP) and machine learning techniques, thereby integrating computational social science into risk governance studies.

#### (3) Contextualized Research:

Focus on specific social groups—such as rural residents, elderly consumers, and digital-native users—to explore contextual variations in risk perception, information access, and trust response, providing micro-level insights for inclusive governance.

### 5.4 Concluding Remarks

Food safety information dissemination is not merely a technological or institutional issue but a process of rebuilding societal trust.

In the evolving landscape of digital governance, effective risk communication must operate within a closed loop of “risk exchange – public trust – collaborative governance.”

By aligning transparency with empathy, and technology with ethics, food safety governance can evolve into a sustainable system characterized by open information, affective resonance, and co-created trust.

Such a transformation will play a vital role in advancing the modernization of China’s national governance capacity and contributing to global discussions on trust-based risk management.

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