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Research Article

Research on Solving Path of Negative Effect of "Information Cocoon Room" in Emergency

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The "information cocoon" can hinder the normal dissemination and flow of emergency information during emergencies. It is important to explore the factors of this effect and to resolve the negative effects of the information cocoon, so as to help the public to "break out of the cocoon" and help the government to better promote emergency information management. Based on information ecology theory and the S-O-R model, this study designed questionnaires using a Likert five-level scale and selected 388 publics from several smart city pilot areas in Changsha, Zhuzhou, Shaoshan, and Yueyang cities in Hunan Province. Field research was conducted based on four factors, information ontology, information technology, government regulation, and social network, and empirical analysis was conducted through structural equations. The study shows that information ontology, information technology, government regulation, and social networks have significant effects on the information cocoon effect by influencing the reinforcement of public information preferences. Among them, government regulation ($P = 0.34$) has the most significant effect on the reinforcement of public information preferences, followed by information ontology ($P = 0.32$) and social networks ($P = 0.31$), and information technology ($P = 0.29$) has the weakest effect. Combining the results of empirical analysis, we propose a four-dimensional path of "information-technology-regulation-value" to break the cocoon. By optimizing information ontology, using technology for good governance, promoting algorithmic fairness, and enhancing social stickiness, we help the public break through the shackles and negative effects of the information cocoon and promote the harmonious, stable, and healthy development of the emergency information field.

1. Introduction

In the digital era, information technology helps the government to disclose emergency warning information more quickly through government websites, emerging media, and mobile terminal programs and respond to social emergency information search demands. Emergency data, as an important factor of production, have widely penetrated into all aspects of emergency management [1]. Emergency information is the general name of information content and information resources released by official and unofficial channels in the process of emergency management of public emergencies [2]. The transmission of this information is of great significance to the public's behavior choice in all kinds of emergencies. At present, the personalized information push with algorithm technology as the core enables the public to freely obtain massive emergency information through different media, effectively reducing the time cost of obtaining information and meeting the high matching of individual needs and information. However, the information filtering mechanism based on algorithm technology caters to the public's browsing habits and interests and pushes homogenous content to users to create a relatively closed information space environment. As a result, the public's information vision becomes narrow, the information source is unbalanced, and the heterogeneous information is not accessible. The public is just like a silkworm chrysalis in a cocoon, thus forming the "information cocoon" effect [3]. In August 2021, the Cyberspace Administration of China (CAC) deployed a series of special actions called "Clear and Clear" to prohibit the push of emergencies, disasters, and accidents, as well as false information from

unknown sources or illegal production. Under an emergency situation, the information cocoon will lead to the public continuously strengthening the existing values and it is difficult to interact with the heterogeneous value groups. In the long run, it is easy to lead to the negative effects such as the intensification of group polarization and the weakening of social adhesion. In addition, the public is bound in the cocoon and one-sided understanding of emergencies, but also it is easy to cause panic, anxiety, and other negative emotions, which is not conducive to emergency information management and effective prevention of emergencies. Therefore, how to break through the shackles, eliminate the negative effect of the "information cocoon room" that may be generated by the public in emergencies, and create a comprehensive, objective, true, and accurate benign emergency information circulation space has become a new problem faced by the government's emergency information management in the era of digital China.

After the emergence of the concept of the information cocoon room, it has aroused extensive attention in academic circles. Many scholars combine their own research fields to study whether the information cocoon room really exists. Duan et al. [4] believe that it has become a common social phenomenon for users to be in the information ecological environment of an external cocoon and internal cocoon driven by information technology. Zhang [5] analyzed the social situation in China and believed that the public's access to information was constantly converging and narrowing, resulting in the information cocoon effect becoming a new social problem. Research on the influence of information cocoon has been the focus of many scholars. Rehm [6] believes that the information cocoon room can strengthen the effect of information dissemination and is easy to be used purposefully to spread public opinion information and information with emotional incitement. Zhou [7] believes that the information cocoon house poses a potential threat to social consensus building by reducing social stickiness, intensifying the sense of division, and widening the knowledge gap. Gong [8] puts forward that the cocoon house of information restricts the free flow of information and causes the squeeze and narrowing of the main space in the ideological field. The discussion on the causes of information cocoon can be roughly divided into three categories in the academic circle. The first category focuses on information technology, the second focuses on the public's own information choice, and the third focuses on the influence of the social information environment. Some scholars believe that algorithm technology is the key factor to produce the information cocoon effect [9], and the personalized recommendation mechanism will strengthen users' inherent bias and weaken their desire for broader information [10]. However, many scholars believe that there is no need to worry about information technology and individual information selection [11] is the main cause of its occurrence. Because the current information technology is not mature enough and the technology between the information providing platform is not interconnected, cannot completely trap users. Shen [12] analyzed the formation process of the information cocoon effect from the perspective of public psychological cognition. Wang [13] stressed that users' own information needs are the final determinant. From the perspective of user interaction, Yang and She [14] propose that the initiative of public participation in interaction is another influencing factor. In addition, many scholars agree that a highly artificial environment [15], social information environment [16], media information transmission [17], and other social environmental factors will affect the formation of the information cocoon house effect.

In summary, most scholars believe that information cocoons are real and have significant negative effects on social progress, so they study the causes of information cocoon effect from individual factors of information technology, individual information choice, and social environment but rarely combine the three factors in multiple discussions. At the same time, most studies on information cocoon are based on information in a broad sense and few scholars have studied emergency information in emergencies. Therefore, this paper combines the information ecology theory with the S-O-R model and analyzes the factors influencing the formation of public information cocoon effect in emergencies from multiple dimensions with the help of the structural equation model. Then, based on the empirical results, we propose suggestions to break the cocoon and eliminate the negative effect of the information cocoon, so as to contribute to the harmonious development of emergency information management in China.

The paper is structured as follows: Section 2 presents the theoretical basis of the article and the research hypotheses. Section 3 describes the data sources, the construction of the overall model, and the selection of specific variables. Section 4 presents the analysis of the empirical results. Section 5 presents the policy recommendations, with the findings of the above study as the suggested starting point.

2. Theoretical Analysis and Research Hypothesis

2.1. Theoretical Model

2.1.1. Information Ecology Theory. Information ecology theory is a new research theory formed by Horton [18], a famous scholar, who combines ecological theory with the views of information resource management. Its core idea emphasizes the harmonious symbiosis between "people, information, and environment." Based on this, Crawford [19] proposed the concept of an information ecosystem in 2000. All kinds of information service activities in emergencies form an emergency information ecosystem, which also emphasizes the harmonious coexistence of the "human-information-environment." The system has the functions of generating, transmitting, communicating, and sharing information and can provide all kinds of emergency information for the public in time. The "human" factor refers to the preference degree of individuals when choosing emergency information. The "information" factor is composed of information ontology and information technology. In the process of an emergency, various disaster information, disaster dynamics, emergency decision-making, and event

evaluation are disseminated to the society through various information transmission methods through official and unofficial channels. Starting from information ontology [20], information ontology is the general name of information type, information content, information quantity, and information quality. With the support of computer and communication technology, algorithmic recommendation technology is an intelligent technical tool that can collect user information data, generate user portraits, and filter and push information through recording plate, analysis plate, and distribution plate, so as to meet the public's information needs [21]. "Environmental" factors include the government's regulatory environment for emergency information dissemination and the public's social network environment. Government supervision is the environment formed by the government's supervision of the contents and channels of emergency information dissemination. The social network is an interpersonal communication circle formed by informal groups such as family members, friends, and colleagues that the public can contact in the process of an emergency before and after the event. Under the joint action of "information" and "environment," the public chooses information based on individual information preference.

2.1.2. S-O-R Model. The S-O-R (stimulus-germ-response) model was first proposed by A. Mehrabian and Aeroshell [22]. It is a classical framework for studying the relationship between Stimulus (S), Organism (O), and Response (R). The core idea of the model is that an individual's environment will stimulate his cognitive and emotional changes and ultimately lead to individual behavior responses. Nowadays, many scholars have introduced the S-O-R model into the research fields of user information behavior such as online health communities [23], mobile government apps [24], and the WeChat platform of university libraries [25]. Combined with the public information cocoon effect, the process of public information narrowing is the process of internal and external factors in stimulating the operation and the body's information preference ultimately leads to the formation of an information cocoon. Therefore, the S-O-R model has internal consistency with the formation of an information cocoon room in emergencies. Therefore, the research paradigm of the S-O-R model is used to comprehensively explore the effect of the public information cocoon room in emergencies.

2.1.3. Hypothetical Model. Based on the research paradigm of information ecology theory and the S-O-R model, this study constructed a research model for the formation factors of the "information cocoon house" effect in emergencies (Figure 1). In the context of emergencies, the public is stimulated by the four factors of information ontology, information technology, government regulation, and social network due to the drastic changes in the environment and their preference for information keeps deepening, which leads to the development of the "information cocoon" effect in the acquisition of actual information by the public.

2.2. Research Hypothesis

2.2.1. Influence of Information Ontology on the Reinforcement of Public Information Preference. Information ontology is the information provided by official and unofficial channels that can be received by the public in emergency events, including information type, information content, information form, and information quality. Zhou [7] pointed out that different groups have different preferences for different types of information. In addition, with the popularity of short video apps, Wang and Zhang [26] found through their research that dynamic audio and video books can better stimulate the public's interest in reading. Therefore, Wang et al. [27] concluded that in the process of receiving and understanding information, the public is affected by the type, content, presentation form, and quality of information and information preference is generated and strengthened over time. Based on this, the following hypotheses are proposed:

> H1: information ontology has a significant impact on the reinforcement of public information preference.

2.2.2. Influence of Information Technology on the Strengthening of Public Information Preference. Algorithmic recommendation technology is a kind of digital information technology that generates a recommendation list based on user interest and realizes efficient matching between user interest and information recommendation content [28]. Zhang and Zhao [29] believe that intelligent algorithms make interest preference labels for the public and recommend homogenous and single reading content. Shen et al. [30] further pointed out that the intelligent recommendation algorithm would cause the public to be trapped in the full picture of the emergency, which further catalyzed the reinforcement of preference. Based on this, the following hypotheses are proposed:

> H2: information technology has a significant impact on the reinforcement of public information preference.

2.2.3. Influence of Government Regulation on the Strengthening of Public Information Preference. Under the background of emergencies, the government supervises the social emergency information environment by using the information technology usage norms, information dissemination norms, laws and regulations in the field of network security, and accountability systems [31]. Li and Hao [32] pointed out that information dissemination must have a public pressure mechanism, rather than relying on self-regulation and restraint of media platforms such as we-media, Weibo, and WeChat. Hen and Wang [33] believe that there are still loopholes in government supervision, which hinder the transmission of the correct information and easily lead to the public's preference for false and public opinion information. Based on this, the following hypotheses are proposed:

> H3: regulatory environment has a significant impact on the reinforcement of public information preference.

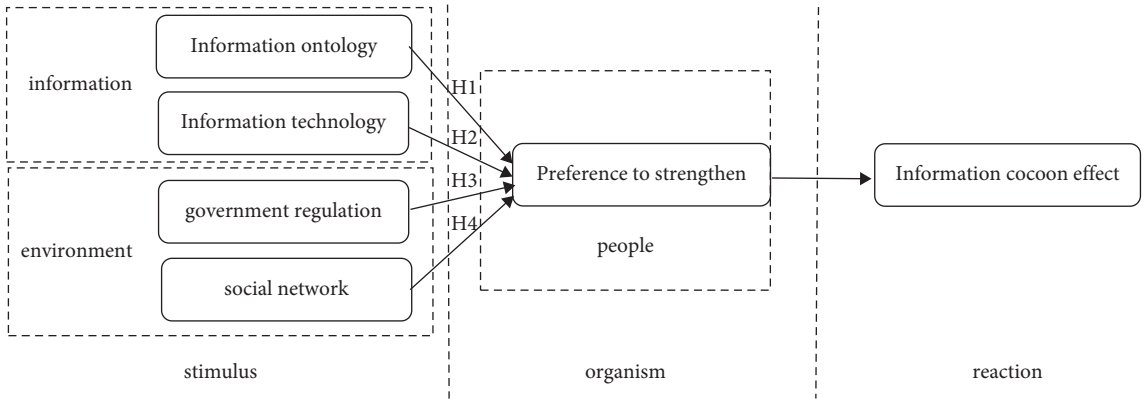

Figure 1: Research model of the formation factors of the "information cocoon room" effect in emergencies.

2.2.4. Influence of Social Network on the Reinforcement of Public Information Preference. The social network is composed of relatives, friends, classmates, and other social groups. Zhu et al. [34] proposed that conformity psychology and group identity would have a direct impact on individual information reading tendency in the process of public information browsing. Zhang [35] also believes that under the subtle influence of parents, friends, relatives, and other social groups, the public's preference for emergency information is constantly strengthened. Based on this, the following hypotheses are proposed:

> H4: social network has a significant impact on the reinforcement of public information preference.

2.2.5. Effect of Strengthening Public Information Preference on the Formation of Emergency Information Cocoon Effect. Preference reinforcement refers to the deepening of the public's emotional tendency and attitude preference when browsing emergency information. Ren et al. [17] believe that information preference causes the public to have stereotyped thinking on information selection. Li et al. [36] showed that the continuous strengthening of information preference would affect the public's attitude and concept of viewing the overall picture of an event. In this process, the public would continuously accept homogenized information and eventually form the information cocoon effect. In emergencies, many information disseminators take advantage of this effect to spread false, fake, junk marketing, emotional incitement, and other bad information, bringing wrong value orientation to the public and causing negative social impact. Based on this, the following hypotheses are proposed:

> H5: the strengthening of public information preference has a significant impact on the formation of the cocoon effect of emergency information.

3. Data Description, Model Setting, and Variable Selection

3.1. Data Sources. The survey questionnaire of this study is generated after adjustment according to the measurement items in the information ecology theory and S-O-R model research literature combined with the specific purpose. The questionnaire is divided into two parts: demographic variables such as gender, age, and education background constitute the first part of the questionnaire, and factors influencing the formation of public information cocoon effect in emergencies constitute the second part of the questionnaire. In order to ensure the scientific, rationality, and standardization of the survey questionnaire, the authors first issued 30 questionnaires for presurvey and sent them to experts in the field for evaluation and modified them according to the presurvey and experts' feedback. According to the list of pilot smart cities announced by the National Ministry of Housing and Urban-Rural Development, field research was conducted in the Hunan Province in February and March 2021. Based on the principle of stratified sampling, Changsha City (Meixi Lake International Service Area, Daxi Pilot District, Changsha County), Zhuzhou City (Yunlong Demonstration Zone), Shaoshan City (Shaoshan Township), Yueyang City (Yueyanglou District), Chenzhou City (Yongxing County, Jiahe County, Yizhang County), etc., were mainly sampled. According to the principle of incidental sampling, 450 questionnaires were sent out and 388 valid questionnaires were sent out, with an effective rate of 86.2%.

3.2. Sample Characteristics. The characteristics of valid data collected by the questionnaire show that the number of females is slightly more than that of males, and most of the interviewees are from the young population aged 19–40. The number of respondents with a bachelor's degree or above was the largest, accounting for 34.8%; according to the law of the People's Republic of China on occupational classification ceremony, based on practice, this study will investigate the object is divided into administrative institutions and enterprises management personnel, professional and technical personnel, business services personnel, and other agricultural industry personnel, including most of the respondents from professional and technical personnel, business services personnel, and other professional personnel; other professional accounted for the highest value, 32.7%; 23.2% of respondents have been paying attention to emergency information for more than 8 years. Respondents used the

emergency information platform for 1–2 hours on average every day. Specific sample characteristics are shown in Table 1.

3.3. Model Selection. The structural equation model is the best method to test the empirical data collected by the survey [37]. The structural equation model is a multivariate statistical approach that can analyze both the effect of individual variables on the explanatory variables and the interrelationships between variables. This paper aims to analyze the influence of information ontology, information technology, government regulation, and social network on the reinforcement of public information preference and the influence of the reinforcement of public information preference on the formation of the information cocoon effect. Therefore, the structural equation model is used to analyze the formation process of the information cocoon effect under the influence of multiple variables. The general structural equation includes two parts: the measurement model and structural equation, which can be expressed by the following three basic equations:

$$\eta = \beta\eta + \Gamma\xi + \zeta, \tag{1}$$

$$y = \Lambda y\eta + \varepsilon, \tag{2}$$

$$x = \Lambda x\xi + \delta. \tag{3}$$

Among them, the endogenous observation variable is Y, the exogenous observation variable is X, the endogenous potential variable is η, and the exogenous potential variable is ξ. In this study, information ontology, information technology, government regulation, and social networks are ξ and preference reinforcement and information cocoon effect are η. η and ξ are linked by linear equations of the molar and γ matrix and error vector ζ to form equation (1), the structural equation. Equations (2) and (3) are measurement models; namely, six latent variables of information ontology, information technology, government regulation, social network, preference reinforcement, and information cocoon effect are described by different observation variables. The measurement variables Y and X are related to the corresponding potential variables η and ξ, respectively, through the factor loads $\lambda\ y$ and $\lambda\ \chi$, while ε and δ are the measurement errors.

3.4. Variable Setting and Description. All the observed variables in this study were based on the existing literature and social reality, and all the answers were given by Likert five-level scale. Specifically, there are five levels: totally disagree, disagree, indifferent, agree, and strongly agree. A specific variable description is shown in Table 2.

4. Empirical Results and Analysis

4.1. Model Evaluation. In this paper, the factors influencing the formation of the public information cocoon house effect were determined through a literature review and the analysis framework was constructed by using information ecology theory and the S-O-R model, and then, the hypothesis testing and parameter estimation were carried out by using Amos24.0 software construction theory. Details are given as follows.

4.1.1. Reliability and Validity Test. Reliability refers to the reliability of measurement data. Cronbach's Alpha and combined reliability were used to test the reliability of the survey questionnaire in this paper. Cronbach's alpha greater than 0.6 indicates that the data reliability passed the test. As shown in Table 3, the alpha values of all variables are greater than 0.8 and the internal consistency of the sample data is good throughout the test.

It can be seen from Table 4 that the combined reliability (CR) of all variables is between 0.818 and 0.885, all greater than 0.7; that is, the sample data have passed the combined reliability test. Validity refers to the validity of measured data. This paper tests the validity from two aspects: convergence validity and discriminant validity. As shown in Table 4, the standardized load is between 0.703 and 0.860, both greater than 0.6. AVE values range from 0.530 to 0.658, all of which are greater than 0.5; that is, the sample data pass the convergence validity test.

It can be seen from Table 5 that the AVE square root values of all variables are greater than the correlation values of other variables; that is, the sample data pass the discriminant validity test.

4.1.2. Fitting Degree Test and Hypothesis Test. A fitting test is used to evaluate the degree of matching between model and data. As the multivariate normal value of the data in this study is greater than 5, it does not conform to the multivariate normal distribution. Therefore, Bollen–Stine Bootstrap was used to carry out the correction operation to improve the accuracy of sample estimation and prevent chi-square expansion and mismatch [38, 39]. Amos24.0 software was used for empirical calculation, and the fitting test results of the hypothesis model were obtained. As shown in Table 6, CMIN/DF is 1.42, RMSEA is 0.03, GFI is 0.94, NFI is 0.94, CFI is 0.98, and NFI is 0.94. All the indicators meet the fit criteria and the fit indices pass the test.

It can be seen from Table 7 that, in emergencies, information ontology has a significant positive impact on the reinforcement of public information preference. The standardized path coefficient is 0.317, and hypothesis 1 passes the test. Information technology has a significant positive effect on the reinforcement of public information preference. The standardized path coefficient is 0.290, and hypothesis 2 passes the test. Government regulation has a significant positive effect on the reinforcement of public information preference, the standardized path coefficient is 0.342, and hypothesis 3 passes the test; social network has a significant positive effect on the reinforcement of public information preference, and the standardized path coefficient is 0.313. Hypothesis 4 passes the test. The reinforcement of public information preference has a significant positive effect on the information cocoon effect, and the standardized path

Table 1: Description of sample characteristics.

Statistics		Frequency	Proportion (%)
Gender	Male	190	49
	Female	198	51
Age	Under the age of 18	39	10
	19–25	97	25
	26–40	151	39
	41–55	81	21
	More than 55 years old	20	5
Education level	Primary and below	4	1
	Junior high school	32	8.2
	High school or technical secondary school	107	27.6
	College	110	28.4
	Bachelor degree or above	135	34.8
Professional	Administrative personnel in enterprises and institutions	55	14.2
	Professional and technical personnel	86	22.2
	Business service personnel	75	19.3
	Agricultural personnel	45	11.6
	Others	127	32.7
Pay attention to emergency information time	2 years or less	34	8.8
	3–4 years	53	13.7
	5-6 years	98	25.2
	7–8 years	113	29.1
	More than 8 years	90	23.2
Average time spent using the platform per day	1 hour or less	132	34
	1 to 2 hours	154	39.7
	2 to 3 hours	61	15.7
	3 to 4 hours	27	7
	More than 5 hours	14	3.6

coefficient is 0.602. Hypothesis 5 passes the test. Accordingly, the structural equation research model with path coefficient as shown in Figure 2 is generated.

4.2. Result Analysis. Under the framework of "human-information-environment" analysis emphasized by information ecology theory, combined with the S-O-R model, the structural equation model is used to study the influence of information ontology, information technology, government regulation, and social network on the reinforcement of public information preference and the influence of the reinforcement of public information preference on the information cocoon effect. The main results are analyzed as follows.

4.2.1. Influence of Information Ontology on the Reinforcement of Public Information Preference. Information ontology has a significant positive influence on the reinforcement of public information preference, with a path coefficient of 0.317 and a P value less than 0.001. This shows that information data in the era of big data increase exponentially, and information itself will seriously affect the public's preference. First, there is a lack of effective integration of different types of emergency information. The public prefers to know information closely related to themselves and lacks understanding and prevention of other types of emergencies. Second, in terms of safety knowledge, emergency prevention knowledge, rescue knowledge, and other information content, when there is no emergency, the public is not within the scope of daily information browsing selection, very easy to be ignored. Thirdly, in emergency situations, the public prefers to learn about events in the form of video information, picture information, and sound information within a limited time. Fourthly, the timeliness, authenticity, and comprehensiveness of information cannot be guaranteed, resulting in the fragmentation of public access to information and individuals being covered in limited information.

4.2.2. Influence of Information Technology on the Strengthening of Public Information Preference. Information technology has a significant positive effect on the reinforcement of public information preference, with a path coefficient of 0.290 and a P value less than 0.001. In order to achieve the purpose of increasing the click rate, information disseminators will make labels for users by using intelligent algorithms based on the public's forwarding, browsing, collecting, and other behaviors during the previous emergency situation. Finally, a personalized push is used to transmit information to the public, so that the information delivery can better meet the public's information preference. The application of algorithm technology makes the information pushed regular and directional, which reduces the chance for the public to come across information outside their interest scope and urges users to continuously strengthen the information preference they have formed. As

Table 2: Variable definition and literature sources.

Latent variables	Item	Observation variable	Source
Information ontology	IO1	I pay different attention to four types of emergencies: natural disaster information, accident disaster information, public health event information and social security event.	Davis F D, 1989; Venkatesh V et al., 2000
	IO2	I pay different attention to different information contents such as basic information of emergencies, common sense of safety prevention and government safeguard measures.	
	IO3	The way information is presented (video, audio, graphic, text, etc.) affects how I pay attention to information.	
	IO4	When an emergency does not occur, the timeliness and comprehensiveness of information will affect my attention to information.	
Information technology	IT1	I will use the software search function to directly retrieve the emergency information of interest.	Yu Guoming, Canren, 2019; zhang Hai, 2020; Ajzen I, 2002
	IT2	I use filters to filter out content that I'm not interested in.	
	IT3	I often see messages pushed by Weibo, WeChat and Douyin.	
	IT4	Most of the information pushed by Weibo, WeChat, Douyin and other software is what I am interested in.	
Government Regulation	GR1	I do not think the laws governing emergency information are perfect enough.	Zhou T, 2018
	GR2	I do not think government regulation of emergency information distributors is in place.	
	GR3	I think there are still some deficiencies in the regulation of algorithmic recommendation technology.	
	GR4	I think the emergency information regulatory environment needs to be improved and perfected.	
Social networking	SN1	I will pay attention to the emergency information recommended by my relatives and friends.	Yang Mengqing et al., 2017; Zhang Changliang, 2019
	SN2	I will share and exchange emergency information with my relatives and friends.	
	SN3	My mood is easily influenced by the people around me.	
	SN4	My preference for emergency information tends to be influenced by the people around me.	
Preference strengthen	PS1	I Have a strong emotional bias toward different emergency messages.	Ajzen I, 2002
	PS2	I Have a distinct preference for different emergency messages.	
	PS3	I know exactly what my preference is for emergency information.	
Information Cocoon effect	ICE1	I Often read information that interests me.	Zhang Hai, 2020; Duan Hui et al., 2020;
	ICE2	It's hard for me to accept information that I'm not interested in and have different values.	
	ICE3	My information source channel, information type is single.	
	ICE4	I do not want to communicate with people who have different values.	

Table 3: Cronbach's alpha test of measurement contents.

The variable name	Information ontology	Information technology	The government regulation	The social network	Preference to strengthen	Information cocoon effect	The overall
Cronbach's alpha	0.852	0.853	0.838	0.818	0.843	0.885	0.939

a result, the public's understanding of the whole face of an emergency is blocked, heterogeneous information input is lacking, and other valuable content is not timely, fully, and effectively utilized. The negative effect of the information cocoon will become more and more significant.

4.2.3. Influence of Government Regulation on the Strengthening of Public Information Preference. Government regulation has a significant positive effect on the reinforcement of public information preference, with a path coefficient of 0.342 and a P value less than 0.001. This indicates that whether the information environment formed under government supervision is good or not will affect the strengthening of public preference for information. There are some loopholes in the government's governance of online public opinion, legislation of network security information, and formulation of emergency information dissemination standards, which result in the inability of social supervision to be carried out effectively. Driven by interests, information disseminators tend to use the public's psychology of rationality, novelty, and conformity to distort

Table 4: Test of combination reliability and convergence validity of measurement contents.

The variable name	Measurement	Nonstandardized load	SE	CR	*P*	Standardized load	CR	AVE
Information ontology	IO1	1.000				0.725	0.853	0.592
	IO2	1.077	0.079	13.636	***	0.762		
	IO3	1.135	0.078	14.511	***	0.828		
	IO4	1.012	0.074	13.592	***	0.759		
Information technology	IT1	1.000				0.710	0.855	0.597
	IT2	0.973	0.075	13.026	***	0.736		
	IT3	1.035	0.073	14.208	***	0.819		
	IT4	1.089	0.077	14.198	***	0.818		
Government regulation	GR1	1.000				0.773	0.838	0.564
	GR2	1.074	0.077	13.924	***	0.760		
	GR3	1.043	0.076	13.751	***	0.749		
	GR4	0.976	0.074	13.279	***	0.721		
Social network	SN1	1.000				0.756	0.818	0.530
	SN2	0.965	0.077	12.488	***	0.718		
	SN3	0.919	0.075	12.277	***	0.703		
	SN4	1.083	0.085	12.673	***	0.732		
Preference to strengthen	IP1	1.000				0.777	0.844	0.644
	IP2	1.056	0.070	15.023	***	0.860		
	IP3	0.865	0.060	14.522	***	0.767		
Information cocoon effect	ICE1	1.000				0.819	0.885	0.658
	ICE2	0.976	0.052	18.643	***	0.858		
	ICE3	0.867	0.052	16.701	***	0.781		
	ICE4	0.944	0.056	16.827	***	0.785		

Table 5: Discriminant validity test of measurement contents.

	Preference to strengthen	Information cocoon effect	Social network	Information technology	Government regulation	Information ontology
Preference to strengthen	**0.802**					
Information cocoon effect	0.621	**0.811**				
Social network	0.620	0.593	**0.728**			
Information technology	0.622	0.562	0.590	**0.773**		
Government regulation	0.631	0.568	0.585	0.643	**0.751**	
Information ontology	0.640	0.654	0.715	0.714	0.649	**0.769**

Table 6: Test of fit degree of the research model.

Fitting index	CMIN/DF	RMSEA	GFI	NFI	CFI	NFI
Adapter standard	<3	<0.05	>0.90	>0.90	>0.90	>0.90
This model values	1.42	0.03	0.94	0.94	0.98	0.94

Table 7: Hypothesis testing and path coefficients.

Path to the relationship between	Normalized path coefficient	Significant	Hypothesis testing
Information ontology ⟶ preference to strengthen	0.317	***	H1 (support)
Information technology⟶preference to strengthen	0.290	***	H2 (support)
Government regulation ⟶ preference to strengthen	0.342	***	H3 (support)
Social network ⟶ preference to strengthen	0.313	***	H4 (support)
Preference to strengthen ⟶ information cocoon effect	0.602	***	H5 (support)

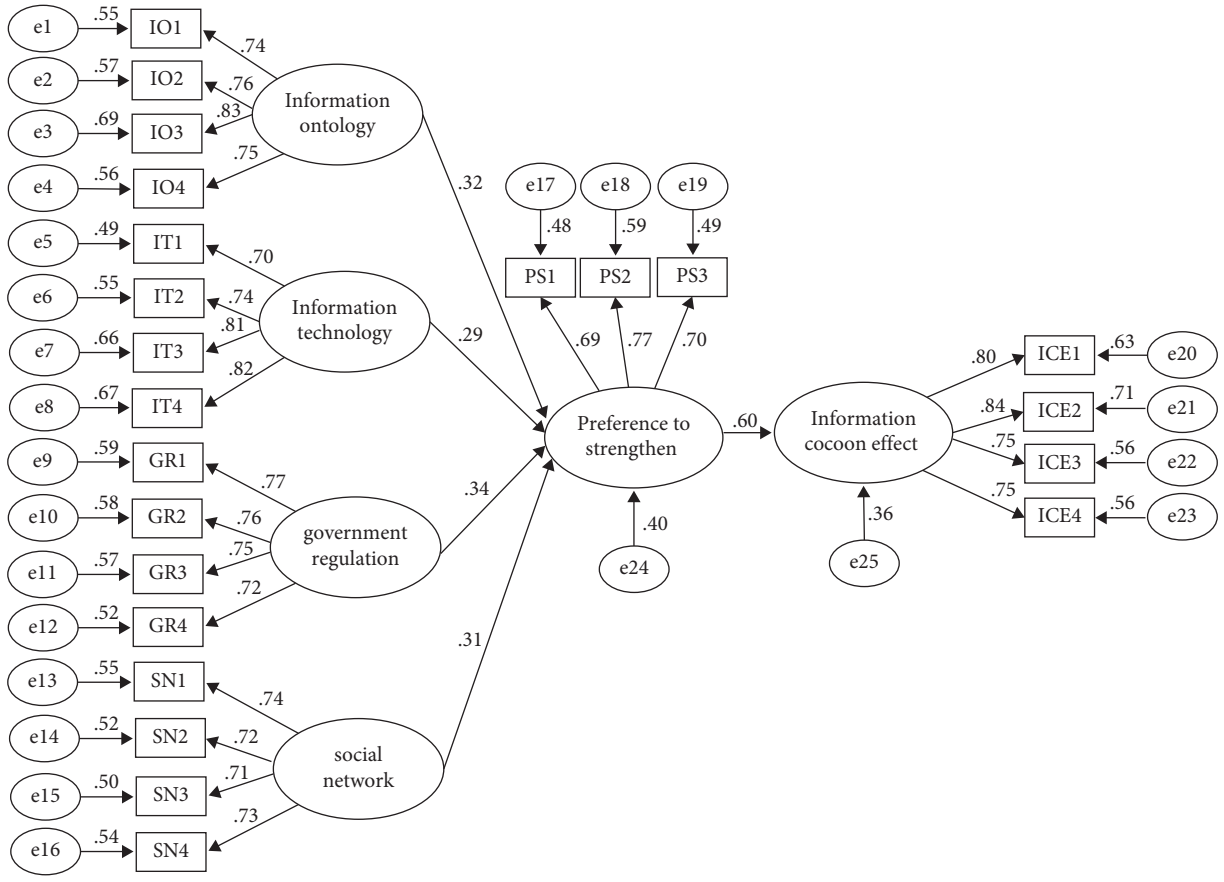

Figure 2: Structural equation model.

the truth of emergencies or use difficult words to stir up emotions, so as to distort their mainstream values, weaken the sense of trust in the government's emergency handling, and cause negative social energy. For example, many studies have found that the public's response to emergencies is passive and helpless. Under abnormal circumstances, the public tends to blame the government for the defects of emergency work, believing that the government's response is slow, the protection is insufficient, and the information is not transparent [40].

4.2.4. Influence of Social Network on the Reinforcement of Public Information Preference. The social network has a significant positive influence on the reinforcement of public information preference, with a path coefficient of 0.313 and a P value less than 0.001. It shows that in the complex and changeable social network environment, the public will be influenced by the community of family, friends, colleagues, and classmates. Due to the sudden events, work and life, politics and economy, social culture, and other drastic changes that break the original balance, the public will tend to find groups who live together, have similar interests, and have timely communication for information exchange and interaction. When seeing emergency reports, disaster data, factual information, and images shared by parents, friends, and relatives, the public can easily reach psychological identity with others, leading to imitation and following in behavior. This effect is highlighted by the fact that, in the face of emergency information, if the information preference of the surrounding community is inconsistent with their own, the public is likely to change their attitude to conform to the preference of the community.

4.2.5. Influence of Enhanced Public Information Preferences on the Formation of Information Cocoon Effect. The reinforcement of public information preference has a significant positive influence on the formation of the emergency information cocoon effect, the path coefficient is 0.602, and P value is less than 0.001. Preference reinforcement is the direct factor leading to the information cocoon effect. Under algorithm recommendation, individuals tend to select emergency information according to their own emotions and attitudes. In the outbreak period of an emergency, the public will take the initiative to transfer information attention to the event, so that the understanding of emergency information will be more profound. However, in the fading period of the event, the public will pay less attention to the event, and the follow-up treatment of the emergency may be relatively unknown. Therefore, when the public chooses information according to their preferences and tendencies, they will confine themselves in the "cocoon house" constructed, resulting in negative effects. First, an "information

cocoon" tends to make the public believe in some distorted and false information, lose individual criticism and negation, and breed public opinion. Second, in a closed information environment, the public lacks an overall understanding of emergencies and is prone to blindly optimistic psychology or even to relax vigilance, which is not conducive to the timely disposal of emergencies. Third, living in the "information cocoon," the public is not willing to accept heterogeneous information and may have panic, anxiety, depression, and other unhealthy psychological emotions under self-suggestion.

5. Conclusions and Policy Implications

Through questionnaire survey and empirical analysis, from the perspective of organism change-response, the formation of the information cocoon effect is the result of the strengthening of public information preference. Therefore, to get rid of the shackles of the cocoon room, it is necessary to pay attention to the strengthening of public information preference. From the perspective of stimulus-organism change-response, information ontology, information technology, government regulation, and social network all make the public strengthen information preference in the process of obtaining emergency information and then produce the information cocoon effect. Therefore, in order to break the cocoon effect of public information in emergency events, we should reduce the factors leading to the strengthening of public information preference. Based on this, a four-dimensional cocoon-breaking path of "information-technology-regulation-value" is proposed to provide a reference for government emergency information management.

5.1. Optimizing Information Ontology to Improve Public Interest in Reading. From the information type, information content, information form, and information quality, we optimize information ontology and stimulate reading interest, which is conducive to the public to accept more emergency content. First, information processing uses digital connections to aggregate different types of information. We form "public forum," give the public choicer angle, and increase the chance of an encounter with heterogeneous information. Second, we increase the propaganda of emergency science popularization of information content and normalize science popularization. Through knowledge lectures, education and popular science, online q&A, and other ways, we popularize common-sense safety prevention knowledge to the public in easy-to-understand language, so as to ensure that more people can receive effective popular science information. Third, diversified forms of information are used to present the professional knowledge involved in emergencies in a more intuitive and vivid form to reduce the public's reading fatigue. At the same time, color, background, pattern, and other materials can be used to improve the ability of information display and improve the public's interest in reading. Fourth, we ensure the timeliness, authenticity, and comprehensiveness of emergency information and maintain a good quality of information. In the face of sudden crisis events, we should pay attention to the timeliness of information, shorten the time interval of collection, analysis, processing, and dissemination as far as possible, and collect disaster information in time. Based on the results of information collection for objective analysis, we strive to restore the truth of the emergency facts in a comprehensive, scientific, and impartial manner to ensure that there is no deficiency in information transmission.

5.2. Using Good Governance of Technology to Break the Barrier of Public Information. With the application of big data, Internet of things, cloud computing, and other technologies in the field of emergency response, emergency management has entered the era of intelligent emergency response. It optimizes digital algorithm technology and helps break down information barriers. In November 2021, the China Federation of Network Social Organizations initiated the Convention on Self-Regulation of Internet Information Service Algorithm Applications to strengthen the self-regulation of the Internet information service industry. In order to better achieve algorithmic self-regulation, algorithm analysis can be improved, an all-round, all-process, and scenario-based user preference system can be built, and distribution strategies can be further improved to combine targeted pushing and mandatory pushing. While targeting information pushing according to public interest, mandatory pushing of public opinion disinformation, basic common sense self-help information, government emergency notices, and other news, by promoting design research and development innovation and continuous algorithm research and development, that information related to emergencies can be disseminated more comprehensively, and better services can be provided for effective prevention of emergencies.

5.3. Promoting the Fairness of Algorithms and Promoting the Disclosure of Public Information. It is an effective way to build a complete regulatory environment in that the government leads supervision and all sectors of society supervise together. First, the government should strengthen the supervision of algorithmic technology. By establishing a comprehensive governance mechanism for algorithm security, from the standpoint that algorithm technology serves social governance, we can separate emergency information from daily entertainment information and prevent the algorithm from impeding the popularization of emergency information. Second, the government should strengthen supervision over information publishers. At the present stage, many "We media" have the problem of the forced push of traffic and entertainment news. Relevant regulatory departments can intervene and urge them to make rectification, guide "We media" to build emergency service columns, top the hot spots of emergency-related information, and optimize online information push services. Third, improve standards, procedures, and regulations for information dissemination. In August 2021, the Regulations on The

Management of Algorithm Recommendation for Internet Information Services (Draft) issued by CAC mentioned that "algorithm recommendation service providers should provide users with options that are not specific to their personal characteristics," which is an important constraint on information dissemination in China. Through the rule of law, the algorithm logic that caters to preferences and solidifies prejudices should be eliminated and individuals or groups that maliciously obstruct the transmission of urgent information and scientific information should be effectively dealt with. Fourth, the government should strengthen cooperation with social organizations. We deeply dig and develop all kinds of mainstream authoritative information service platforms and expand the public's horizon of understanding emergencies through all-round and three-dimensional information transmission. We must establish a "joint contribution, sharing, and governance" emergency information dissemination supervision system.

5.4. Strengthening Social Stickiness and Maintaining Public Value Neutrality. The public will be indirectly influenced by social networks when making judgments and evaluations on emergencies. First, increase group interaction and enhance social stickiness. The public should be encouraged to actively establish communication links with other social groups and perceive emergencies from multiple perspectives and channels. The public should be encouraged to cultivate social cooperation and collective spirit, enhance the perception of public values and enhance social cohesion. Second, improve information literacy and improve information acceptance and tolerance. In the face of numerous emergency information, the public should improve rational thinking, adjust the degree of preference, and receive more comprehensive emergency information. Through rational use of digital media, various emergency information can be consciously "mixed" to enhance the collision of information views and avoid the negative effect of the "information cocoon house." Third, be as value-neutral as possible in the social networking environment. For public emergencies, which are related to public interests, while obtaining emergency information from the external environment, emotional rationality should be strengthened, value neutrality should be maintained, and opportunities for communication and association with the society should be enhanced.

Due to the limitations of subjective and objective factors, this paper only explores the path of breaking the negative effect of the "information cocoon" in emergencies, which is suitable for the topic of the article. There are still some limitations in the study, and further improvement and refinement are needed to address the shortcomings and defects.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the present study.

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