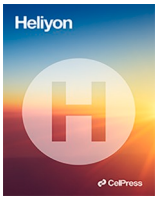
Heliyon 10 (2024) e35229

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon



Research article

The research on the impact of industry governance on trust after group product-harm crisis

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ARTICLE INFO

Keywords:
Group product-harm crisis
Industry governance
PLS-SEM
Reflective–formative hierarchical model
Single enterprise product-harm crisis

ABSTRACT

The group product-harm crisis has much greater and longer negative impact, and its governance has become an important issue. To address this issue, this study proposed a new construct: industry governance. On the basis of clarifying the dimensions and measurements of industry governance, this study constructed a reflective–formative hierarchical model and collected data through a questionnaire. Utilizing convenience sampling, 329 valid samples at the University in Wuhan, China collected by survey were used to verify the hypotheses. With the help of Smart PLS 3.0, this study finds that the industry governance has a significant and positive impact on consumer's trust (enterprise trust, industry trust and government trust) after the group product-harm crisis. Industry governance plays an important role in the governance of group product-harm crisis. This study is the first time to explore the structure and measurement of industry governance, and verifies the impact of industry governance on group product-harm crisis, which enriches governance theory, and perfects product-harm crisis theory, providing a new direction and guidance for managers to better manage product-harm crisis.

1. Introduction

"Product-harm crises are discrete, unplanned, well-publicized events of defective and/or dangerous products" [1]. In recent years, the Samsung smartphone battery explosion event is the memorable example of a product-harm crisis [2,3]. Product-harm crises negatively impact consumers and the general public [1,4], related industries [5], and other stakeholders [6], such as managers [7].

In the past 30 years, product-harm crisis has become more frequent and common [8,9]. Significantly, with the increasing amount of product-harm crisis, the amount of enterprises involved in a same crisis is also increasing [10,11]. Thus, some scholars [11–14] divides the product-harm crisis into group product-harm crisis and single enterprise product-harm crisis according to the amount of enterprises involved in a product-harm crisis. In short, the group product-harm crisis refers to a violation involving multiple enterprises in an industry, while the single enterprise product-harm crisis refers to a violations involving only one enterprise [11–14]. In recent years, the group product-harm crisis has occurred frequently in many countries [10,11]. For example the melamine contamination crisis in China involved 22 dairy enterprises in 2008 [10,11,14,15]. Compared with the single enterprise product-harm crisis, the group product-harm crisis had greater impact, longer duration and greater harm [11,14,15]. It not only increases consumers' perceived risk of industrial products, but also affects consumers' trust in the industry [16] and in government regulation [17]. Although the impact of group product-harm crisis is significant, previous research has mainly focused on single enterprise product-harm crisis [18], and very

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https://doi.org/10.1016/j.heliyon.2024.e35229
Received 29 November 2023; Received in revised form 22 July 2024; Accepted 24 July 2024
Available online 26 July 2024

few research on this crisis [10]. Especially how to govern group product-harm crisis has not been studied.

After exposure of a product-harm crisis, the negative publicity directly leads to the trust crisis [19]. Trust not only includes the trust in enterprises but also in the broader context of the business environment, which is broad-scope trust [16,20–22]. The previous research of product-harm crisis on trust mainly focus on the narrow-scope trust (e.g. trust in brand or enterprise) [23–25], and rarely links product-harm crisis with broad-scope trust (e.g. trust in industry institution or system) [26]. The trust recovery post crisis is crucial for crisis governance [27], and its status is an important indicator to measure the effect of product-harm crisis governance. Therefore, this study used narrow-scope trust (enterprise trust) and broad-scope trust (industry trust, and government trust) as the dependent variables to explore the impact of crisis governance on it, in order to clarify the effectiveness of governance.

The governance strategies after a product-harm crisis are crucial for mitigating the impact of the product-harm crisis [28]. The governance or response strategies for product-harm crisis mainly includes recall, remedy, or deny [29], which mainly focuses on individual enterprise governance. When several enterprises in the market have unethical behavior, it is not enough to analyze only from the perspective of the moral behavior of a single enterprise [30]. Therefore, the previous governance strategy for the single enterprise product-harm crisis can not achieve effective results for the group product-harm crisis [30]. The governance of group product-harm crisis not only involves measures such as apology, compensation and recall, but also is accompanied by the reconstruction of industry order, namely industry governance [31]. That is to say, it is necessary to explore the governance of group product-harm crisis from the perspective of industry governance.

Based on the above analysis, there are three gaps in the previous research. Firstly, the group product-harm crisis is an important research topic, but little is known about group product-harm crisis [10]. Secondly, in the past, research on the trust after the product-harm crisis has mainly focused on the narrow-scope trust (e.g. trust in brand or enterprise) [23–25], and rarely considered the broad-scope trust [26]. Thirdly, previous research on crisis management has mainly focused on the governance of individual enterprise, without studying from the perspective of industry governance. To fill the gap of the previous research, this study focused on the group product-harm crisis and proposed a new construct - industry governance. Based on exploring the dimensions and measurement items of industry governance, this study analyzed the impact of industry governance on trust (enterprise trust, industry trust, and government trust), in order to clarify the effectiveness of industry governance on group product-harm crisis. This study aims to address the following questions.

Q1: What is the structure of industry governance and how to measure it?
Q2: Whether and how industry governance affects post crisis trust (narrow-scope: enterprise trust; broad-scope trust: industry trust and government trust)?
Q3: Is industry governance effective in managing the group product-harm crisis?

2. Theoretical background and hypotheses

2.1. Group product-harm crisis

A product-harm crisis will occur when the product does not meet specific safety standards, or contains defects that may cause product-related injuries [18]. At present, the amount of enterprises involved in a crisis is constantly increasing, gradually evolving from one enterprise in the industry to multiple enterprises in the industry violation [10,11]. Many scholars call this crisis involving multiple enterprises in an industry as a group product-harm crisis and call the crisis involving an enterprise as single enterprise product-harm crisis [11–14]. There are many examples of group product-harm crisis. For example, in China in 2012, the decyl butyl phthalate (DBP) in Baijiu exceeded the standard involving many Baijiu enterprises, which caused a group product-harm crisis in the Baijiu industry [14]. Compared with a single enterprise product-harm crisis, a group product-harm crisis not only increases consumers' perceived risk of industrial products, but also affects consumers' trust in the establishment and maintenance of a specific social background related to organizations or individuals [20] including trust in the industry [16,21] and trust in government regulation [17]. Once consumers and the public lose trust in an industry and regulatory system, it will lead to a long-term downturn and gradual shrinkage of the whole industry [15]. The impact of a group product-harm crisis makes the governance of group product-harm crisis become an important issue. After the product-harm crisis, enterprises often resolve the impact of the crisis by means of apology and compensation [1,29,32,33], denial [34], silence [35], recall [36] or restore consumers' trust in the enterprise through trust repair strategy [37]. Under the condition of a single enterprise product-harm crisis, the enterprise's independent response or strategic arrangement can resolve the impact of the crisis. However in the context of a group product-harm crisis, only the response of the enterprise may not achieve the expected effect [30], because consumers will gradually realize that the phenomenon of exposure is only the tip of the iceberg, the expectation for the improvement of the current situation will become slim, and the trust and confidence in the industry will become very fragile [14]. Previous studies have found that when many enterprises violate the rules in the industry (group product-harm crisis), simple governance of individual enterprises cannot eradicate the crisis in the industry [30]. Therefore, it is necessary to construct governance strategies for group product-harm crises from the new perspective.

2.2. Trust

Product-harm crisis can trigger trust crisis [19] and reduce or lose consumer's trust [8,36]. Previous studies have found a close relationship between trust and product-harm crisis [26]. For example, Lin et al. [23] argued that product-harm crisis had a negative impact on consumers' trust in enterprises. Trust is the psychological state of positive expectation to others' behavior [38,39], and is the

willingness of one party to bear harm for the actions of the other party [40]. Given the impact of product-harm crisis on trust, the trust recovery after the crisis has become an important issue [27]. Measuring the trust level of post crisis is an important indicator to measure the effectiveness of crisis governance. In correspondence with trust-related research [e.g. 16, 20, 21], it is believed that trust not only included narrow-scope trust, but also broad-scope trust. Specifically, the narrow-scope trust generally refers to consumers' trust in enterprises [26], and the broad-scope trust is the consumers' trust in the specific social background of establishing and maintaining the relationship with organizations [20], such as trust in industry [16,21] and institution [22] or system [20].

Considering the previous research status that the research on the impact of product-harm crises had mainly focused on narrow-scope trust rather than broad-scope trust [26]. This study analyzed the effectiveness of crisis governance from two aspects: narrow-scope trust (enterprise trust) and broad-scope trust (industry trust and government trust).

2.3. The theory of collaborative governance

Collaborative governance theory is an interdisciplinary theory between synergy theory in natural science and governance theory in social science [41], which is the theoretical foundation of this study. Collaborative governance refers to the coordination of multiple social subjects, including government, non-governmental organizations, enterprises, and individuals, coordinate with each other to cooperate in the governance of social public affairs, to achieve maximum governance efficiency [42,43]. It breaks through the traditional governance model led by government, emphasizing the participation of multiple subjects and the integration of capabilities, which can effectively compensate for the failures of the government and market [44]. Collaborative governance provides an open governance channel, which manifests as active participation and cooperation among multiple subjects to improve governance efficiency [45].

In recent years, collaborative governance has become a popular approach as it has the potential to mobilize the efforts, expertise, and resources of different subjects to solve complex social problems [46]. Facing some complex social problems, such as environmental pollution and food safety, many scholars have conducted research using the theory of collaborative governance. For example, Liu et al. [47] analyzed the issue of nuclear wastewater management with the help of collaborative governance theory. Wang et al. [48] found that the government-enterprise collaborative governance could significantly reduce urban carbon emissions. Levy [49] explored the impact of collaborative governance on crises. The product-harm crisis, especially the group product-harm crisis, is no longer just a simple enterprise's problem, it has gradually escalated into a social problem [15]. A single organization alone cannot solve the problem, and it is necessary for multiple subjects to jointly govern in order to solve the problem [50]. Therefore, it is reasonable for this study to use the theory of collaborative governance as the theoretical foundation.

2.4. The structure and measurement of industry governance

2.4.1. Concept of industry governance

Since the 1990s, governance as the counterpart of management theory, has become one of the research focus for academic and practitioner. In 1995, the report issued by the commission on global governance defined the governance as the sum of various ways in which individuals, public institutions and private institutions jointly manage affairs. According to the theory of collaborative governance, the remarkable feature of governance means is that multiple agents use multiple tools to work together to achieve a goal through efficient coordination among various agents [51]. Industry governance is an activity that supervisors (the subject of industry governance) use certain means to effectively regulate and govern the problems existing in the industry in order to achieve specific industry development goals [31]. Based on collaborative governance the essence of industry governance is that the subject of industry governance such as the government, coordinates the relationship between different organizations establish market order and enterprise norms through appropriate means and effective cooperation [31].

2.4.2. Index

Li et al. [52] found that collaborative governance is a set of social arrangements that involve institutional elements (structure) and local interactions (agency). From the structure perspective, collaborative governance releases the allocation of rules and resources to constrain the behavior of individual subjects [53]. From the agency perspective, collaborative governance involves a series of coordinating and communicating activities of affected subjects [54]. On this basis, Li et al. [52] proposed a collaborative governance framework, believing that the effectiveness of collaborative governance is mainly related to resources, cooperation, trust, participation, communication and collaboration.

Based on the collaborative governance theory, this study suggested that the industry governance emphasized the participation of different subjects [55], enables multilateral interaction between diverse, decentralized actors, which to achieve more than what could be achieved by the separate subjects on their own [56]. It can be seen that multi-subject participation [57], interactions between participant [58,59], coordination [60] and solving problems together are the important features of industry governance [61,62]. Therefore, the effect of industry governance is mainly related to the characteristics of the subjects (e.g. cooperative attitude, and resources) and the relationship between subjects (e.g. trust, communication, and collaboration).

2.4.3. Measurement

In general, there are two measurement perspectives regarding the structural relationship between latent construct and its indicators: reflective indicators and formative indicators [63,64]. Jarvis et al. [64] provided four criteria to determine whether the measurement model should be formative or reflective. The construct of industry governance proposed in this study was measured from

the subject characteristics and subject relationship, which the 2 s-order constructs were composed of three first-order constructs. According to the criteria of Jarvis et al. [64], industry governance in this study was a formative measurement model.

2.5. Hypotheses

According to the concept of industry governance, this study believed that the effect of industry governance was mainly related to the characteristics of the subjects participating in industry governance and the relationship between subjects. Meanwhile, referring to the collaborative governance framework [52], this study analyzed the dimensions and its impact on the effectiveness of industry governance.

Subject characteristics include cooperative attitude (the subject realizes the importance of cooperation in the process of crisis resolution and is willing to cooperate sincerely) [65,66], cooperative ability (the dynamic ability to integrate, build and reconfigure internal and external resources for crisis resolution) [67,68] and resource investment (whether and how much resources the partners have invested to solve the crisis) [52,69].

When the members of industry governance hold a cooperative attitude, they have a stronger ability to accept the views and opinions of other parties than when they think they have advanced technology, organizational ability and strategic judgment ability, thereby improving the quality of cooperation [70,71]. The attitude towards the cooperative solution of product-harm crisis will directly affect the enthusiasm, energy and resource investment of cooperative solution, and have an important impact on the effect of cooperation and crisis resolution [72]. That is, the more positive the cooperative attitude is, the better the cooperation effect is and the better the crisis resolution is. Cooperative ability is a dynamic ability to integrate, construct and reconfigure internal and external resources to adapt to the changing environment [68,73]. The stronger the cooperative ability of different subjects, the stronger the good interaction between multiple subjects [74], and the easier it is to realize industry governance and solve product-harm crisis events [75]. The resources owned by the organization are the basis for its participation in any activity [52,69]. For the industry governance, without sufficient resources, the cooperation and governance between the subjects will be difficult to maintain and resource investment can effectively improve the effectiveness of governance [52]. Therefore, it can be seen that the subject characteristics have an important impact on the industry governance.

Referring to the researches of Li et al. [52], Uzzi [76] and Tsai & Ghoshal [77], subject relationship include trust (goodwill, responsibility and consideration of the interests of other parties) [52,76], communication (information exchange and communication between internal and external partners) [52,78], collaboration (the behavior of partners working with other partners to overcome difficulties and make their own adaptive adjustments to maintain the collaborative relationship) [79,80].

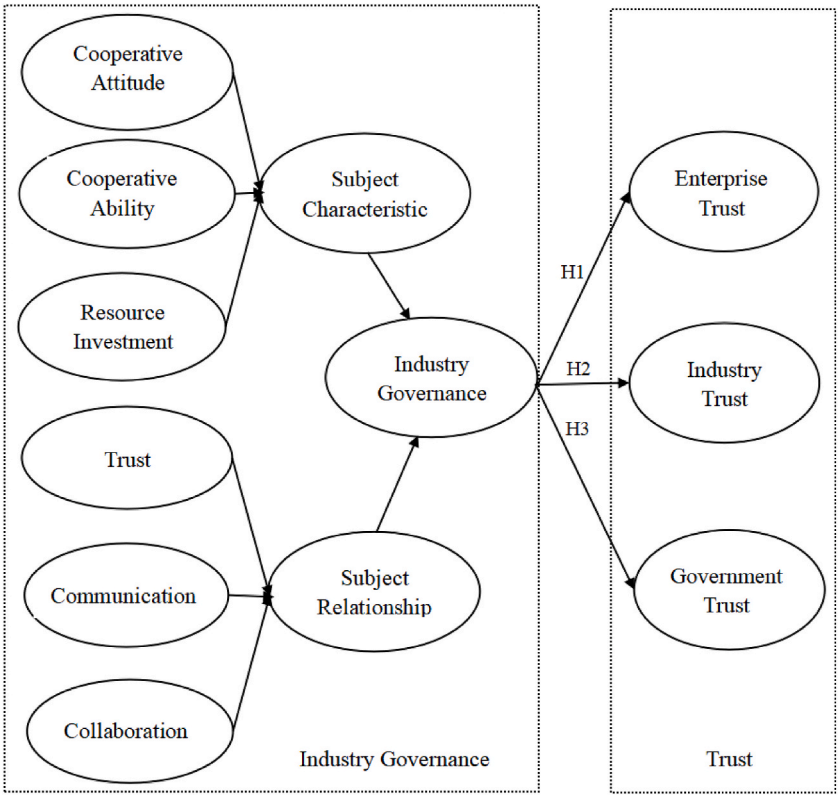

Fig. 1. The conceptual model.

Trust among subjects in the process of industry governance can reduce opportunistic behavior [78,81], regulate the cooperative relationship and directly affect the governance effect [52,82]. In order to achieve effective industry governance, effective communication is needed between cooperation subjects [52]. Communication in the process of industry governance helps to obtain more complete information, avoid distortion of information, enhance the understanding of objectives, tasks and responsibilities among cooperation participants, and improve the ability to deal with crisis events in a coordinated manner [52,74,78]. Collaboration is a process in which organizations jointly complete tasks, coordinate and help each other solve problems and overcome difficulties [82,83]. It represents the behavior of cooperative subjects and other partners to jointly overcome problems, deal with crisis events, maintain cooperative relations and make their own adaptive adjustment in the process of governance [79,83]. Through collaboration it helps to improve the ability of different subjects, which can virtually promote the improvement of industrial governance effect [75]. Therefore, it can be seen that strengthening the relationship between subjects can effectively improve the effect of industry governance.

Based on the above analysis, this study drew on the collaborative governance framework [52] to analyze the structure of industry governance from two aspects: subject characteristics (cooperative attitude, cooperative ability, and resource investment) and subject relationships (trust, communication, and collaboration). Theoretical analysis indicated that characteristics of the subjects participating in industry governance and the relationship between subjects as the second-order indicators of industry governance, had a significant impact on the effectiveness of industry governance. Research shows that governance has a significant impact on trust [84]. Therefore, after the outbreak of a group product-harm crisis, the cooperative attitude, cooperative ability, and resource investment of different subjects have promoted the resolution of the crisis [52,72,75], which has an important impact on trust recovery after the crisis. Moreover, trust, communication, and collaboration between different subjects enhance the efficiency of crisis management [52,74,75,78,82,83], which helps to recover trust post a crisis. Therefore, it can be inferred that industry governance after the group product-harm crisis contributes to trust recovery, which increases the individual's trust in enterprise, industry, and government. Based on the above analysis, we propose the following hypotheses.

H1. Industry governance positively affects the individual's trust in enterprise.

H2. Industry governance positively affects the individual's trust in industry.

H3. Industry governance positively affects the individual's trust in government.

The constructs and variable relationships involved in this study are shown in Fig. 1.

3. Methodology

3.1. Participants and sampling

The data used for this paper were gathered by questionnaire. Calder and Tybout [85] noted that when studies focused on the causal relationship between variables, college students could be used as subjects for the sake of sample homogeneity. Therefore, to reduce the interference of exogenous variables, to achieve good internal validity and to obtain participants easily, this study used college students as the samples. In the study of product-harm crisis, many scholars [e.g. 11–14] used college students as samples for research. Considering the convenience and ease of sample acquisition, we adopted convenience sampling method to conduct a survey in a University in Wuhan, China. This study has been approved by the ethics committee and meets ethical standards. Before filling out the questionnaire, we introduced this study to the participants. After ensuring that all participants were anonymous and their responses were only for academic purposes, all participants consented and voluntarily participated in this study. Filling out each questionnaire took approximately 10 min. The sample size of this study was determined using the standards of Hair et al. [86], which required five to ten times the size for each item.

Considering that this study involved 29 items, the sample size ranging from 145 to 290 participants was sufficient [86]. This study determined the sample size based on the higher end (ten times). A total of 360 questionnaires were distributed in this study and 350 questionnaires were collected, yielding a 97 % response ratio, and 21 of which were excluded because of incomplete filling. Finally, 329 valid questionnaires, constituting 94 % of the total respondents, were included in the analysis. The basic information of participates including gender, age, grade were presented as demographic characteristics (see Table 1).

Table 1
Demographics of the participants.

Participants Characteristic	Percentage	Participants Characteristic	Percentage
Gender:		Grade:	
Male	45.00 %	Freshman	14.00 %
Female	55.00 %	Sophomore	33.40 %
Age:		Junior	35.00 %
Under 20		Senior and above	17.60 %
21-23			
Above 24			

3.2. Design scenario

To collect data, the authors conducted a survey in which a report including a fictional group product-harm crisis and industry governance means were displayed through background materials. The measurement of industry governance, trust and personal information of the participants were presented in the questionnaire.

3.2.1. Stimulus

Based on the research of the Tu et al. [14] this study chose shampoo as the stimulus, which had two reasons. First of all, shampoo as the fast moving consumer goods, consumers use it frequently, and they are familiar with goods, advertisements and other related information. Second, there are a large amount of enterprises in the shampoo market, which can create a situation of group product-harm crisis and facilitate the reasonable control of the survey. Moreover, in recent years, there have been reports of shampoo containing dioxane causing cancer [14]. In summary, choosing shampoo as a stimulant has makes the material closer to the participants and improved the authenticity of the research materials.

3.2.2. Background material

According to the news report in recent years, when the content of dioxin in shampoo exceeds the standard, it will cause cancer. Based on the above news report and the research of Tu et al. [14] and Yao et al. [82], the background material of this research was finally formed. The background material was described as *recently after random inspections of shampoos in shopping malls and supermarkets in major capital cities across the country, the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China announced that content of dioxin in shampoo produced by six enterprises exceeded the standard, which might cause cancer or even death. After the crisis was exposed, the government quickly united with enterprises and industry associations to take measures. First, it organized certain personnel, arranged corresponding technology and invested certain* funds *to rectify the incident. Second, it held special meetings to discuss, formulated work plans and clarified relevant responsibilities. Third, it fully integrated relevant resources, fully coordinated the interests of all parties and established the corresponding working mechanism.*

At the same time, the government, industry associations and enterprises treated each other sincerely, abided by their cooperation commitments and solved the problems in the crisis in a practical and realistic manner. Moreover, around the crisis, the government, industry associations and enterprises have established a regular communication mechanism, made full use of information technology to broaden communication channels and increased communication frequency. Under the leadership of the government, industry associations, enterprises and other relevant parties were jointly responsible for crisis management, jointly solving crisis problems and cooperating to overcome difficulties.

3.3. Procedure for data collection

This research questionnaire survey was conducted on the campus of a University in Wuhan, China where was the author' workplace, making it easier and more convenient to access samples and complete data collection work. After introducing the research background and ethical statement, if the intercepted students at campus were willing to participate in this survey, we invited the students to fill out the questionnaire in the classroom we have prepared.

During the questionnaire filling stage, we first reiterated the ethical statement of the study, and then issued the questionnaire to the participants after the participants were informed of the purpose of the research and consented to participate in the research. Second, after the students received the questionnaire, we required them to carefully read the background materials and then filled in the corresponding questions based on their understanding of the materials. At this stage, we emphasized that their choices were not right or wrong, as long as they filled in according to their own understanding. Finally, after the students have completed the questionnaire, we retrieved it and expressed our gratitude. The whole process lasted approximately 10 min. We spent 10 days collecting data.

3.4. Data processing and analysis

This study analyzed the impact of industry governance on trust. The industry governance was a multi-dimensional construct, which consisted of the reflectively measured first-order constructs and the formatively measured second-order/third-order constructs. The trust (enterprise trust, industry trust and government trust) was a reflectively measured first-order construct. Given the characteristics of the model in this study, we used PLS-SEM method to process the data and analyzed data using Smart-PLS 3.0. The PLS-SEM method is very appealing to many researchers because it enables them to estimate complex models with many constructs, indicator variables and structural paths without imposing distributional assumptions on the data [86]. More importantly, this method can simultaneously process the data from both the formative indicator model and the reflectively indicator model [86], which was consistent with the model in this study. Therefore, we chose this method to process the data.

3.5. Measurements

The items of questionnaires (see Appendix) with a seven-point Likert scale anchored on "1 = strongly disagree" to "7 = strongly agree" were adapted from literature in order to improve content validity.

Trust. The trust in this research was divided into enterprise trust, industry trust and government trust and the three variables were measured separately. The measurement of enterprise trust and industry trust were based on the items developed by Hansen [16],

which included three items respectively. Government trust was measured with five items drawn from literatures of Freimuth et al. [87] and Paek et al. [88].

Industry governance. Industry governance was a second-order construct of the reflective–formative hierarchical component model/construct. The first-order reflective model included cooperative attitude, cooperative ability, resources investment (subject characteristics) and trust, communication, collaboration (subject relationship). The measurement of subject characteristics and the subject relationship were based on the items developed by Yao et al. [82]. The measurement of cooperative attitude, cooperative ability, resources investment, trust, communication and collaboration all included three items.

4. Result

4.1. Measurement model

Examining the measurement model is the first step in in evaluating PLS-SEM results [89]. This study involved both reflective measurement model and formative measurement model, and there were differences in the indicators analyzed by different models. Therefore, this study analyzed different measurement models separately.

4.1.1. Assessing reflective measurement model

The reflective measurement model assessment involves examining the indicator loadings, internal consistency reliability, convergent validity and discriminant validity [86].

The item reliability examines is estimated by evaluating the loadings for all the items with their respective latent variable. And the standardized loadings of the items should be 0.50 or higher, and ideally 0.70 or higher and all factor loadings should be statistically significant [90]. Internal consistency is commonly measured by the composite reliability (CR) [91], which should be higher than 0.70 [92]. Convergent validity is observed through average variance extracted (AVE), which should exceed 0.50 [93]. In order to assess the reliability and validity of first-order constructs, the software of Smart PLS 3.0 was conducted. The findings confirmed that all the item loadings, CR and AVE exceeded the cut off values of 0.7, 0.7 and 0.5 respectively, indicating that the measure had adequate reliability (see Table 2).

Discriminant validity refers to the degree to which a construct is truly different from other constructs [89]. This research have adopted two widely recognized methods, namely Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT) [93,94]. The method of Fornell-Larcker criterion evaluates discriminant validity by the means of AVE [93]. If the square root of each construct's AVE is greater than its highest correlation with any other construct, discriminant validity exists [91]. The result of discriminant validity check (see Table 3) indicated that the measurement scales in this study had good discriminant validity.

In addition according to the method of heterotrait-monotrait (HTMT) ratio proposed by Henseler, Ringle and Sarstedt [94], all

Table 2
Parameter estimates (reflective) of the first-order model.

Constructs	Items	Loadings	CR	AVE	Cronbach's α
Cooperative Attitude	CAT1	0.911	0.922	0.798	0.874
	CAT2	0.877			
	CAT3	0.891			
Cooperative Ability	CAB1	0.910	0.930	0.816	0.887
	CAB2	0.908			
	CAB3	0.892			
Resource Investment	RI1	0.881	0.926	0.806	0.880
	RI2	0.907			
	RI3	0.906			
Trust	TR1	0.890	0.901	0.751	0.835
	TR2	0.858			
	TR3	0.852			
Communication	COM1	0.914	0.923	0.800	0.875
	COM2	0.865			
	COM3	0.904			
Collaboration	COL1	0.880	0.907	0.765	0.846
	COL2	0.866			
	COL3	0.877			
Enterprise Trust	ET1	0.872	0.908	0.768	0.849
	ET2	0.877			
	ET3	0.879			
Industry Trust	IT1	0.865	0.896	0.741	0.825
	IT2	0.839			
	IT3	0.878			
Government Trust	GT1	0.850	0.927	0.717	0.901
	GT2	0.845			
	GT3	0.834			
	GT4	0.851			
	GT5	0.853			

Table 3
Discriminant validity assessment (Fornell-Larcker criterion).

Construct	CAT	CAB	RI	TR	COM	COL	ET	IT	GT
Cooperative Attitude (CAT)	**0.893**								
Cooperative Ability (CAB)	0.096	**0.903**							
Resource Investment (RI)	0.171	0.366	**0.898**						
Trust (TR)	0.266	0.249	0.274	**0.867**					
Communication (COM)	0.159	0.277	0.337	0.034	**0.894**				
Collaboration (COL)	0.273	0.492	0.386	0.236	0.101	**0.874**			
Enterprise Trust (ET)	0.395	0.497	0.665	0.400	0.397	0.533	**0.876**		
Industry Trust(IT)	0.327	0.489	0.590	0.368	0.374	0.525	0.842	**0.861**	
Government Trust(GT)	0.387	0.492	0.564	0.390	0.349	0.510	0.824	0.768	**0.847**

Note: 1. Diagonal elements (in Bold) represent the square root of AVE for that construct.
2. Other elements are simple bivariate correlations between the constructs.

HTMT values were lower than 0.850 (see Table 4). The discriminant validity was reaffirmed.

4.1.2. Assessing formative measurement model

Formative measurement model is evaluated including convergent validity, indicator collinearity, statistical significance and relevance of the indicator weights [92].

A redundancy analysis proposed by Chin [95] provides the assessment of convergent validity. When running a redundancy analysis, researchers can select a global single-item as the criterion variable [96]. The authors have used a global single-item of industry governance to help in validation purposes. The results showed that the path coefficient was 0.769, which exceeded threshold of 0.70 [92]. This provided support for the industry governance construct's convergent validity.

The variance inflation factor (VIF) is often used to evaluate collinearity of the formative indicators [89]. Ideally, the VIF values should be close to 3 and lower [89]. The results showed that the VIF values were all lower than 3, which met this requirement. This indicated that there was no serious collinearity issue among the indicators in the formative measurement model used in this study.

According to the suggestion of Hair et al. [89], the statistical significance of the weights and relevance of indicators with a significant weight should be tested to judge the quality of the measurement model. The weight should meet the requirements of statistical significance ($p < 0.05$) and the significant weights should be higher than 0.1 [97]. or 0.2 [95]. Using the software of Smart PLS 3.0, the assessment results of formative measurement model indicated that the model had adequate reliability (see Table 5).

4.2. Assessing structural model

Based on evaluation of the measurement model, the structural model evaluation was considered. The standard assessment criteria of structural model includes the coefficient of determination (R^2), the blindfolding-based cross-validated redundancy measure Q^2, and the statistical significance and relevance of the path coefficients [89].

The R^2 value is a measure of the model's explanatory power [97], which R^2 values of 0.75, 0.50 and 0.25 can be considered substantial, moderate and weak [98]. Calculating the Q^2 value is a way to assess the model's predictive accuracy [99]. If Q^2 values are larger than zero for a specific endogenous construct, it shows that the path model's predictive relevance for this particular construct exists [91].

This results showed that the structural model had explanatory power, as shown in Table 6 and Fig. 2, where it can be seen that the enterprise trust was explained in 64.60 % by industry governance ($R^2 = 0.646$), industry trust was explained in 55.30 % by industry governance ($R^2 = 0.553$) and government trust was explained in 55.30 % by industry governance ($R^2 = 0.553$). Therefore, these results indicated that the model had quality and its results were useful for making decisions [92]. Moreover, the Q^2 values in this study were 0.490 for enterprise trust, 0.408 for industry trust, and 0.290 for government trust, which indicated that the model illustrated sufficient predictive relevance with Q^2 above zero [91]. In summary, this structural model had strong explanatory power in predicting enterprise trust, industry trust, and government trust and provided a high level of predictive accuracy for most other endogenous constructs.

Table 4
Discriminant validity assessment (HTMT ratio).

Construct	CAT	CAB	RI	TR	COM	COL	ET	IT	GT
Cooperative Attitude (CAT)									
Cooperative Ability (CAB)	0.106								
Resource Investment (RI)	0.194	0.414							
Trust (TR)	0.313	0.288	0.325						
Communication (COM)	0.182	0.315	0.382	0.057					
Collaboration (COL)	0.315	0.476	0.447	0.276	0.116				
Enterprise Trust (ET)	0.455	0.573	0.767	0.473	0.460	0.626			
Industry Trust(IT)	0.383	0.571	0.803	0.442	0.440	0.628	0.773		
Government Trust(GT)	0.435	0.549	0.634	0.448	0.392	0.582	0.553	0.623	

Table 5
Parameter estimates (formative) of the second-order/third-order model.

First-order	Weights	VIF	Second-order	Weights	Third-order
Cooperative Attitude	0.327***	1.157	Characteristics	0.634***	Industry Governance
Cooperative Ability	0.518***	1.032			
Resource Investment	0.562***	1.181			
Trust	0.478***	1.059	Relationship	0.459***	
Communication	0.448***	1.010			
Collaboration	0.605***	1.069			

Note: 1. ***p < 0.001.
2. Random subsamples of bootstrapping are typically about 5000.

Table 6
PLS-SEM results of the structural model.

Path	R^2	f^2	Q^2	*B*	*t* value	*p* value
Industry governance→enterprise trust	0.646	1.828	0.490	0.801	34.602	***
Industry governance→industry trust	0.553	1.249	0.408	0.744	25.256	***
Industry governance→government trust	0.553	1.249	0.389	0.743	25.677	***

Note: 1. ***p < 0.001.
2. Random subsamples of bootstrapping are typically about 5000.
3. R^2 = coefficient of determination, values: >0.25 = weak; >0.50 = moderate; >0.75 = substantial [98].
4. f^2 = effect sizes: >0.02 = small effect; >0.15 = medium effect; >0.35 = large effect [95].
5. Q^2 = predictive relevance, value > 0 [91].

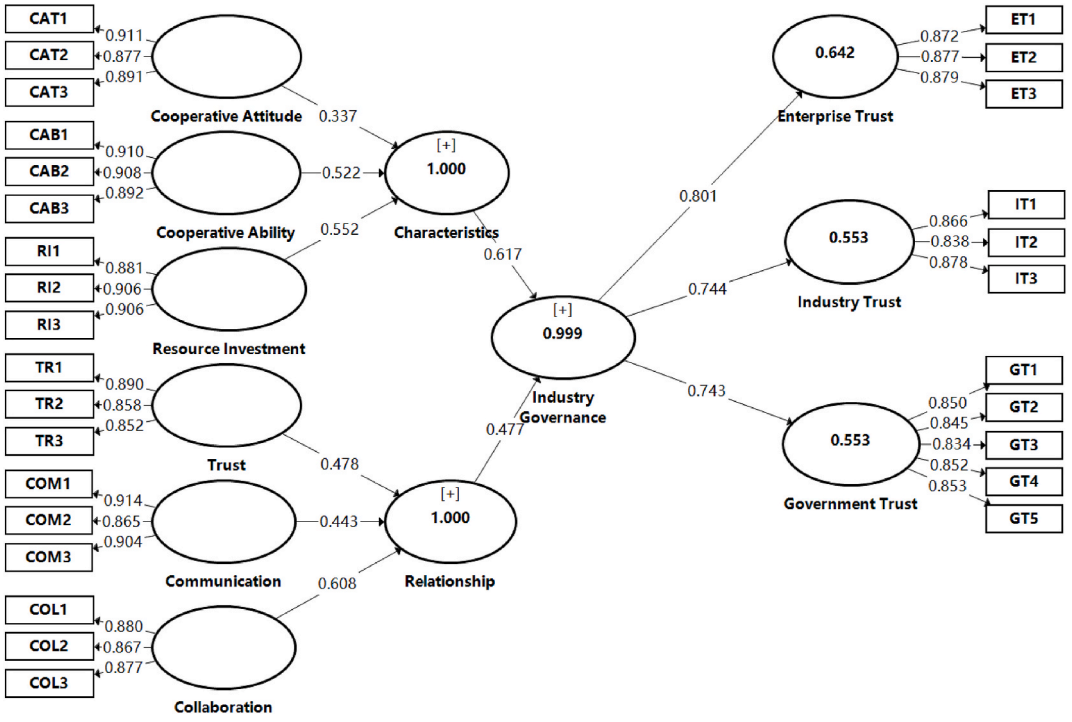

Fig. 2. Structural model (path coefficients).

With regard to the H1, the results shown in Table 6 and Fig. 2 ($\beta = 0.801$, $p < 0.001$) indicated that the industry governance had a significant and positive effects on the enterprise trust. Therefore, H1 was accepted, as the industry governance had an 80.10 % impact on enterprise trust, and according to Cohen's test [95] was of large size, having obtained a value of $f^2 = 1.828$, which shown that the industry governance contributed largely in the power of prediction of the enterprise trust. This was to say that industry governance had a large impact on the enterprise trust.

Concerning the H2, the results indicated that industry governance had positive and significant effects on industry trust ($\beta = 0.744$, $p < 0.001$). Hence, H2 was confirmed, as the industry governance had a 74.40 % impact on enterprise trust. According to Cohen [95],

the effect was large in size ($f^2 = 1.249$), which indicated that the industry governance contributed in a largely way on industry trust. Therefore, industry governance had a large impact on the industry trust.

Regarding H3, the results showed the effects that industry governance had on government trust ($\beta = 0.743$, $p < 0.001$), therefore H3 was accepted, as it has been found that industry governance had a direct impact of 74.30 % on government trust, and that this effect according to the test of Cohen [95] was large in size ($f^2 = 1.249$), which indicated that the industry governance had a large direct contribution in the power of prediction of the government trust.

The data analysis results confirmed the hypotheses proposed in this study, that is, industry governance had a significant impact on consumer's trust, which could enhance the trust of consumers in enterprises, industries and governments post crisis.

5. Discussion

In recent years, group product-harm crisis has become increasingly frequent and analyzing its impact has become extremely important [11]. Although this topic is important, little is known about group product-harm crisis [10,11]. Previous studies have shown that the group product-harm crisis bought greater negative impact on trust [100]. How to effectively govern the group product-harm crisis to recover the trust post crisis has become an important issue [27]. However, in the past, the government of product-harm crisis was mainly based on the situation of single enterprise product-harm crisis, using means such as apology and compensation [1,33], which cannot completely solve the violations of enterprises [30]. Punishing only one enterprise within the industry cannot eliminate the impact of group product-harm crisis, and it is necessary to manage group product-harm crisis from the perspective of industry governance [31]. However, previous studies have not explored the governance of group product-harm crises from the perspective of industry governance. Based on the theory of collaborative governance, this study explored the dimensions and measurements of industry governance. On this basis, this study analyzed the impact of industry governance on trust to clarify the governance effect of industry governance on group product-harm crisis. This research had the following findings.

Firstly, although some scholars [e.g. 31] have proposed the concept of industry governance in previous studies, there has been a lack of exploration of the dimensions and measurements of industry governance. Referring to the collaborative governance framework [52], this study clarified the dimensions of industry governance and established a second-order formative indicator measurement model. Specifically, this study suggested that industry governance was a structure composed of 2 s-order indicators (subject characteristics and subject relationship) and six first-order indicators (cooperative attitude, cooperative ability, resource investment; trust, communication, collaboration). Further data analysis indicated that the industry governance measurement scale established in this study had good reliability and validity. These research findings answered the first question raised in this study (Q1). The feature of the construct of industry governance proposed in this study was its emphasis on the participation and cooperation of multiple subjects in the governance process. This is consistent with the core ideas of governance theories proposed in the past to govern social issues, such as social co-governance [75,101,102], collaborative governance [52,103,104], and network governance [105]. Secondly, to verify the effectiveness of industry governance, this study analyzed the impact of industry governance on trust (enterprise trust, industry trust, and government trust). This study found that industry governance had a significant and positive impact on trust after group product-harm crisis. That is to say, industry governance has alleviated the trust crisis caused by group product-harm crisis. Industry governance can effectively govern the group product-harm crisis. These research findings answered the second and third questions raised in this study (Q2 and Q3). Previous studies have shown that governance had a significant impact on mitigating the impact of crisis [84,104,105]. This study analyzed the impact of governance from the perspective of industry governance, forming consistent conclusions with previous studies and enriching existing research findings.

6. Implications

6.1. Theoretical implications

Our results had several theoretical implications. Firstly, based on the insufficient research on governance of group product-harm crisis in the past [30], this study proposed the construct of industry governance and explored its dimensions and measurements, forming a clear theoretical framework for this construct. And as far as we know, it was the first time that industry governance has been applied to the governance of group product-harm crisis. This study made up for the deficiencies of existing research and enriched the governance theory and the product-harm crisis governance theory. Secondly, previous studies have shown that product-harm crisis can reduce or lose consumer's trust [8,36]. Trust recovery has become an important issue faced by enterprises after a crisis [27]. However, previous research on trust has mainly focused on narrow-scope trust, such as trust in enterprise [25,26]. In fact, the product-harm crisis not only affects narrow-scope trust, but also broad-scope trust [20]. Therefore, post crisis trust repair cannot be limited to narrow-scope trust alone, but should be extended to broad-scope trust. This study analyzed trust recovery from both narrow-scope trust (enterprise trust) and broad-scope trust (industry trust and government trust), which expanded the scope of trust recovery.

Thirdly, product-harm crisis has become very universal in today's market [106] and it is common for a product-harm crisis involving multiple brands or enterprises in an industry [10]. However, prior researches have focused on the single enterprise product-harm crisis [18] and few studies have been conducted on group product-harm crises [10,11]. This study explored the governance of group product-harm crisis, enriching the theory of product-harm crisis.

6.2. Practical implications

From a managerial perspective, the current study provided many guidance. Firstly, this study explored the structure and dimensions of industry governance with the help of collaborative governance theory, and pointed out that the effectiveness of industry governance was related to the cooperation of multiple subjects, which was crucial for product-harm crisis managers. In the past, the governance of product-harm crisis or social issues mainly relied on a single regulatory model of enterprises or governments [50]. This governance model has become an obstacle to achieving governance effectiveness [50,107]. Based on the findings of this study, when facing product-harm crisis or other social issues, managers should establish an idea of multi-subject cooperation and build a governance model that coordinates multiple subjects such as the government, market, and public.

Secondly, this study established a second-order measurement index model for measuring industry governance. This study indicated that the measurement scale had good reliability and validity. Meanwhile, this study found that industry governance has a positive impact on consumer's trust. According to the dimensions of industry governance (subject characteristics: cooperative attitude, cooperative ability, resource investment; subject relationship: trust, communication and collaboration), these factors these factors can affect the effectiveness of industry governance. Therefore, as a manager, one can strengthen the effectiveness of industry governance by adjusting the factors that affect industry governance. For example, the managers can increase resource investment in personnel, technology, and capital or expand communication channels and strengthen communication frequency to improve the effectiveness of industry governance.

7. Conclusions

This study proposed governance strategies for group product-harm crisis from the perspective of industry governance. On the basis of clarifying the dimensions and measurements of industry governance, this study analyzed the impact of industry governance on trust. We found that the measurement scale of industry governance proposed in this study had good reliability and validity. Moreover, industry governance had a significant and positive impact on post crisis trust. Industry governance helps to restore trust after a group product-harm crisis.

8. Limitations and future study

This current research had limitations and provided a direction for future research. First, considering the convenience of data collection, the measurement of industry governance in this study was mainly based on the participants' perception of governance behavior on the basis of fictional group product-harm crisis scenario. Although this can achieve the measurement effect to a certain extent, there was still a certain gap with real crisis situation. Therefore, in the future, it will collect data to measure industry governance under the context of real crisis in order to improve the validity of this study.

Second, there are different leading subjects in industry governance, such as government, industry organizations or enterprises. This study took the government as the leading subject of industry governance, and studies the impact of industry governance on trust. Logically speaking, there may be differences in the impact of industry governance on trust under different leading subjects. Therefore, in the future, in-depth research on whether there are differences in the impact of industry governance on trust under different leading subjects should be conducted, so as to continuously improve the conclusions of this study.

Third, this study analyzed the impact of industry governance from three aspects: enterprise trust, industry trust and government trust. For the convenience of the study, this study did not analyze the mutual influence of the three levels of trust. Previous studies have shown that broad-scope trust affected narrow-scope trust [16,20,26]. Therefore, in the future, incorporating the mutual influence between different levels of trust into the model to fully explore the impact of industry governance should be considered.

Fourth, this study analyzed the impact of industry governance on trust, and clarified the intensity and direction of the impact of industry governance on trust. To deeply understand the trust changes caused by industry governance, the level of trust before industry governance should be considered. By comparing the changes of trust before and after industry governance, we may deeply understand the impact of industry governance on trust. Therefore, in the future, measuring the changes of trust before and after the governance should be considered to further explore the impact of industry governance.

Fifth, considering the convenience of research and data acquisition, this study took students as samples and adopted a convenient sampling method for data collection. Although such survey subjects and sampling methods are often used in consumer behavior research, the generalizability of the conclusions drawn from this method has always been questioned. Therefore, in the future, the sample range can be further expanded and more representative samples can be selected to improve the generality of research conclusions.

Informed consent statement

All participants provided informed consent before joining the study.

Funding and Acknowledgement

This work was supported by Scientific Research Foundation for the Introduction of Talents, Suqian University, Jiangsu Innovative and Entrepreneurial Talent Project [grant number JSSCBS20221478], the Ministry of Education of Humanities and Social Science

Project [grant number 17YJA630047], and Hubei Province Philosophy and Social Science Research Major Project [grant number 16ZD031].

Data availability statement

Data will be made available on request.

CRediT authorship contribution statement

Yalin Li: Writing – review & editing, Writing – original draft, Funding acquisition, Conceptualization. **Min Zhao:** Investigation, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Constructs and measurements.

Constructs	Code	Items	Reference
Enterprise trust	ET1	I believe the enterprises are trustworthy.	Hansen (2012)
	ET2	I don't think these enterprises will keep their commitments.	
	ET3	Overall, I believe these enterprises are honest.	
Industry trust	IT1	I believe the shampoo industry is honest.	Hansen (2012)
	IT2	I think the shampoo industry cannot keep its commitment.	
	IT3	I believe the shampoo industry is trustworthy.	
Government trust	GT1	I believe the government is trustworthy.	Freimuth et al. (2014); Paek et al.(2008)
	GT2	I believe the government has the ability to handle crisis.	
	GT3	I believe the government will share information with the public.	
	GT4	I believe the government will communicate openly with the public.	
	GT5	I believe the government's actions are in the best interest of the public.	
Cooperative attitude	CAT1	Holding a special meeting to demonstrate a cooperative attitude.	Yao et al.(2010)
	CAT2	Developing a work plan indicates a cooperative attitude.	
	CAT3	Clarifying the responsibilities of all parties demonstrates a cooperative attitude.	
Cooperative ability	CAB1	Integrating relevant resources reflects the ability to cooperate.	Yao et al.(2010)
	CAB2	Coordinating the interests of all parties reflects the ability to cooperate.	
	CAB3	Establishing a working mechanism reflects the ability to cooperate.	
Resources investment	RI1	Personnel are an important resource investment for crisis governance.	Yao et al.(2010)
	RI2	Technology is an important resource investment for crisis governance.	
	RI3	Capital is an important resource investment for crisis governance.	
Trust	TR1	Sincere treatment reflects the trust between collaborators.	Yao et al.(2010)
	TR2	Keeping cooperation commitments is a manifestation of mutual trust.	
	TR3	Seeking truth from facts is a manifestation of mutual trust.	
Communication	COM1	Strengthening regular communication is the manifestation of improving communication effectiveness.	Yao et al.(2010)
	COM2	Expanding communication channels is a manifestation of improving communication effectiveness	
	COM3	Strengthening communication frequency is a manifestation of improving communication effectiveness.	
Collaboration	COL1	Joint responsibility for crisis governance is a manifestation of coordination among partners.	Yao et al.(2010)
	COL2	Jointly resolving crises is a manifestation of coordination among partners.	
	COL3	Coordination overcoming difficulties is a manifestation of collaboration among partners.	

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