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The Effects of Firm Actions on Customers' Responses to Product Recall Crises in the Automobile Industry

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Abstract

Product recalls in various industries are common. In managing quality-related crises, the behavior of enterprises significantly impacts their brand image. In recent years, there has been an increase in global production, product complexity, and customer demand for product quality and safety, leading to frequent product hazards worldwide. Companies often use product recalls to address defective, harmful, or dangerous products. This study examines the impact of different companies' behaviors on consumers and identifies which firm actions positively influence brand image during product recalls. It focuses on the influence of manufacturers' varied responses on consumers in the automobile industry and identifies corporate actions that bolster brand image amidst product recall crises. Data were collected via a survey to test hypotheses regarding these impacts. We determined which company actions during recall events affect consumer evaluations of the company's products and brand image. Based on these findings, we offer suggestions for companies' recall strategies.

Keyword: Product Recall; Customer Responses; Firm Actions; Brand Image.

1. Introduction

In recent years, the surge in global production, product intricacy, and consumer demand for product quality and safety has precipitated frequent product hazards worldwide (Chen et al., 2009). Scholars have termed these recurrent incidents as "product hazard crises" wherein a company's products are identified as defective or harmful (Dawar and Pillutla, 2000). The repercussions on consumer rights and public safety stemming from defective products have escalated into a significant societal concern. When faced with a product hazard crisis, companies typically resort to response measures, often disseminating information regarding their actions.

Four crisis management strategies have been posited to alleviate the adverse repercussions of product-harm crises: denial, involuntary recall, voluntary recall, and super-effort (Laufer and Coombs, 2006). Among these strategies, product recalls emerge as a common recourse for addressing defective, harmful, or hazardous products (Wei et al., 2016).

In the automotive sector, recalls are a frequent occurrence upon the discovery of defects. Noteworthy instances include GM's recall of 1.05 million Chevrolet Cobalts in 2007 (JUSTIA Auto Recalls, 2010), Toyota's three major recalls of nine million vehicles between 2009–2010 due to accelerator pedal and floor mat issues (Haq, 2010), BMW's 2010 recall of 350,000 vehicles worldwide, including 5,800 Rolls Royces made in the UK (Reuters, 2012), and SAIC-GM's 2016 recall of 2.16 million vehicles with third-generation 1.6L and 1.8L naturally aspirated engines (Reuters, 2016). However, product recalls entail negative product information that detrimentally impacts brand preferences and

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advertising effectiveness (Liu and Venkatesh, 2015). Consumers may lose trust in the implicated companies and their products, perceiving recalls as indicative of the company's failure to deliver safe products, thereby jeopardizing customer safety (Kalaignanam et al., 2013). Companies may employ additional strategies during recalls, such as public explanation, apology, and compensation offers. The public's response to these measures is pivotal, as mismanagement could exacerbate the adverse effects of the recall (Zavyalova et al., 2012).

The impact of recalls, particularly in the automotive realm, possesses distinctive characteristics, rendering research intricate and induction challenging. Each recall unfolds within a specific timeframe and pertains to particular vehicle models. Recalls may be instigated by the manufacturer or governmental entities and may entail varying degrees of risk for drivers (Souiden and Pons, 2009). Diverse corporate actions can either amplify or mitigate the negative fallout of a product recall. This study focuses on the influence of manufacturers' varied responses on consumers and identifies corporate actions that bolster brand image amidst product recall crises.

The remainder of this paper is organized as follows: Section 2 reviews the relevant literature. Section 3 describes the problem and outlines the research hypotheses. Section 4 introduces the research methodology. Section 5 presents statistical analyses and findings. Lastly, Section 6 furnishes conclusions and suggests avenues for future research.

2. Literature Review

The literature contains numerous studies addressing product recalls across various industries, investigating different aspects of these crises (recent examples include Ball et al., 2022; Chakraborty et al., 2023; Raithel et al., 2024; and Astvansh et al., 2024). Furthermore, several studies specifically focus on product recalls within the automobile industry. In a recent study, using the US auto recall data, Ro, et al. (2024) analyzed the legitimacy consequences for both foreign and domestic car companies. They investigated how organizational crises impact multinational corporations (MNCs) versus domestic firms. They argued and tested the idea that foreign firms face bigger legitimacy losses during crises due to their emphasized foreign identity and differing legitimacy expectations. They also investigated whether crises in one foreign firm have stronger negative ripple effects on other foreign firms compared to domestic ones.

In another recent paper, Xu, et al. (2024) investigated how a product recall by Tesla, an electric vehicle company, affected its competitors (BYD, NIO, LI). They analyzed online public opinion (social media buzz and sentiment) about Tesla and the stock market performance of these other companies before and after the recall. The study aimed to determine if and how Tesla's crisis "spilled over" to its rivals, both directly through stock prices and indirectly through public perception, and how social media played a role in this process. They also considered factors like brand similarity and the time it took for these effects to occur. For more similar studies in automobile industry, see Astvansh, et al. (2022), Malik and Jebari (2023), Astvansh and Eshghi (2023), Singh and Grewal (2023), Martins and Pires (2024), and Martins and Pires (2025).

Considering the serious consequences of product recalls for enterprises, the management of such crises has become an urgent concern (Chen et al., 2009). Different enterprises use various methods to deal with product quality crises based on the specific circumstances at the time. However, most previous studies have focused solely on the recalls themselves and have seldom considered how the behavior of enterprises affects consumer responses. Consequently, the importance of these actions has often been overlooked (Wang and Laufer, 2020).

Research on firm actions is, in fact, of great significance. The method of recall is an important factor that companies need to consider. Souiden and Pons (2009) explained that voluntary recalls positively influence a manufacturer’s image, whereas involuntary recalls negatively affect it. Furthermore, if a company refuses to recall (denial), the brand's image worsens.

How companies disclose information to the public during recalls is also crucial. Feng et al. (2010) pointed out that negative publicity by the media following a product recall announcement can lead consumers to overestimate the probability of potential risks. Zavyalova et al. (2012) emphasized that the involved enterprises should take subsequent actions to stabilize consumer sentiment and minimize the negative impact. Previous studies on crisis and impression management have shown that corporate information subsidies can affect media coverage (Westphal and Deephouse, 2011) and influence consumers' impressions by choosing which issues to report and how to explain them (Pollock et al., 2008). Generally, the effectiveness of corporate information subsidies depends on the actions announced by enterprises (Zavyalova et al., 2012). Enterprises can release manual information about their behaviors through

information intermediaries, such as the media, thereby influencing consumers' views on the appropriateness of corporate behavior.

When a recall event occurs, the enterprise's advertising strategy also needs to be considered. Using an event study method, Gao et al. (2015) proved that when a recall involves a new product with slight harm, the stock price loss is reduced; however, when the recalled product is an established model with significant risk, the loss is aggravated. Additionally, when a recall involves a new product, reducing pre-recall advertising can exacerbate stock price losses, regardless of the risk.

Moreover, whether and when the enterprise apologizes to the public is also worth considering. Toyota experienced a six-year continuous recall event from 2005 to 2010. Due to its failure to communicate and apologize to the public promptly, the company suffered serious losses, and customers' perception of the brand worsened (Weng, 2019). However, due to various considerations, enterprises do not always choose to disclose the real situation to the public and apologize.

Using the protective action decision model (PADM), Wei et al. (2016) researched the Volkswagen automobile recalls in China in 2013. They found that customers facing a product recall crisis have a greater demand for information, and their intention to seek information increases their favorable behavior intention. The scholars emphasized that when a product recall crisis occurs, follow-up action and related information disclosure are crucial to crisis management. However, their study only focused on the recall of one enterprise in China.

Souiden and Pons (2009) studied the impact of product crisis management on brand impression and customer loyalty, focusing mainly on four categories of recalls: denying the defect, involuntary recall, voluntary recall, and an improvement campaign. Other corporate behaviors, such as publicly apologizing and offering compensation, were not studied. Therefore, in this paper we improve this model by incorporating various firm actions within the scope of our research. To the best of our knowledge, this approach is novel and has not been previously studied.

3. Problem Description

3.1 Research Objectives

The behaviors of companies during product recalls can be diverse and multifaceted. Firstly, the four crisis management strategies mentioned previously—denial, involuntary recall, voluntary recall, and super-effort—may have varying effects on customer evaluations of the company's brand image. It is essential to understand these differential impacts in detail. Additionally, if an enterprise chooses to apologize publicly, it is crucial to assess whether this action can effectively mitigate the damage to its brand image and restore consumer trust. Furthermore, determining which types of information a company should disclose to the public during a recall event is vital. The manner and content of these disclosures can significantly influence public perception and consumer confidence.

Moreover, in the context of a recall, some companies offer customers cash compensation or other forms of recompense. This approach can potentially increase consumer satisfaction and subsequently enhance the brand image. However, it is important to investigate which types of compensation are most valued by consumers and to what extent these compensations influence their perceptions of the brand. The degree to which different compensation methods impact brand image and consumer loyalty needs comprehensive study.

Therefore, this research primarily focuses on the impact of the aforementioned corporate actions on customer responses. The central research question is: in the case of automobile recalls, which specific firm actions are most concerning to consumers, and how do these actions affect the company's brand image and customer loyalty? This involves a detailed examination of consumer reactions to various corporate behaviors during recalls. Additionally, the study explores the effectiveness of different crisis management strategies in maintaining or restoring the company's reputation and customer base.

To address these questions, we have constructed a hypothetical conceptual model, which is depicted in Figure 1. This model aims to illustrate the potential relationships between different corporate actions and their impacts on consumer perceptions and behaviors. By analyzing these relationships, the research seeks to provide insights into the most effective strategies for managing product recalls and mitigating their negative effects on brand image and customer loyalty.

This study not only seeks to contribute to the academic literature on crisis management and consumer behavior but also aims to offer practical recommendations for companies facing product recalls. By understanding the nuanced impacts of various crisis management strategies and corporate actions, businesses can make more informed decisions that align with consumer expectations and enhance overall brand resilience.

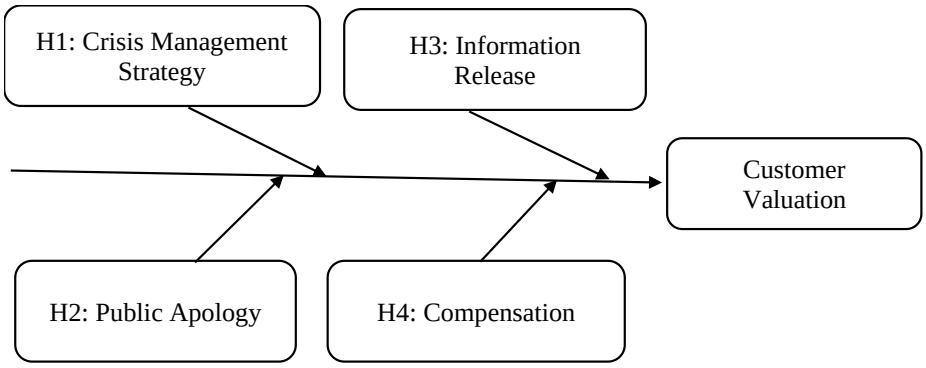

Figure 1. Research Framework

3.2 Research Hypotheses

Based on the research framework, we hypothesize that customers will respond differently to various firm actions. This study will discuss four categories of firm actions: crisis management strategy, public apologies, information release methods, and compensation methods.

1) Crisis Management Strategy: This research focuses on consumers' attitudes towards voluntary recalls, mandatory recalls, and denials. It investigates whether voluntary recalls can mitigate the decline in the company's brand image during a product quality crisis. Additionally, it examines whether consumers perceive voluntary recalls as evidence of the company's sense of responsibility.

2) Apologizing Publicly: The study analyzes the effectiveness of public apologies, exploring consumers' attitudes towards companies' public apologies and their impact on corporate brand impressions. It aims to determine how sincere apologies influence consumer trust and brand loyalty.

3) Information Release: This refers to the company's behavior in disseminating information during a car recall incident. The research primarily considers the impact of the type of information, the method of release, and the timing of the release on customer perceptions. It examines how transparent and timely communication affects consumer confidence and brand image.

4) Compensation: The study investigates whether compensation can increase customer satisfaction and improve the company's brand image during a recall crisis. Additionally, it explores what types of compensation consumers prefer and how different compensation methods influence their perceptions of the company.

By addressing these hypotheses, this research aims to provide a comprehensive understanding of how different firm actions impact consumer responses during product recalls. The findings will contribute to the development of effective crisis management strategies that enhance consumer trust and loyalty, ultimately improving the company's resilience in the face of product quality crises.

Hypothesis 1: H1 (Crisis Management Strategy and Customer Valuation)

- **H1-1:** *Voluntary recall positively influences customers' valuation of the brand image.*
- **H1-2:** *Mandatory recall required by the government (involuntary recall) negatively influences customers' valuation of the brand image.*
- **H1-3:** *Denial strategy negatively influences customers' valuation of the brand image.*

Hypothesis 2: H2 (Public Apology and Customer Valuation)

- **H2:** *Public apology positively influences customers' valuation of the brand image. In other words, a public apology helps to restore the brand image.*

Hypothesis 3: H3 (Information Release and Customer Valuation)

- **H3-1:** *If an enterprise fully explains the recall and communicates with customers, consumers will tend to give positive reviews to the brand.*
- **H3-2:** *If an enterprise communicates with customers in a timely manner, consumers will tend to give positive reviews to the brand.*

Hypothesis 4: H4 (Compensation and Customer Valuation)

- **H4:** *If the company compensates the owner of the recalled vehicle, it will help the company restore its brand image; in other words, it will positively affect customer valuation.*

In short, this study hypothesizes that in a recall event, customers will respond differently to various firm actions, and customers' evaluations of the brand will also be influenced by these actions. The research methods used in this paper will be introduced in detail in the methodology section.

4. Methodology

4.1 Sample Selection and Data Collection

This study used questionnaires to collect data. The data collection for this empirical study was conducted online, primarily targeting internet users in China. Initially, 789 questionnaires were collected. After screening for validity, questionnaires with an answer time of less than one minute and those with obvious contradictory answers were removed. This process resulted in 758 valid samples.

The demographic breakdown of the valid samples is as follows:

- Age group 18-25: 7%
- Age group 26-35: 26%
- Age group 36-45: 26%
- Age group 46 and older: 41%

Regarding automobile ownership:

- 84% of respondents or their families own at least one car.
- 7% of respondents have more than three cars.
- 16% of respondents do not own a car.
- 21% intend to purchase a vehicle within a year.
- 74% have more than one year of driving experience.
- Nearly 53% have more than five years of driving experience.
- 90% have heard of or learned about car recalls.
- 13% have personally experienced a car recall.

This demographic information indicates that the majority of respondents have substantial familiarity with the phenomenon of car recalls.

4.2 Research Methodology

This research utilized a hypothesis-testing approach, employing a self-administered questionnaire to gather data. All items in the questionnaire were measured on a five-point Likert scale (1 = totally disagree to 5 = totally agree). The questionnaire explored consumers' attitudes towards four types of corporate behaviors and their impact on brand image. The design of the questionnaire was based on two previous studies, Siomkos and Kurzbard (1994) and Souiden and Pons (2009).

Data analysis incorporated both qualitative and quantitative methods, including descriptive statistics, hypothesis testing, variance analysis, and linear regression analysis. These methods were used to verify the proposed hypotheses through thorough data analysis.

5. Results

This study analyzes and discusses the four firm actions mentioned above to determine their impact on consumers. The analysis verifies the assumptions stated earlier.

5.1 Reliability and Validity Analysis

Before testing the hypothesis with the questionnaire data, the reliability of the data must be assessed. In this study, Cronbach's Alpha is used to analyze data reliability. The questionnaire items are divided into four categories based on the company behavior involved, and a reliability analysis is conducted for each category. Items with a corrected item-total correlation (CITC) less than 0.4 are removed. The reliability test results are shown in Table 1.

Table 1. Result of the reliability test

Firm action	Retained items	Cronbach's Alpha
Crisis Management Strategy	5	0.801
Apologizing Publicly	4	0.823
Information Release	5	0.890
Compensation	2	0.811

As shown in the table, Cronbach's Alpha for each category exceeds 0.8, indicating that the data meets reliability requirements and has good consistency. Therefore, the data can be used for further analysis. We also tested the validity of the data, with results shown in Table 2.

Table 2. Result of the validity test

KMO and Bartlett's test		
	KMO	0.92
Bartlett Test	Approx. Chi-Square	2697.05
	df	120
	P-value	0.00

From the table, the Kaiser-Meyer-Olkin (KMO) measure is 0.920, greater than 0.8, indicating good validity of the research data.

5.2 Hypothesis Testing

5.2.1 Results of Crisis Management Strategy

For data processing, this study averages the items involving attitudes towards voluntary recall, mandatory recall, and denial, thereby constructing three new variables: voluntary recall, mandatory recall, and denial. The descriptive statistical results of these variables are shown in Table 3.

Table 3. Voluntary recall and mandatory recall

Firm action	N	Min.	Max.	Mean	S.D.	Median
Voluntary recall	758	1.000	5.000	4.003	0.901	4.000
Mandatory recall	758	1.000	5.000	4.260	0.978	5.000
Denial	758	1.000	5.000	4.271	1.172	5.000

According to the questionnaire, if the customer's preference for voluntary recall is higher, the value of the variable voluntary recall is higher. A value closer to 5 indicates a higher degree of customer recognition of voluntary recall,

suggesting that voluntary recall improves their attitude towards the brand image. Conversely, values closer to 5 for mandatory recall and denial indicate higher customer aversion, as these actions are perceived to damage the brand image.

A normality test conducted on these three datasets shows that, while not perfectly normal, they can be approximated by a normal distribution. Therefore, methods for normal distribution analysis can be used. Since a score of 3 on the Likert scale represents a neutral attitude, verifying H1-1, H1-2, and H1-3 requires testing whether the mean of each dataset is significantly greater than 3. A Z-test on the distributions of the three datasets provides the results shown in Table 4.

Table 4. The result of Z Test

Firm Action	H_0	95% CI	Z	p	
Voluntary recall	$4.003 \leq 3.000$	3.893 ~ 4.113	17.881	0.000	Rejected
Mandatory recall	$4.260 \leq 3.000$	4.141 ~ 4.379	20.694	0.000	Rejected
Denial	$4.271 \leq 3.000$	4.128 ~ 4.414	17.419	0.000	Rejected

The mean Z-test results show that the null hypotheses are rejected at the 95% confidence level. Thus, it can be concluded that, at the 95% confidence level, consumers favor voluntary recalls and reject mandatory recalls and denials. This supports H1-1, H1-2, and H1-3. Therefore, the research results indicate that consumers' evaluation of the brand image improves with voluntary recall actions. Conversely, if the government mandates a recall, customer evaluation declines. Additionally, it is clear that companies cannot evade responsibility for quality crises by denying responsibility.

5.2.2 Results of Public Apology

This study uses the same method as above to construct variables related to customers' attitudes towards a company's public apology behavior. The descriptive statistical results of this variable are shown in Table 5.

Table 5. Public Apology

Firm action	N	Min.	Max.	Mean	S.D.	Median
Public Apology	758	1.000	5.000	4.053	0.788	4.000

In this study, the normality of the variable was tested. A value closer to 5 indicates a higher degree of recognition of public apologies. To test people's attitudes and responses to a company's public apology behavior, a mean Z-test was conducted on this dataset. The results are shown in Table 6.

Table 6. The result of Z Test

Firm Action	H_0	95% CI	Z	p	
Public Apology	$4.053 \leq 3.000$	3.957 ~ 4.149	21.464	0.000	Rejected

The mean Z-test results show that the mean of the data is significantly greater than 3, indicating that consumers have a positive attitude towards a company's public apology in a recall event. Therefore, H-2 is supported.

5.2.3 Results of Information Release

This section discusses customer responses to a company's information release behavior, focusing on preferences for the company releasing technical details of recalled vehicles and timely explanations of the recall's cause and handling measures. Two variables are constructed as described above. The descriptive statistical results of these variables are shown in Table 7.

Table 7. Information release

Firm action	N	Min.	Max.	Mean	S.D.	Median
Technical Details	758	1.000	5.000	4.180	0.767	4.250
Timely Release	758	1.000	5.000	4.093	0.929	4.000

These variables assess customer attitudes towards the company's release of technical details and timely press conferences. Normality tests indicate these datasets can be approximated as normal distributions. To verify the hypotheses, a mean Z-test is conducted on these datasets, with results shown in Table 8.

Table 8. The result of Z-test

Firm Action	H_0	95% CI	Z	p	
Technical details	$4.180 \leq 3.000$	4.086 ~ 4.274	24.711	0.000	Rejected
Timely release	$4.093 \leq 3.000$	3.980 ~ 4.206	18.898	0.000	Rejected

The results indicate that respondents have a positive attitude towards the release of technical information by the company. If the company explains the technical details and the cause of failure during the recall event, the public's evaluation of the company's brand image improves, supporting H3-1. Moreover, timely release of relevant information enhances the public's impression of the company, supporting H3-2.

5.2.4 Results of Compensation

The impact of compensatory behavior on customers is also discussed. The descriptive statistical result of the data is shown in Table 9.

Table 9. Compensation

Firm action	N	Min.	Max.	Mean	S.D.	Median
Compensation	758	1.000	5.000	4.244	0.827	4.500

This dataset can also be approximated as a normal distribution. To test whether customers show a positive attitude towards a company's compensation behavior in a recall event, a mean Z-test is conducted. The results are shown in Table 10.

Table 10. The result of Z-test

Firm Action	H_0	95% CI	Z	p	
Compensation	$4.244 \leq 3.000$	4.143 ~ 4.345	24.162	0.000	Rejected

The null hypothesis is rejected at the 95% confidence level, indicating that customers have a positive attitude towards a company's compensation behavior. If a company compensates the owner of a recalled vehicle, its brand image improves, and consumers tend to accept the compensation. Thus, H4 is supported. In summary, all the hypotheses in this study are supported.

5.3 Discussions

5.3.1 Comparison of Different Corporate Behaviors

The data analysis indicates that the four types of corporate behaviors positively impact customer evaluations. This section further discusses the influence of these behaviors on customers, specifically examining which behaviors elicit the most sensitivity from the public.

Variables reflecting positive attitudes were identified, and paired-sample t-tests were performed for each pair of variables. The significant differences were identified, and the results are presented in Table 11.

Table 11. Paired-sample t-tests

ID	paired	mean	S.D.	Mean difference	t	*p*
Paired 1	Technical Details	4.18	0.77	0.18	3.877	0.000**
	Voluntary Recall	4.00	0.90			
Paired 2	Technical Details	4.18	0.77	0.13	3.786	0.000**
	Public Apology	4.05	0.79			
Paired 3	Technical Details	4.18	0.76	0.09	2.360	0.004*
	Timely Release	4.093	0.929			
Paired 4	Compensation	4.244	0.827	0.24	4.621	0.000**
	Voluntary Recall	4.00	0.90			
Paired 5	Compensation	4.244	0.827	0.19	4.422	0.000**
	Public Apology	4.06	0.74			
Paired 6	Compensation	4.244	0.827	0.15	3.277	0.001**
	Timely Release	4.093	0.929			

*p <0.05 **p <0.01

The data reveals that during a recall incident, the public is most sensitive to detailed information released by the company and the proposed compensation method. The technical details about the product hazard released by companies help customers understand the causes of failures more thoroughly, thereby increasing their confidence in the company's ability to resolve quality issues. Conversely, a lack of clear explanation may erode customer trust in the manufacturer's products. This heightened attention to detailed information explains why customers prioritize this behavior.

Consumers also place significant importance on whether companies provide compensation and the nature of that compensation, likely because compensation directly affects their personal interests. When their rights are impacted, the potential for compensation becomes a primary concern. The lack of significant difference between the importance placed on compensation and the release of detailed information suggests that consumers view these two behaviors with nearly equal importance. Thus, compared to recall methods and company apologies, consumers are more concerned about the company's ability to resolve quality problems and protect their rights and interests.

5.3.2 Comparison of Different Groups of People

This section examines the differences in attitudes among various demographic groups towards company behavior during recalls. The goal is to determine if different customer groups respond differently to corporate actions.

An analysis of variance (ANOVA) was conducted across different age groups: Group 1 (18-25 years old), Group 2 (26-35 years old), Group 3 (36-45 years old), and Group 4 (over 45 years old). The results are shown in Table 12.

Table 12. The difference between people with different age

	Age (Mean ± S.D.)				*F*	*p*
	1.0 (*n*=53)	**2.0 (*n*=197)**	**3.0 (*n*=197)**	**4.0 (*n*=311)**		
Voluntary Recall	4.30±0.93	3.63±0.98	4.13±0.64	4.11±0.93	5.777	0.001**
Public Apology	4.13±0.87	3.86±0.84	4.04±0.61	4.17±0.82	2.223	0.086
Technical Details	4.43±0.63	3.95±0.78	4.21±0.70	4.26±0.79	3.143	0.026*
Timely Release	4.44±0.62	3.94±0.90	4.06±0.85	4.15±1.02	1.641	0.180
Compensation	4.50±0.69	4.07±0.83	4.22±0.77	4.33±0.87	2.031	0.11

*p <0.05 **p <0.01

The analysis indicates that Group 2 (26-35 years old) shows significantly lower recognition of voluntary recall and technical detail release behaviors compared to other age groups. This suggests that customers in this age group are the least likely to improve their brand impression following quality issues. For other corporate behaviors, there are no significant differences among age groups. Therefore, if a brand or company primarily targets customers aged 26-35, it should focus its crisis management efforts on public apologies and compensation methods during a recall.

Further analyses were conducted based on driving experience, recent car purchase intentions, the number of vehicles owned, and previous recall experiences. The results show that these factors do not significantly impact customer attitudes.

Interestingly, while no significant differences were found among groups in their attitudes towards company behavior, individuals with the intention to purchase a car within the next year are more sensitive to negative company behavior. For example, as shown in Table 13, those with purchase intentions are significantly more likely to agree that a lack of public apology will lead to a decline in brand evaluation compared to those without purchase intentions.

Table 13. Influence of purchase intention

	Purchase intention (Mean ± S.D.)		*F*	*p*
	0.0 (*n*=596)	1.0 (*n*=162)		
Refusal to apologize leads to a decline in brand image	4.12±1.06	4.53±0.69	7.389	0.007**

Thus, if a company mishandles a recall, potential customers who are considering a recent car purchase are more likely to form negative reviews, underscoring the importance of effective crisis management for auto companies.

5.3.3 Customer's Preference for Compensation

Section 5.3.1 established that compensation behavior significantly influences public and customer attitudes. Thus, determining the optimal compensation method to enhance brand image and customer satisfaction is crucial. The questionnaire included questions addressing this issue.

Respondents were provided with five compensation options:

1. Provide a spare vehicle during the recall maintenance period;
2. Subsidy for traffic costs due to the recall;
3. Compensation for lost wages caused by the recall;
4. Other compensation methods (specify);
5. No compensation required (mutually exclusive with other options).

The results, shown in Table 14, indicate that respondents prioritize addressing vehicle problems and traffic costs incurred during the recall. Some respondents also expressed a preference for receiving a new car. Over 95% of respondents believe that companies need to provide necessary compensation, reaffirming the importance of compensation behavior during recalls.

Table 14. Compensation methods

Compensation methods	N	proportion
Spare Vehicle	494	65.12%
Transportation Expenses	514	67.83%
Lost Wages	288	37.98%
Other Compensation Methods	21	2.71%
No Compensation	26	3.49%

6. Conclusions

In this paper, we examined how various corporate actions during car recall events affect consumers' evaluations of corporate products and brand image. The study focused on four types of firm actions: crisis management strategy, public apology, information release methods, and compensation methods. The research revealed that during a quality crisis, if an automobile company chooses to voluntarily recall problematic vehicles, it can help restore its brand image and improve customer evaluations. Conversely, if the company handles the situation poorly, resulting in government or regulatory intervention to mandate a recall, consumer evaluations of the company's brand image will significantly decline.

The study finds that timely communication with customers before and after the recall positively impacts brand evaluations. Particularly, if the company provides detailed information about the recall and the reasons for the quality issues, consumers are more likely to give positive feedback. Additionally, a sincere public apology during the recall can lead Chinese consumers to believe that the company will better control product quality in the future. Thus, while a recall may negatively impact the company's brand image, a responsible attitude can mitigate this impact.

Furthermore, customers highly value the compensation behavior of companies. Proper compensation for the owners of problematic vehicles can significantly improve customer satisfaction and the company's brand image. Among various compensation methods, respondents showed a clear preference for providing a spare vehicle and traffic cost compensation. The paper also presented a comparative analysis of the four behaviors. The findings suggest that customers are more sensitive to the technical details of failures and the company's compensation measures. This conclusion provides valuable insights for enterprise crisis management.

Additionally, the study compared the responses of different demographic groups. Notably, individuals aged 26 to 35 are more sensitive to recall events, making it more challenging for companies to improve reviews from this age group. Therefore, companies should focus more on addressing the concerns of this demographic. Moreover, individuals planning to buy a car within the next year are more sensitive to the company's negative behaviors and news. Consequently, poor handling of a quality crisis can significantly impact recent sales.

Research Limitations: This study utilizes questionnaires to analyze attitudes towards corporate behavior without examining actual customer behavior in real car recall cases. Considering potential discrepancies between personal

attitudes and actual behaviors, the impact of corporate actions on customers may be more complex in real recall events. Moreover, the sample consists exclusively of respondents from China, reflecting only the attitudes of Chinese customers towards recall incidents. Furthermore, nearly half of the random sample included customers older than 46 years, which may not fully represent younger consumers who are increasingly influential in today's automotive markets.

Future Studies: Future research could combine actual recall incidents to study the public's true responses to corporate behaviors. Additionally, this study found that some respondents are less concerned with public apologies and more focused on the company's specific handling measures. However, a lack of public apology still negatively impacts their favorability towards the company. Exploring such complex and interesting issues could be a fruitful area for future research.

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