

Analysis of Differences in Comments of Internet Users under Hot Internet Events: The Case of the Nuclear Sewage Discharge Incident in Japan

Mingjia Zhang

*Shanghai Weiyu School, Shanghai, 200000, China
13918480097@163.com*

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Abstract: In the aftermath of the New Crown epidemic, there has been a substantial increase in active discussion among Internet users on various Internet platforms. At the same time, the topic of ecological environment has been increasingly emphasized. Recently, Japan's decision to gradually dump nuclear wastewater has aroused people's concern about environmental safety. This major event has provoked heated discussions among netizens from various countries. What kind of reaction will the new network environment produce under the impact of this event in the post epidemic period? This paper centers on the event of Japan's nuclear sewage discharge, and researches and selects the evaluation content and characteristic information of netizens of various network platforms to analyze the differences of netizens' comments under the hot events in the network environment after the epidemic.

1. Introduction

The development of society is often inseparable from the fermentation of social opinion, and human beings, as the main body of social opinion, tend to socialize by nature. A large number of human clusters constitute the main structure of today's society [1]. And humans, as a member of the society, cannot live without social opinion. This is because being a member of a society requires not only living in a society, but also exchanging opinions and information with other members of the society, thus promoting the society to a certain extent [2].

The traditional social network [3], due to its slower social information transmission, relies on a specific geographic location or serves a specific purpose, which leads to a lower degree of dissemination and diffusion of social hotspot events, poorer degree of fermentation of social public opinion, difficult to form a large-scale, characteristic group evaluation, and also difficult to observe individual differences in the group evaluation. With the emergence of cell phones and fixed-line phones [4], the operation of social networks has changed, although to some extent free from the limitations of geographic location, but still limited by the constraints of family and friend relationships, and often serve a specific purpose. It is still difficult to promote the expansion of social opinion and unable to form evaluations with aggregation. With the arrival of the Internet era [5], a series of social networking platforms have emerged, such as e-comments, blogs, MSN and so on. The

emergence of these platforms has, to a certain extent, improved the efficiency of social communication and accelerated the fermentation of social opinion. A series of communities and forums began to surface, and a certain number of group evaluations began to appear, but the individual differences in the evaluations were not obvious enough. This is because the social network at that time was still limited by the level of technology to a certain extent, and the popularity and transmission speed of the poorer network affected the transmission of social opinion.

With the arrival of the 5G era [6], the popularity and transmission speed of the network has undergone an exponential growth. The emergence of a large number of online social platforms and multiple types of socialization methods greatly facilitated the dissemination of hot social events, and the phenomenon of group evaluation began to erupt, while the individual differences in group evaluation began to be manifested [7]. During the 2020 New Crown Pneumonia Epidemic, the emergence of a generalized quarantine situation further established the importance of online social media [8], and this phenomenon has, today, reached its peak with the exposure of a large number of social events and extremely active netizens, constituting a burdensome public opinion in today's era [9]. The increasing amount of information and the complexity of interpersonal relationships in the network make social networks have the nature of small-world networks, and the distance between people is significantly shortened, so that information spreads faster in the network, leading to more and more difficult to monitor public opinion [10]. Human subjective emotion can spread along with the spread of information, and human subjective emotion is the core of public opinion dissemination [11], and this leads to the individual differentiation of evaluation in a large number of network hot events evaluation becomes more and more serious.

In the current era, people's discussion of social hotspots has become a kind of social emotion, and this kind of venting has led to the emergence of the phenomenon of differences in the evaluation of social hot topics. Social emotions are people's feelings about various situations in social life, through the interaction between group members, to form a more complex and relatively stable attitude experience [12]. Social emotions are based on personal emotions, and when similar personal emotions reach a certain stock, they will appear in the face of social emotions. By virtue of its cumulative, infectious and instructive properties, social emotions can have a significant impact on the cognition and behavior of groups and individuals [13]. Take the new media platforms led by Weibo, Twitter and TikTok as an example, these platforms provide contemporary netizens with channels to vent, share their emotions and express their own opinions by virtue of their strong network interactivity [14].

The first major contributing factor to the fermentation of public opinion today is the unrestricted netizen comments [15], which means that any netizen can forward and comment on a certain breaking news. Internet users can not only express their own opinions, but also reply and comment on other comment posters to communicate and discuss. The unrestricted nature of online comments [16] leads to the fact that comments can be interpreted differently because of individual netizens' value differences, cognitive level, age. Region and other factors are understood and secondary dissemination in different degrees [17], thus inducing network public opinion. Under the development trend of information dissemination, the speed and range of information dissemination have been greatly improved, and it takes only a few seconds for online public opinion to reach the receiving end of the audience from the sending end. Under such a situation, uncontrolled negative online public opinion information can cause serious consequences to the physical and mental health of Internet users, and disrupt public order, further increasing the difficulty of the corresponding public management work. Therefore, in order to provide a better online environment for today's Internet users, this paper will explore the influencing factors that lead to differences in Internet users' comments under network emergencies, which will help to strengthen the control of online public opinion environment.

Therefore, this paper adopts the content analysis method, through the more explicit content of

various information, objective, systematic and quantitative description; participatory observation method, through the evaluation of the same social hotspot events under different social network channels in various network platforms, on the basis of participatory observation, the main observation of the manifestation of the differentiation of the netizen's comments and the netizen's own qualities.

At present, some scholars have carried out relevant research, however, the research samples of most scholars are not specific enough, this paper through the construction of hierarchical analysis model, the specific netizen evaluation of multiple types and forms of social media to start data collection, to ensure the validity of the analysis, and to a certain extent, can supplement the part of the industry in a vacancy. In addition, this paper chooses the coupled analysis of questionnaire survey method and participant observation method, through the participant observation method to draw preliminary conclusions, combined with the questionnaire survey to carry out further analysis, the conclusions obtained are based on specific and comparative data. In addition, due to the impact of the new crown epidemic, the current network environment has been more obvious fluctuations, the usability and reference value of previous research has been greatly weakened, this paper has been the post-new crown era as the background of the study, closely matching the actual, to ensure the validity of the conclusions of the study.

2. Research

2.1 Research background

Nuclear wastewater is wastewater that contains radioactive material. There are more reasons for the formation of nuclear wastewater, but its core lies in the direct or indirect contact between water quality and nuclear waste. For example, during the operation of nuclear facilities such as nuclear power plants, nuclear fuel reprocessing plants, and nuclear medicine facilities, the water in the equipment and pipelines may be contaminated by radioactive substances and become nuclear wastewater; or when an accident occurs in a nuclear facility, radioactive substances may leak into the equipment and the environment and form nuclear wastewater; or a large amount of water is used to cool the reactor core or nuclear fuel in a nuclear facility. This water may be contaminated with radioactive substances and become a source of nuclear effluent [18].

The presence of nuclear effluent poses a serious threat to the natural environment and human health. If it is discharged into natural water bodies without proper treatment, it contaminates water sources, damages water ecosystems, and may enter the food chain. Accumulated radioactive material poses a potential risk to long-term human health and increases the risk of cancer and other diseases, and in addition, nuclear sewage causes direct damage to marine ecosystems, affecting the reproduction and survival of marine organisms.

On March 11, 2011, a massive earthquake and tsunami measuring 9.0 on the Richter scale struck Japan, resulting in a serious accident at the Fukushima Daiichi nuclear power plant, which resulted in the meltdown of three reactors and the leakage of large quantities of radioactive material. After the accident, in order to cool down the melted down reactors, the Tokyo Electric Power Company (TEPCO) kept injecting water into the reactors and at the same time kept pumping water out of the reactors, resulting in the formation of a large amount of nuclear effluent from the direct or indirect contact between the cooling water and the nuclear waste. Although these nuclear effluents have been treated to remove most of the radioactive material except tritium, they still contain high concentrations of tritium, which can enter the food chain through the metabolism of water and living organisms, with potential impacts on the human nuclear environment.

Due to the huge cost of storing and treating nuclear wastewater, as the total amount of nuclear wastewater continues to increase, the Government of Japan and the Tokyo Electric Power Company (TEPCO), believing that it is difficult to support the huge cost, decided on April 13, 2021 to gradually

dump nuclear wastewater into the Pacific Ocean in batches in the next 30 years.

After the Japanese government formally announced its decision to discharge nuclear wastewater into the sea, it immediately aroused the opposition of many governments and people, and this behavior of the Japanese government not only violates international morality, but also violates the relevant provisions of the United Nations Convention on the Law of the Sea. However, in the face of this incident, many different voices appeared in the international official public opinion arena. At present, the world has just received the impact of the new coronary pneumonia, people in the network of public opinion on the general increase in the degree of activity, at the same time, people for environmental issues, health issues are far more concerned than before the impact of the epidemic. At this time, the online public opinion environment has changed a lot compared to the pre-epidemic period, and it coincides with the topic of nuclear effluent discharge, which involves people all over the world. Therefore, not only the opinions and positions of the officials are impacting on each other, but also the controversy among the netizens has arisen. In this paper, we are going to fully investigate the online public opinion on the nuclear sewage discharge in Japan, to understand the situation of netizen's public opinion in the new online public opinion environment and the factors influencing the direction of public opinion under this situation[19].

2.2 Research methodology

To study the situation of online public opinion and to analyze the factors affecting online public opinion, it is necessary to collect and analyze different groups of Internet users and their comments. Therefore, based on the hierarchical analysis method, this paper stratifies, categorizes and organizes different factors to obtain the factors that may influence the direction of public opinion as shown in the following figure 1.

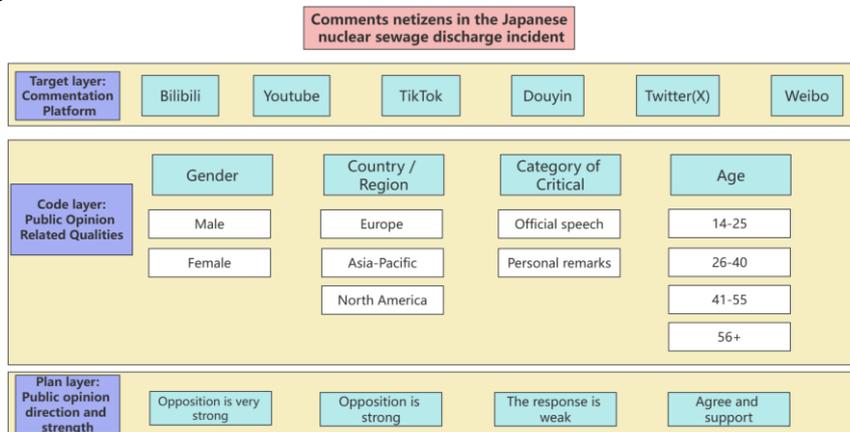


Figure 1: Hierarchical Analysis Factor Sheet

In order to solve the problem of this paper, multiple levels are selected, in which the target level is set as the Internet platform where the network public opinion is located. As the Internet platform as the gathering place of Internet users, the users held by different platforms also have different properties [20]. Among them, when conducting Internet user research, large platforms tend to have richer user groups, and with reference to the current indexes related to China's internal and international Internet, this paper chooses large entertainment or social platforms such as BILIBILI, Youtube, Tiktok, Douyin, Twitter (X) and Weibo.

China is closely related to Japan in terms of geography, history and humanities, so three different Internet application platforms used by Chinese netizens in their daily lives are selected - BILIBILI, Douyin and Weibo. The above platforms have developed rapidly, and their user groups have already included not only internal Chinese netizens, but also official windows of China, as well as official

and personal accounts of various countries. The samples are rich and have a certain degree of reference. Among them, the users of BILIBILI and Weibo platforms are more youthful and more diversified, with more intense collision of comments, and BILIBILI is more for video users, while Weibo is more for communication platforms, with certain differences in user qualities, and Douyin has the largest coverage of users, with a large number of users, and all kinds of news and media are active in it, which is of very high sample value. Douyin has the largest user coverage, a large number of users, and all kinds of news and media are active in it, so it has very high sample value.

Similarly, for the relevant social networking platforms selected in China, the corresponding platforms are selected in the international network platforms for comparison, among which Youtube is close to BILIBILI in terms of its nature of use, and its users' types, characteristics, and numbers are much higher than those of BILIBILI, while Tiktok is the public version of the Douyin platform around the world, which has the same characteristics as those of Douyin users. Tiktok is the public version of Douyin platform in the world, which itself has the attributes of Douyin users, and the number of users of Tiktok has increased dramatically in recent years, which can effectively meet the sample requirements of this study. Twitter (X), as one of the most popular international Internet platforms for socializing, news, current affairs and reviews, is the most suitable sample for this paper in terms of the number and types of users, the countries and regions included, and especially the fierce collision of public opinion. Therefore, this paper selects the above Internet platforms as the target layer content, based on which the subsequent research will be carried out.

Some researchers have found that Internet users are often influenced by their own traits when evaluating the Internet [21], such as gender (there is a certain difference between the ratio of male and female in terms of sensibility and rationality), nationality and region (the influence of netizens' own position, historical factors, and political factors), and age (the influence of the character and the understanding of different events), etc. For certain political-related topics, whether the commented object is official or individual may vary, and different voicing objects may guide netizens' comments differently and lead to changes in public opinion. Therefore, in the guideline layer, factors such as gender, country (region), guided object, and age of the commented netizens are used as relevant indicators to complete the subsequent research.

Since this study also involves the analysis of the direction of public opinion, netizens' support for or opposition to the event of Japan's dumping of nuclear wastewater will be counted in the scenario layer in order to complete the relevant analysis of this study.

2.3 Methods of analysis

The correlation coefficient is an indicator of the correlation between two data, and the correlation of two data can help people understand the pattern of change of affairs to some extent. Pearson Correlation Coefficient is the most commonly used indicator to measure the linear correlation between two variables, based on the indicator to generate a certain score to describe the correlation between multiple variables.

$$\text{COV}(X, Y) = \frac{\sum_{i=1}^n (x_i - E(X))(y_i - E(Y))}{n}$$

Where, and represent the expectation of the two, respectively, and in terms of the numerator overall, the numerator is positive when one of the overall values, x, is greater than the mean value of X, and y is also greater than the mean value of Y, or the numerator is positive when both are less than the mean value. And when neither is greater or less than the mean, the numerator is negative. Therefore, if two variables cancel out positively or negatively, the covariance will be small and the variables will be difficult to correlate. And when two sets of variables are correlated, the entire covariance should be very large positive or negative. And if there is a large difference between the two sets of variables,

for example, $x=0.01$ and $y=1000$, then again, the results will be biased by the large biased variable, and therefore the equation needs to be quantitatively eliminated on the basis of the covariance calculation to obtain a quantitatively dimensionless quantity, which is the Pearson's correlation coefficient. The method of solving for this coefficient is mainly based on dividing the variance of the variable in the calculation:

$$\rho_{X,Y} = \frac{COV(X, Y)}{\sigma_X \sigma_Y} = \frac{\sum_{i=1}^n (x_i - E(X))(y_i - E(Y))}{\sqrt{\sum_{i=1}^n (x_i - E(X))^2} \sqrt{\sum_{i=1}^n (y_i - E(Y))^2}}$$

The final Pearson correlation coefficients obtained are all between -1 and 1, where closer to 1 indicates that the two are positively correlated, closer to -1 indicates that they are negatively correlated, and the closer they are to 0, the more they are uncorrelated.

2.4 Result of an investigation

Based on the above set of indicators, this research was conducted on major platforms, and the research obtained a total of 306 initial data, removing 12 unusable samples, and the final usable samples were 294, with a data validity rate of 96.1%. Among them, the general statistical indicators of the data are shown below Fig. 2:

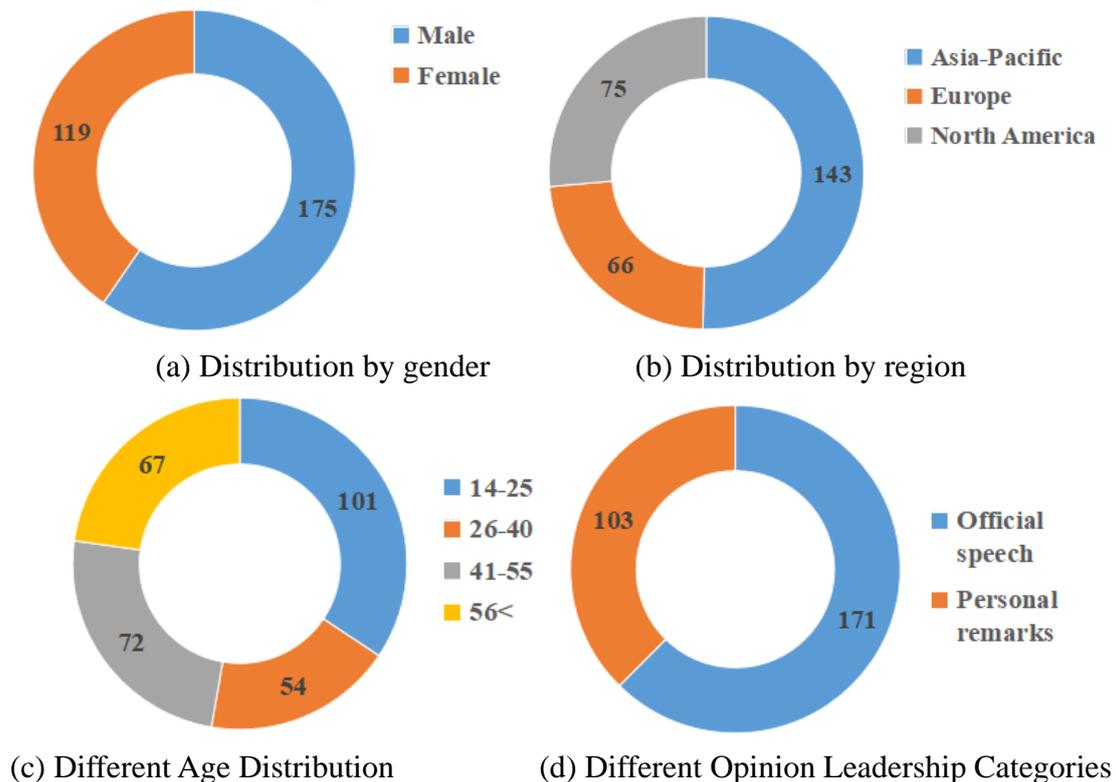


Figure 2: Statistical Distribution of Research Data

Therefore, a Pearson correlation analysis was calculated for the above data using the final opinion direction as an indicator, and the results were obtained as shown in the table 1 below:

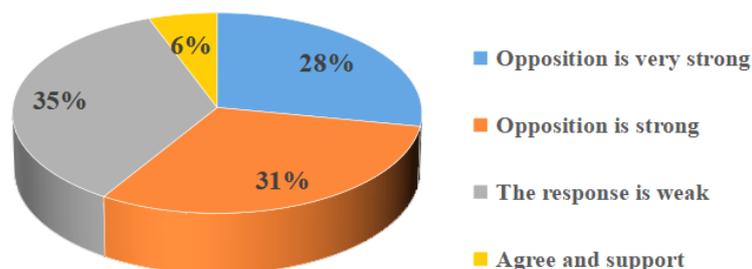
Table 1: Pearson correlation analysis

	Opposition is very strong	Opposition is strong	The response is weak	Agree and support
Gender	0.811*	0.704*	0.616*	0.437
Country / Region	0.893**	0.841**	0.652	-0.492**
Category of Critical	0.535*	-0.612	0.413	0.572*
Age	0.714	0.663	-0.621	0.572
* represents a significant p-value or sig value of less than 0.05				
** represents significant p-value or sig value less than 0.01				

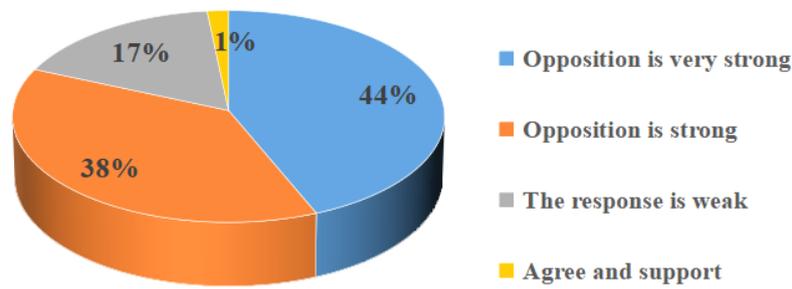
After analysis, it can be found that the indicators in the guideline layer have a certain degree of correlation or significant correlation with the evaluation indicators of public opinion direction in the program layer, among which, it can be found that gender, country and region have a greater correlation with the guidance of public opinion direction in the case of Japan's dumping of nuclear sewage, and there is a certain degree of correlation between the object of public opinion being commented on as well as the age and the variability of the evaluation of the Internet, but the However, the factors that influence the variability of netizens' evaluation of the dumping of nuclear sewage in Japan are smaller than other factors.

Specifically analyzing, it can be thought that firstly, after experiencing the influence of the new coronary pneumonia epidemic, although the enthusiasm of commenting on the network platform has been greatly improved, but also after the baptism of the complex and mixed information on the network during the epidemic period, the current netizens have a higher capacity to recognize the public opinion orientation of the commented party, and are more capable of evaluating the event through their own thinking. Secondly, the dumping of nuclear sewage in Japan is of great significance, and the official and private media from all walks of life in various countries have a lot of information to publicize, and netizens have more perspectives to understand the state of affairs on the platform, so it is difficult to be drastically biased by a certain comment. Therefore, from the analysis results in Table 1, although whether the subject of comments is official or private media has a certain impact on the differences in netizens' evaluations, the correlation is not prominent. From the age point of view, it is obvious that for this kind of major social hotspot events that can have a certain impact on the ecological environment and the survival of human beings, netizens of all ages have more intense discussions, and this factor has not become an influential factor leading to the differentiation of network evaluation.

According to the analysis results in Table 1, the two factors of gender, country and region have a greater impact on the differentiation of online evaluation, and among them, the factor of country and region has the greatest impact on the differentiation of netizens' evaluation under the incident of Japan's dumping of nuclear sewage. Firstly, in terms of gender, men and women are further analyzed, and the results are shown in Figure 3:



(a) Evaluation differential distribution of male Internet users



(b) Differential distribution of female Internet users' evaluations

Figure 3: Distribution of differences in Internet users' evaluations based on gender

From the results of the specific analysis, in the evaluation of the incident of dumping of nuclear sewage in Japan, the evaluation of female netizens is a bit more aggressive than that of male netizens. Based on existing research, this may be due to the fact that the emotional factor of female Internet users is more influential, which makes women tend to be able to speak out their opinions more directly when evaluating emergencies, whereas men seem to be more conservative, which leads to the differentiation of the comments under the event. This is similar to all existing studies.

From the perspective of countries and regions, geographic location, historical factors, humanistic environment and political standpoints all lead to different ideologies of Internet users, which leads to the differentiation of the evaluation of online events. Therefore, the specific situation needs to be specifically analyzed, first for the country and region of this factor to expand the data, as shown in Figure 4:

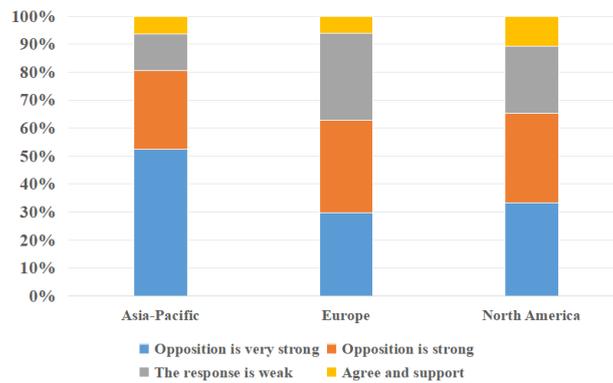


Figure 4: Distribution of Internet users' ratings in different country regions

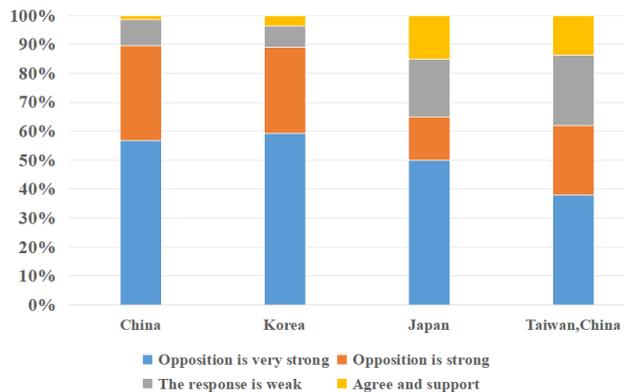


Figure 5: Distribution of Internet users' ratings in different countries\regions in the Asia-Pacific region

From Figure 4, it can be found that the composition of Internet comments in each region compared to the other can be seen that there is a certain difference in the evaluation of Internet users in the Asia-Pacific region and Europe and the United States, with Internet users in the Asia-Pacific region evaluating the incident of nuclear sewage dumping in Japan more aggressively than those in Europe and North America, and opposing the incident with a stronger voice. Through specific analysis, it can be concluded that this situation is mainly affected by geographic location, in which the Asia-Pacific region, as a region neighboring Japan and sharing the Pacific Ocean, is the region most directly affected by the nuclear sewage, and therefore, the majority of netizens are opposed to the incident, and their attitudes are stronger. Europe and North America, especially Europe, mainly rely on the Atlantic Ocean and the Arctic Ocean and other related areas, and due to the influence of ocean currents, within a short period of time, the nuclear sewage in the Pacific Ocean is difficult to have an impact on other oceanic waters, so the residents of the region have a weaker sense of crisis, and the North American countries have a close cooperation with Japan in the economy and politics, which has led to the different regions of the netizens for the same event under the commentaries.

And Figure 5 further breaks down the countries in the Asia-Pacific region, in which there is a big difference between netizens in China and South Korea and those in Japan as well as Taiwan, China on the incident of Japan's dumping of nuclear sewage. Specifically analyzing the situation in each region, there are a number of complex relationships between China, South Korea and Japan, including historical conflicts, economic competition, cultural competition and political competition, and the geographical proximity of the three countries is the most vulnerable to the impact of nuclear sewage. Japan itself, due to its self-interests, has different comments from those of the other two countries. As for Taiwan, China, due to its complex relationship with Japan in history, and from the content of the comments, some netizens in Taiwan hold a hostile attitude toward China and an affinity attitude toward Japan, and this historical and humanistic factor also leads to the differences in the comments of netizens in this region with China and South Korea. From this analysis, we can see that in this kind of events, which are mainly related to the ecological environment and human health, netizens' comments are still influenced by political stance and historical and humanistic factors.

3. Conclusion

To summarize, this paper collects netizen comments under each platform, each media window by focusing on the major international event of Japan's discharge of nuclear effluent, and determines the direction of different comments and the degree of radicalization by dividing the content. It also combines the thinking of hierarchical analysis to build a hierarchy of factors, carries out data investigation with target factors, and discusses the differentiation of netizen comments by combining the general statistical description and correlation analysis, and finally finds that gender, country and region will play an influential factor on the differentiation of netizen comments under this event. The influence of country and region mainly includes the influence brought by the difference of country and region.

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