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The Social Cognition of Japan's Nuclear-Contaminated Water in Chinese Social Media

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Abstract: The issue of nuclear-contaminated water in Japan has led to various concerns, including social public safety and food safety. This study aims to investigate the impact of this issue on the perception of social public safety among Chinese consumers by examining the spread of Japanese products in China. The study employs methodologies such as questionnaire analysis, online review collection, and examination of business statistics to analyze the data objectively. Focusing on the official discharge of nuclear-contaminated water into the sea as a crucial event, the study compares the social cognition of the audience on different social media platforms before and after the discharge. Quantitative and qualitative analysis using a subject analysis framework is used. The findings indicate that the discharge of nuclear-contaminated water in Japan has significantly improved people's social cognition of public safety on Chinese social media, significantly changing their attitude toward Japanese products.

Keywords: boycott nuclear pollution emissions, Japanese-related product sales decline, reduce Japanese imports, condemn the Japanese government, test product safety

1. Introduction

Japan is a relatively resource-poor country surrounded by the sea, and the growing demand for energy, immaculate, efficient, and reliable nuclear energy, has made Japan one of the most dependent countries in the world on nuclear energy. In the face of such large-scale nuclear energy reserves, Japan needs help with problems, such as effectively controlling risks and hazards. A tsunami triggered by the magnitude-9 earthquake that struck Japan on March 11, 2011, seriously damaged the Fukushima Daiichi nuclear power facility, and resulted in an accident involving radioactive leaks. Large amounts of seawater must be pumped in to cool the molten nuclear fuel, resulting in the daily production of around 100 tons of contaminated water. The Japanese government's decision to discharge more than 1.3 million tons of radioactively tainted water into the Pacific Ocean on August 24, 2023, has been controversial worldwide.

This study uses social cognitive theory to study nuclear-contaminated water events in the context of social public safety because social cognitive theory applies to a broader group study [1]. This research is based on social public safety events and social cognitive theory. It uses nuclear-contaminated water discharge as the background and uses social cognitive theory to examine people's opinions and ideas about future events. Historical research is reviewed to compare public safety events [2].

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The analysis conducted in this research study involves the following: 1) The examination of the information transfer that occurred during the discharge of nuclear-contaminated water in Japan. This analysis aims to understand how this information influenced the psychological changes of individuals and the dissemination of goods. 2) The assessment of the attitudes expressed by official media and social media platforms towards the "Japan nuclear-contaminated water Discharge Event." This analysis aims to understand how these diverse sources contributed to the spread of information and the audience's reactions. 3) The determination of when discussions about the leak of nuclear-contaminated water in Japan became prominent on social media platforms. This analysis aims to identify the point at which public awareness and engagement on this topic reached a significant level. 4) The evaluation of the factors responsible for the long-term and widespread effects resulting from the release of nuclear-contaminated water in Japan. This analysis aims to uncover the key drivers that amplified the impact and consequences of this event. 5) The examination of how the information related to the leak of nuclear-contaminated water in Japan influenced public perception and its impact on the export and dissemination of goods. This analysis reveals the connections between information flow and its influence on public attitudes and economic activities. Through these analytical investigations, this research aims to provide a nuanced understanding of the dynamics and consequences associated with the discharge of nuclear-contaminated water in Japan. The findings can contribute to developing more effective strategies for information dissemination, risk management, and public communication in similar incidents.

2. Methods

2.1. Survey Questionnaire

Quantitative analysis was conducted in the form of questionnaires, and the research time was mainly between the announcement of the discharge of nuclear-contaminated water and the official discharge of nuclear-contaminated water (August 24) and the two stages after the discharge of nuclear-contaminated water. These two stages are the period of social media public opinion fermentation and the period of social public opinion explosion, during which the quantitative analysis can more accurately analyze the more rational and predictable answers of Chinese users to the public safety issue of nuclear sewage into the sea [3]. The two questionnaires respectively surveyed 200 Chinese users from different social platforms.

Most respondents in this study were located in central and eastern China, particularly in coastal areas. The sample comprised primarily young individuals and students, with women accounting for 60% and men making up 40%. This research explored participants' background cognition, psychological attitudes, consumption perceptions, and any changes in their perceptions. These aspects' questions and corresponding answers were independently coded to identify several key themes. Ultimately, a comparison was drawn between the characteristics of views from the two periods to identify specific factors impacting people's consumption patterns. A significant portion of the respondents in this study resided in central and eastern China, with a particular focus on coastal areas. Most participants were young people and students, with women accounting for 60% of the sample and men making up 40%. The analysis of this research encompassed several dimensions, including background cognition, psychological attitudes, consumption perceptions, and changes in perception. Each dimension was coded separately to identify key themes and patterns. Finally, a comparison was made between the characteristics of views during the two periods to identify factors influencing people's consumption behaviors.

The quantitative questionnaire administered before and after the discharge of nuclear-contaminated water was subjected to Pearson correlation analysis [4, 5]. This study utilized linear correlation analysis, with values ranging from -1 to 1. The Pearson correlation coefficient formula

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employed is as follows [6]. To analyze the relationship between variables, this study employed Pearson correlation analysis for the quantitative questionnaire administered before and after the discharge of nuclear-contaminated water. The analysis employed the Pearson correlation coefficient, which measures the linear correlation between two variables and ranges from -1 to 1.

Table 1: Correlation analysis between attitude and consumption factors before discharge of nuclear contaminated water.

	A.What is your attitude towards the discharge of nuclear contaminated water in Japan?
B. Do you know the background and related situation of the discharge of nuclear contaminated water in Japan?	0.226** p:0.001
C. Will you change your purchasing attitude towards Japanese products because of the discharge of nuclear wastewater in Japan?	0.244** p:0.000
D. Will you actively choose to purchase alternative products from non-Japanese brands?	0.082 p:0.246
E. Do you think Chinese consumers will boycott Japanese products because of the release of nuclear contaminated water?	0.202** p:0.004
F. Are you satisfied with the attitude of the Chinese government in dealing with the discharge of nuclear contaminated water from Japan?	0.156* p:0.028
G. Are you willing to participate in the boycott of Japanese goods?	0.156* p:0.028
H. Are you satisfied with the Chinese media's reports on the discharge of contaminated water from Japan?	0.147* p:0.038
I. Are you willing to continue buying Japanese goods, but choose goods from areas that are not affected by nuclear contaminated water?	0.272** p:0.000
J. Are you willing to pay a higher price for Japanese goods affected by non-nuclear contaminated water?	0.305** p:0.000
K. Are you willing to buy Japanese goods that have been rigorously tested and meet safety standards?	0.216** p:0.002

*p<0.05 ** p<0.01

Even if the correlation value is less than 0.2, it remains statistically significant, denoted by an asterisk (*) in the upper-right corner. A single asterisk (*) indicates significance at the 0.05 level, while two asterisks (**) indicate significance at the 0.01 level. Significance in this context means the occurrence of the correlation. Based on Table 1, a correlation analysis using Pearson correlation coefficients was conducted to examine the relationships among 11 variables labeled A, B, C, D, E, F, G, H, I, J, and K. The results indicate significant positive correlations between A and B, C, E, I, J, and K at a significance level of 0.01. This means that as A increases, B, C, E, I, J, K also tend to increase, and vice versa. Additionally, A shows significant positive correlations at a significance level 0.05 with F, G, and H.

However, the correlation coefficient between A and D is 0.082, close to zero, suggesting no significant correlation between them. In summary, we can assess the strength and statistical significance of the relationships among these variables by considering the magnitude of correlation coefficients and significance levels.

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Table 2: Cross analysis of attitude and consumption factors after discharge of nuclear contaminated water.

Pearson Related - Standard format	
	A.What is your attitude towards the discharge of nuclear contaminated water in Japan?
B. Do you know the background and related situation of the discharge of nuclear contaminated water in Japan?	0.000 p:1.000
C. Will you change your purchasing attitude towards Japanese products because of the discharge of nuclear wastewater in Japan?	-0.131 p:0.421
D. Will you actively choose to purchase alternative products from non-Japanese brands?	0.066 p:0.687
E. Do you think Chinese consumers will boycott Japanese products because of the release of nuclear contaminated water?	0.066 p:0.687
F. Are you satisfied with the attitude of the Chinese government in dealing with the discharge of nuclear contaminated water from Japan?	0.505** p:0.001
G. Are you willing to participate in the boycott of Japanese goods?	-0.091 p:0.576
H. Are you satisfied with the Chinese media's reports on the discharge of contaminated water from Japan?	0.081 p:0.618
I. Are you willing to continue buying Japanese goods, but choose goods from areas that are not affected by nuclear contaminated water?	0.031 p:0.852
J. Are you willing to pay a higher price for Japanese goods affected by non-nuclear contaminated water?	-0.072 p:0.657
K. Are you willing to buy Japanese goods that have been rigorously tested and meet safety standards?	-0.031 p:0.852

* $p<0.05$ ** $p<0.01$

Table 2 presents the results of the correlation analysis examining the relationships between variables. The following findings were observed: A shows correlation coefficients close to 0 with all variables except for F, indicating no significant correlation.

After comparing the results, it was found that the overall correlation between the questionnaire assessing attitudes towards the discharge of nuclear-contaminated water and the questionnaire assessing purchasing behavior significantly increased, except for variable D, which showed no correlation. This indicates that people's attitude toward the discharge of nuclear-contaminated water impacts their consumption of Japanese products, and different attitudes will result in different purchasing behaviors. However, in the questionnaire analysis assessing attitudes after the discharge of contaminated nuclear water, variable F showed a positive correlation with variable A, while the other variables showed little relationship with attitude. Influenced by the incident, there has been a shift toward negative attitudes regarding consuming Japanese products.

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2.2. Quantitative Analysis

The qualitative analysis lists three themes: official media, popular science or commentary self-media, and Japanese brand spokespersons or promoters (Internet celebrities, celebrities). Then, the differences and similarities of the audience's attitudes were compared from two periods before and after the discharge of nuclear-contaminated water. The three data sources are from Weibo, the most significant social platform in China, where the changes in public opinion under the social media platforms of People's Daily, Yuyuantan, and SKII brand spokespersons are selected, respectively.

Table 3. Analysis of the frequency of social media comments before the discharge of nuclear contaminated water.

Name	Options	Frequency	Percent (%)	Cumulative percentage (%)
Public attitudes of state media before the release of nuclear contaminated water (n=9)	oppose	7	77.78	77.78
	neutrality	1	11.11	88.89
	agree	1	11.11	100.00
Comments on popular science we-media audience attitude before nuclear contaminated water discharge	oppose	35	71.43	71.43
	neutrality	9	18.37	89.80
	agree	5	10.20	100.00
The attitude of Japanese product spokespersons and recommenders of Internet celebrities before the discharge of nuclear contaminated water under the media	oppose	1	2.04	2.04
	neutrality	5	10.20	12.24
	agree	43	87.76	100.00
Total		49	100.0	100.0

From the analysis before and after the discharge of nuclear-contaminated water, it can be seen that the comments of the official media remained consistent within a specific data range (Tables 3, 4). In contrast, the proportion of opposition to the comments of the popular science self-media increased significantly, and no relevant comments supported the discharge of nuclear-contaminated water. Finally, the media accounts of Internet celebrities and Japanese product spokespersons have changed from many endorsing products to a phenomenon of polarization and neutrality. To sum up, the formal discharge of nuclear-contaminated water significantly correlates with consumers' purchasing and critical psychology.

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Table 4: Analysis of the frequency of social media comments after the discharge of nuclear contaminated water.

name	Options	frequency	percent (%)	Cumulative percentage (%)
The attitude of the audience of the official media after the discharge of contaminated nuclear water (n=9)	oppose	7	77.78	77.78
	neutrality	1	11.11	88.89
	agree	1	11.11	100.00
Comments on popular science we-media audience attitude after the discharge of nuclear contaminated water	oppose	43	87.76	87.76
	neutrality	6	12.24	100.00
The attitude of Japanese product spokespersons and recommenders of Internet celebrities after the discharge of nuclear contaminated water under the media	oppose	24	48.98	48.98
	neutrality	9	18.37	67.35
	agree	16	32.65	100.00
total		49	100.0	100.0

3. Results and Discussion

The release of water contaminated with nuclear waste presents a severe and enduring public safety concern [7]. Furthermore, the COVID-19 pandemic has brought about shifts in the economic landscape and consumer habits, resulting in changes in consumption levels and patterns [8]. Based on recent research, Japan's discharge of nuclear-contaminated water has had a significant adverse effect on Japanese products, especially in the Chinese consumer market.

To address these challenges, it is imperative to adopt a mindset of long-term coexistence with public safety issues [9-10]. This can be achieved by reducing the risks associated with the discharge of nuclear-contaminated water through predictive analysis of public awareness and consumer psychology on social media. Based on current research, it is evident that the discharge of nuclear-contaminated water by Japan has had a substantial negative impact on Japanese goods, particularly within the Chinese consumer market. Overall, it is vital to establish a mentality of long-term coexistence with public safety issues, implement measures to reduce risks, and effectively control the challenges arising from the discharge of nuclear-contaminated water, just as we do in the face of other social public safety issues such as the COVID-19 pandemic.

4. Conclusion

As Japan began to announce the official discharge of nuclear-contaminated water, more and more people began to pay attention to the dynamic development of the event, which began to question, boycott, and other attitudes, but at the same time, there were several loyal users still believe that the relevant products have been strictly standardized production testing, so there will be no wavering attitude. From Table 1 to Table 2, it can be analyzed that people had significant changes in cognition before and after the discharge of nuclear-contaminated water. Chinese social media strongly disagreed with Japan's attitude towards discharging nuclear-contaminated water. From the analysis of Table 3 and Table 4, it can be observed that all fans of product spokespeople and some people dependent on and loving products have little change in their attitudes toward Japanese products. Therefore, the people who have changed their attitudes are mostly those who have used Japanese products and are worried about the future of Japanese products. The proportion of this group is also

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more significant than those who do not use Japanese products and insist on using Japanese products. Through this study, we find data support to help consumers bring more scientific purchasing data. In addition, this study has also brought about changes in the purchasing popularity of Chinese users in different aspects for related enterprises to adopt more scientific and innovative coping methods. No matter what policy response is taken to the issue of nuclear-contaminated water, it is a social and public security issue related to the community of human destiny. Through research, all parties are encouraged to actively face the problem of nuclear-contaminated water and strive to find safer and more effective solutions to provide a safe and reliable environment for society.

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