Sentiment Analysis Approach towards Public Opinion on Sensitive Issues Via Social Media: A Way of Crisis Management Control

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Online media is one of the tools of public opinion formation where social media users immediately express their thoughts and perception towards an issue. The process of public opinion formation is described from the start of one's perception, and it depends on the cultural background, past experiences and values. These factors determined one's supporting or opposing an issue. The main objective of this study is to determine the correlations between sensitive issues with negative sentiment builds up among the public. This quantitative content analysis study investigated the influence and relevance of information sources on the distribution of public opinion. There were 4 parameters measured as independent variables, mainly independent sources, conventional sources to the dependent variable, public opinion. The monitoring bodies and regulators utilise the research results in handling sensitive issues in Malaysia.

Key words: *Public opinion, Sentiment Analysis, Social Media, Sensitive Issues.*

Introduction

Online media is a powerful medium, and it is widely used worldwide. It has become an effective channel for sharing information, but it also can be a medium to spread lies and misinformation. Online media is one of the tools of public opinion formation, where it

influences public opinion and perceptions on any specific issues. In Melvin L. DeFleur's book on the Mass Communication Theories: Explaining Origins, Processes, and Effects highlighted that public opinion plays a more central role in a democratic system and it has been the principle and ultimate power in all forms of governments of all times. Although the study by James Bryce was in the 1800s, but the ideology of public opinion as the central role in a democratic system is relevant and applicable even in Malaysia. The study was made during the first election in the United States, and Bryce found that the less communication between the candidates and the public during the election was the weakness of the democratic process. It shows how media plays an essential role as a tool to influence public opinion formation.

Public opinion consists of the desires, wants, and thinking of the majority of the people; it is the collective opinion of the people of a society or state on an issue or problem. This concept came about through the process of urbanisation and other political and social forces. It has become important what people thought, as forms such as for political contention changed or over sensitive issues. For example, during the 14th General Election, it is proven that media play as an important role on influencing the public opinion especially the young generation of Malaysian on polling day and change the current government that rules the country for more than 60 years. This does not imply political issues, but it is also affected on sensitive issues that can threaten national security. (Bullock et al., 2011) explained that risk of disclosure, in the form of security threats by state and non-state actors or social sanctions by the community indicates expression of views on sensitive topics could be very dangerous for individual. Thus, Pasir Gudang chemical waste spilling is considered a sensitive issue in Malaysia as the incident affect public health and safety. More than 2,000 people were affected that have been hospitalised for breathing difficulty symptoms. This incident also sparks anxiety among Malaysians when the media portray how serious the situation was that threaten the safety and health of local residents. However, the situation was not reported in a critical stage in the beginning, but the situation became more intense when the media coverage on the incident showed it had threatened the public safety directly. This situation has built negative reactions from the public that urge the former Menteri Besar of Johor to step down from his position and replaced by Dr. Sahruddin Jamal. From this incident, it shows how effective the media influence public opinion formation.

The negative reactions lead to sentiment build-up, and it was portrayed over the social media. Public concerned the safety of people in Pasir Gudang. Moreover almost all of the victims of the incident are mainly school students. Most of the sentiment analysis research was mostly done to determine people's opinion towards an entity. Thus, the pattern of customer behavioural, product usage and market value of a service or product were determined by data mining. But sentiment analysis towards an issue is critical in maintaining the national security of a country where the authority can use the data in planning crisis management plan (CMP) and how to control the reactions of the public during a crisis.

To identify the news sources of sensitive issues in order to successfully creating media agenda, quantitative content analysis approach has been used for this research. Four online news portals had been selected based on their social media engagement values which are News Straits Times, Utusan, Free Malaysia Today (FMT) and MalaysiaKini. Archived news article on chemical spilling incident in Kim Kim River, Pasir Gudang was selected based on a few keywords related to the incident's news articles.

Literature Review and Theoretical Framework

Sentiment Analysis

Sentiment analysis has been used as the platform of data and information-gathering method of big data mainly from social media. To find out what other people think on an entity or an issue, and by using the growing opinion-rich sources online, opinions are available to be analysed. Sentiments tools analyser were developed, and the complicated -non-user-friendly tools were improved and became more user-friendly, and almost everyone from every field of study can use it. Because of the demand for information of opinions and sentiment, more researcher became more interested in this field of study.

In the early years of the study, the research of sentiment analysis was first developed in the computer science field where computer models of belief systems and points of view were found and developed with the rise of machine learning methods in information retrieval and natural language processing in studies by (J. Carbonell, 1979) and (Wilks & Bien, 1984). Later, algorithms were set up with the availability of datasets and developed review-aggregation websites that can be accessed by the public. Automated words detection and a set of words segregation were identified to classify the sentiment whether they are positive, negative or neutral (J.M. Wiebe 1994,1995,1998). The research was further done by (Pang & Lee, 2008) where sentiment analysis system facilitates and review many kinds of approaches to a variety of opinion-oriented classification problems where this marked the shift of the usage of sentiment analysis on an entity to an issue. Contextual and textual semantics were than part of the approach (H. Saif et al., 2016) and (S. Poria et al., 2017).

Sensitive Issues in Malaysia, Media Agenda and Public Opinion Formation

Many people believe that subject matter that possesses sensitive elements socially, economically and politically that are considered as sensitive issues. The topics tend to be intrusive and inappropriate to be discussed in some culture are considered sensitive issues. There are not much of sensitive issues research in social science perspective. (Tourangeau, 2011) explained that a topic is sensitive because it involves intrusiveness, risk, and social desirability. (Blair, Coppock & Moor, 2018) formulated the origin of sensitive issues are

from four sources; self-image, taboo (intrusive topics), risk of disclosure and social desirability. Some topics are considered sensitive for some culture; it reflects from their personal experience and self-image. Hence, different regions carry different values of issues that are considered negative. (Bullock et al., 2011) explained that risk of disclosure, in the form of security threats by state and non-state actors or social sanctions by the community indicates expression of views on sensitive topics could be very dangerous for the individual. Sensitive issues can be defined as anything that against the national constitution that threaten national security and peace. Thus, the media, as a source of information, play their role here to disseminate sensitive issues in well-mannered to avoid any dispute.

The Media Agenda on Sensitive Topics and Issues

(Weaver, 1984) made two major assumptions on agenda-setting research: (1) The media does not reflect reality, but instead filters and shapes it; and (2) concentration by the media over time on relatively few issues leads the public perceiving these issues as more important than other issues. The media is responsible to illustrate whether an issue is important or not by planning the pattern, frequency and direction of the news reporting. Assumption number two highlight the concentration of media content has shaped the importance of the issue among public. This has become part of public opinion formation process referring to the agenda-setting model by (Dearing, 1988) where media agenda influence public agenda and it will then influence policy agenda. However, it is interconnected to each other. Hence, public opinion formation is the result of the process.

Thus, two hypotheses have been developed based on the theoretical framework above:
1. There is correlation/influence among independent sources of sensitive issues with the public opinion/sentiment build up.
2. There is correlation/influence among conventional sources of sensitive issues with the public opinion/sentiment build up.

Based on media agenda setting and media framing, most often a particular opinion gets repeated throughout various news mediums and social networking sites until it creates a false vision where the perceived truth can be very far away from the actual truth. There are two dimensions of public opinion which consisting of preference (support or reject) and intensity (it measures how far preferences of those), and some level of public opinion that has been identified is the dispute, communication and evaluation. For all these three levels, three elements need to be considered, namely social judgment or social condition or feedback.

Methodology and Materials

In order to examine the public opinion formation and sentiment built upon the Pasir Gudang chemical spilling incident, quantitative content analysis is made to identify the news sources sensitive issues

Sensitive Issue Selection and Time Frame

Pasir Gudang chemical spilling issue has been selected as the case study of this research. This issue considered as one of the sensitive issues in Malaysia's perspective where this issue has brought debate and disagreements among Malaysians and threaten public health in Sg. Kim Kim, Pasir Gudang. The incident starts on 7th March 2019 caused by illegal chemical waste dumping in Sg. Kim Kim River. The chemical spilling has caused toxic fumes spread to the nearest area affected more than 6,000 people, especially schools in the area. More than 2,000 victims were hospitalised and treated.

Figure 1. Pollution Map

Source: MalaysiaKini

Figure 1 shows the visual chronology of the incident of chemical waste spilling that was dumped near Kota Masai that was pouring down along Kim Kim river that affected 103 victims on 7th March 2019, and then the incident affected 106 victims on 11th March 2019. On 12th March toxic fumes affected 260 victims at SMK Tanjung Puteri Resort before Ministry of Education ordered the closure of 111 schools in the area. All of the victims were hospitalised with breathing difficulties and vomiting symptoms.

Quantitative Content Analysis

The methodology used for this research is quantitative content analysis. In the process of collecting news that will be analysed and related to the chemical spilling issue in Sg. Kim Kim, Pasir Gudang, a few keywords have been determined, such as "Sg. Kim Kim", "Pasir Gudang" and "chemical spilling". The news that contained either any keywords above will be selected as research materials.

Online News Outlets Selection

News articles were divided into two types; Conventional online news portal and Independent online news portal. Both conventional news outlets and independent news portal, news articles were selected based on their online posting frequency, social media followers (Facebook and Twitter) and social media engagement value.

Media Outlets	Online Posting Frequency	Facebook Followers	Twitter Followers	Social Engagement Values
News Straits Times (NST)	N/A	713,700	672,100	N/A
Utusan	30 posts every 4 weeks	2 Million	528,900	847
Malaysia Kini	10 posts per week	1.7 Million	1.3 Million	596
Free Malaysia Today (FMT)	168 posts per week	718,600	84,800	38

Source: NST, Utusan, Malaysia Kini, & FMT Social Media Official Accounts
*This research was done before Utusan ceased their operation on 9th October 2019

Coding Book and Coding Sheet

In this research, coding book and coding sheet are the most vital instrument in order to carry out the quantitative content analysis on selected online news reports. The coding book consists of 5 sections that were developed with designed instruments.

Pilot Test

	Intercoder	Total of Variables	Questions	Intercoder %
Coder 1	444/528	6	88	84%
Coder 2	384/528	6	88	73%
Coder 3	446/528	6	88	84%
Average				80%

1. Coder 1 : 2 x 444 ÷ 1,056 = 0.84 / 84%
2. Coder 2 : 2 x 384 ÷ 1,056 = 0.73 / 73%
3. Coder 3 : 2 x 446 ÷ 1,056 = 0.84 / 84%

Average
Coder 1 + Coder 2 + Coder 3
$\qquad$ 3
= 0.84 + 0.73 + 0.84
$\qquad$ 3

= 0.80 / 80%

Average for three coders is 0.80 or 80%. In conclusion, this average shows that the value of the validity and reliability intercoder test of the posting samples chosen to be analysed are beyond the significant ≤ 0.70 or 70% for validity and reliability intercoder test using the Holsti Formula which is a value of 80%.

Results and Findings

Distributions of Online News Sources on Sensitive Issues

Type of Media Outlet

Table 1: Type of News Report

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Conventional Online News Report	104	68.4	68.4	68.4
	Independent News Portal	48	31.6	31.6	100.0
	Total	152	100.0	100.0	

This research was done before Utusan ceased their operation on 9ᵗʰ October 2019

In this research, a total of 152 articles were analysed based on the selected news portal, topic, keywords and time frame. Based on Table 1, the conventional online news portal shows the highest percentage at 68.4% of reporting the Pasir Gudang chemical spilling issue with 104 news articles were reported. While the independent news portal contributed 31.6% of news articles reporting on the same issue with only 48 news articles were reported. This shows that both selected conventional online news portal, Utusan and News Straits Times reported the most during the incident of the chemical spilling.

Sentiment Build Up
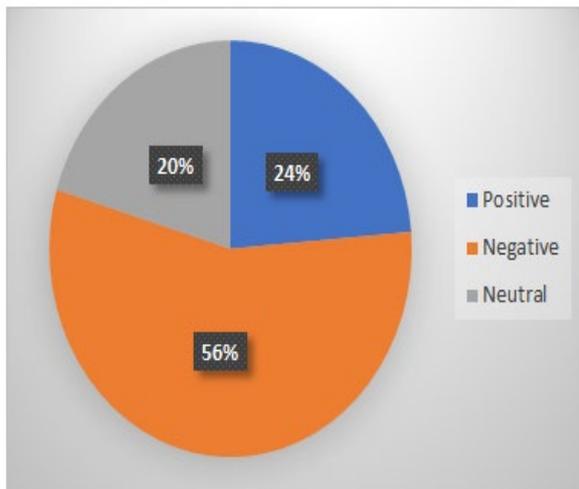
Figure 2. Heading Perceptions
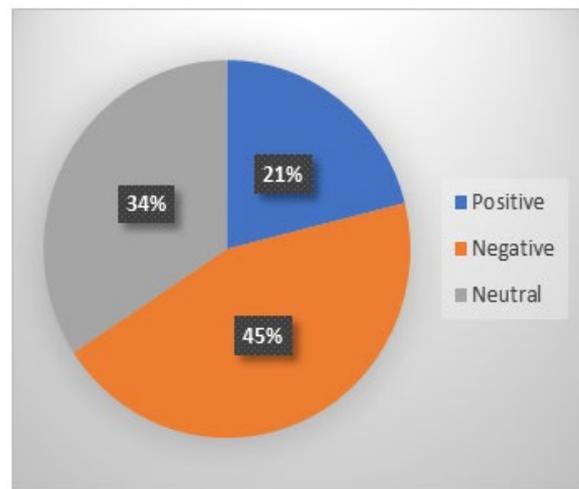
Figure 3. Article Perceptions

Figure 1 and 2 shows the perception of the coders on the articles heading and the full article reported in their portals on Pasir Gudang chemical spilling in 2019. 56% of the articles' headings were given negative perceptions, while 24% of them were positive and 20% of it was neutral. The data for articles' perceptions were also showed that negative perceptions were the highest-rated, at 45%, 21% were positive, and 34% were reported neutrally.

Based on the data collected, News Straits Times reported has the highest percentage of leading towards negative sentiment build-up towards the issue. With the highest percentage of negative headings (87%) that lead to a negative direction of reporting of the issue.

Hypothesis Testing

Table 3: Chi Square on Article Perceptions

Type of News Report	Online News Report Types		Article perceptions
Conventional Online News Report	News Straits Times	Chi-Square	10.719^a
		df	2
		Asymp. Sig.	.005
	Utusan	Chi-Square	18.650^b
		df	2
		Asymp. Sig.	.000
Independent News Portal	MalaysiaKini	Chi-Square	12.800^b
		df	2
		Asymp. Sig.	.002
	FreeMalaysiaToday	Chi-Square	2.000^c
		df	1
		Asymp. Sig.	.157

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 21.3.

b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 13.3.

c. 2 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 4.0.

*This research was done before Utusan ceased their operation on 9th October 2019

Based on Table 3, the value of X^2 for News Straits Times = 10.719 is significant at p = 0.05; the null hypothesis is rejected. Same goes to Utusan; the value of X^2 = 18.650 is significant at p = 0.05, the null hypothesis is rejected. The value of X^2 for MalaysiaKini and FreeMalaysiaToday are = 12.800 and 2.000 are both significant at p = 0.05. Hence, the null hypothesis is rejected.

This shows that there are correlations between all the variables in the study. Thus, the hypothesis of the study is accepted and proven that:

- There is correlation/influence among independent sources of sensitive issues with the public opinion/sentiment build up.
- There is correlation/influence among conventional sources of sensitive issues with the public opinion/sentiment build up.

Discussion and Conclusion

Based on the research question, both conventional and independent online news sources had contributed the highest percentage towards negative sentiment build upon the sensitive issue of Pasir Gudang chemical waste spilling. The data collected shows that each news portals were reported towards the negative direction of the issue that lead to negative sentiment build-up towards the issue. Based on the media generic and major framing measures (Semetko & Valkenburg, 2000) it showed that the articles help to spark emotions that lead to sentiment build up among the readers. It has proven that media as the source of information plays a vital role as the vehicle in the process of public opinion formation that consists of sentiments of the public towards an issue.

The online news sources create communication between the media and the public through the social media of each news portal since every post have been uploaded in their social media official accounts. If the media portray the issue in a different direction, it may lead to crisis, especially sensitive issues where it is part of the national security issues. Hence, it is the media role to report an issue in an excellent manner to avoid negative sentiment build up among the public.

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