

Conference Paper

Analysis of People Response on Twitter Towards Tidal Wave Disaster in the Southern Coast of Yogyakarta Special Province (Case Studies: Parangtritis Beach, Bantul Regency)

Satria Indratmoko¹, Inayah Bastin Al Hakim¹, and Wahyu Satrio Guntoro²

¹Master Student of Disaster Management, Universitas Gadjah Mada

²Master Student of Tourism Studies, Universitas Gadjah Mada

Abstract

In July 2018 the movement of the wind from Australia to the Indian Ocean gives the impact on season transition from rainy to dry season. As the result, the wave becomes so much higher than normal condition as it hits the coastal area as well as in the southern part of Yogyakarta Special Province where is directly bordered with the Indian Ocean. Some impacted areas are popular tourism spots like Parangtritis Beach. The wave wrecks several shops along the beach owned by the local people. The majority of damaged objects are semi-permanent buildings constructed by traditional bamboo and timber. Moreover the tourism activity has been warned due to the dangerous condition. The advancement of technology becomes one of popular issues including the increasing of online social media usage. Internet and gadgets such as smartphone are recently the part of people lifestyle. The nowadays people prefer to access anything online through their smartphone including to find the news on the website or social media such as Twitter. One of interested news is about disaster particularly in recognizable places as well as about tidal wave disaster in Parangtritis Beach.

This study aims to investigate the advantages of Twitter contents related to the tidal wave in Parangtritis Beach on people response about the disaster and the beach. The analysis applies sentiment analysis theory. Furthermore the data being collected in this research is online from Twitter accounts that has divided into three phases of disaster (before tidal wave, during tidal wave, and after tidal wave).

Keywords: Twitter, Tidal Wave, Sentiment Analysis

Corresponding Author:

Satria Indratmoko
 satria.indratmoko@mail
 .ugm.ac.id

Received: 14 July 2019

Accepted: 29 July 2016

Published: 4 August 2019

Publishing services provided by
Knowledge E

© Satria Indratmoko et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the IGSSCI Conference Committee.

1. Introduction

1.1. Background

Indonesia is the biggest archipelago country in the world. It is proven with more than 81,000 kilometres long of coastal line which is bordered 17,508 small and main islands

 **OPEN ACCESS**

(Budiharsono, 2001). By its grace, Indonesia has high marine potentials and results towards fishery activities that helps coastal people economic income. Moreover, in some particular spots the beauty of the islands and coastal views used for tourism industry. Tourism is one of products that can be promoted and providing satisfaction for tourists who travel. One of tourism products is tourism destination. According to Tourism Law Number. 10 Year 2009 tourism destination can be defined as geographical area that is located one or more administrative areas and which included tourist attractions, public facilities, tourism facilities, accessibility, and communities that are interrelated and complement the realization of tourism.

One of most popular tourist spots in Yogyakarta is the Parangtritis Village that is located in Bantul Regency, Special Province of Yogyakarta. As a village situated in the southern part of the province, Parangtritis offers the natural view of Indian Ocean. Moreover, Sunarto et al (2010) mentioned that there are actually three potential natural tourism area at Parangtritis Village. The first one is Parangtritis Beach which is famous for its natural beach beauty, the second destination is Parangkusumo which is recognized as a ritual site and historical place of Mataram Kingdom, and the last one is Depok Beach which is recommended for seafood culinary lovers. Yet, Parangtritis Beach is taking the first place over Parangkusumo and Depok Beach. Parangtritis Beach has unique potency and beauty such as the scenery of the beach itself, the sunset spot, the ATV rental, horse-cart riding, and the existence of sand dunes. Based on data from Tourism Department of Yogyakarta Special Province (Dinas Pariwisata Provinsi DIY) (2016), There are more than 2 million tourists visiting Parangtritis Beach as the holiday destination in 2016. The number of tourists has increased during four years period (2012-2016). As the result, Parangtritis Beach becomes most favourite destination to be visited in DIY Province following The Prambanan Temple on the second place BPS Bantul Regency (2016) calculated the income of tourism industry at Parangtritis Beach throughout 2015 – 2016 is more than 19 billion Rupiahs out of total 23 billion Rupiahs. Moreover, Sönmez (1998) found the tourism industry has vulnerability to a series of disasters which can be happened anytime. It is because there is compressive industry and it depends on so many components and individual businesses; more importantly, disasters may endanger the safety of visitors (cited in Wu & Hayashi, 2014).

According to Indonesian Laws Number 24 of 2007 about Disaster Management “Disaster is an event or series of events that threaten and disrupt people’s lives and livelihoods caused by both natural factors and/or non-natural factors as well as human factors resulting in human casualties, environmental damage, property losses and psychological impacts.” There are many kinds of natural disaster including earthquake,

tsunami, flood, landslide, tidal wave, typhoon, etc. Those disaster may happen as the result of several factors as well as the weather, the geographical, and the geological in the particular places. Different factors and places may be resulted different kind of disaster hazard. It has also the possibility of the existence of multi-hazards in one place.

The coastal zones have threat on some kinds of natural disaster such as tsunami, tidal wave, flood, windstorm and combination of any. Tidal wave is serious disaster that often occurs along the coast. The result of the event causes the flood on the shore that comes up from the sea. Indonesian National Agency of Disaster Management (BNPB) released there are eleven events of tidal wave reported in 2018. Even though the death victim is zero, there are 652 affected people and 179 damaged residents because of tidal wave.

In the end of July 2018, tidal wave happened along the southern coast of Java Island including Parangtritis Beach. Tidal wave occurs as the result of wind movement from Australia to the Indian Ocean. The impulse of the wind gives the impact of the wave speed and the height becomes higher as it hits the shore. The height wave reported reaching 5 up to 8 metres. Inarisk BNPB (2013) reported that Kretek Sub-District where Parangtritis Beach is located has medium level on tidal wave threat where the level of exposed population is high. That high level is as the result of number of population who live near the beach. The number exposed population near Parangtritis Beach reaches 1.459 people. Furthermore, approximately 85% of the population depends their income from tourism sector (PGSP & BIG, 2016). Tourism products offered by the local people are services and goods such as hostelry, guiding, and culinary. However, the beach is closed temporary for tourism activities due to the tidal wave effect. Meteorology Climatology and Geophysics Council (BMKG) predicted the highest wave occurred within 24 and 25 July 2018. The material and economical loss are also experienced by the local people even though there is no calculation about the total loss estimated in Rupiahs.

The news about the tidal wave at Parangtritis Beach has gone viral on the internet whether the sources released from the official websites and social media platforms. The rapid progress of technology plays important role in current society life. One of technological development is internet. By July 2018 internet was accessed by more than 4.1 billion people from all over the world (Statista, 2018). Devices such as computer, laptop, and smartphone are the tools that people use to surf within the cyberspace. The increasing of demand is in line with the era requires the continuation upgrading of gadgets or devices. Cisco IBSG (2011) predicts in 2020 there will approximately be 50 billion devices connected to internet while the population is only 7.6 billion. Based on

the prediction in two years ahead, there will be at least 6 until 7 connected devices run by one person.

The expansion of cyberspace and the increasing of device demand in the world especially smartphone also give the impact towards the new information delivering and accepting. Goodchild (2007) and Rosser et al (2017) found that phenomenon resulting people to have easy accessibility in documenting the current events and moments with the shared information in such actual time through social media. The discovery is well known as crowdsourcing which means the sourcing model that can be organized by using internet technology in order to utilize the crowd's efforts virtually in case of performing certain organizational tasks (Saxton, et al., 2013).

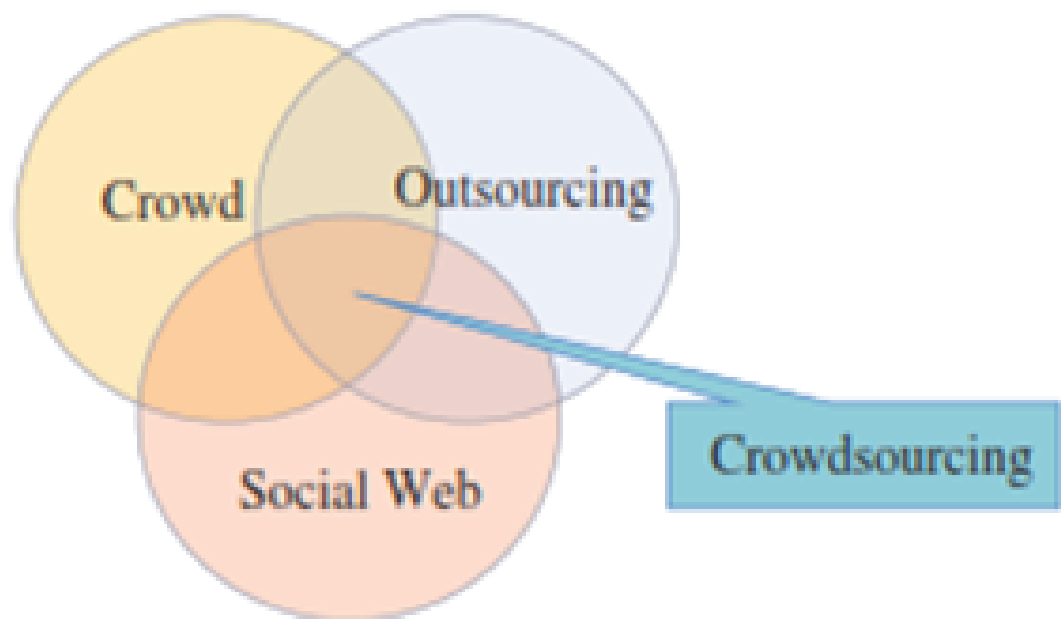


Figure 1: Three element in crowdsourcing (Saxton, et al., 2013).

Voluntary utilization of information from social media has the potential to increase deficiencies data and provide disaster-related information for the benefit of decision makers and the community (Hartato, et al., 2017), one of that things can be formed as the tourist decision to determine holiday destination. Social media platforms including Instagram, Facebook and Twitter give the freedom in sharing information that can be accessed for other people who are in the same platform. Anyone can also able to respond the information from one particular account through comment column that are available on Instagram and Facebook. Thus, Twitter is different with other mentioned platforms.

Twitter network is not two-way, which means that connections do not have to be mutually beneficial. Twitter is one of platforms where the user can create an account

for free from its website Twitter.com (Carley, et al., 2015). Moreover Twitter is not only accessed through website, but it can be downloaded on the smartphone within operating system such as Android and iOS. Twitter Users can post a messages ('tweets') of a maximum of 280 characters per tweet. Twitter serves a hash symbol ('#') before a word which is called a 'hashtag'. A 'hashtag' that is made may become several functions, for example as a conclusion, a label, or a keyword of the post. People can respond another account's post or well-known as a 'tweet' through another 'tweet' if the users want to write a message, a 'retweet', and a 'love' icon to copy the 'tweet'. Those posted tweets occur on their own account and their followers' account timeline. This is following content structure of a 'tweet' or a post.



Figure 2: Content Structure of a 'tweet' on Twitter (Poorthuis cited in Kusumo, et al., 2017).

This study aims to investigate the advantages using Twitter as the tools for capturing people preferences to decide tourist destination and explores the usefulness of this information for capturing people perception in case of knowledge about the tidal wave and decision to visit the beach just right after the tragedy. Twitter as one of biggest social media platforms in Indonesia gives significant role through fast and responsive information.

1.2. Methodology

Sentiment analysis, also called opinion mining, is the field of study that analyses people's opinions, sentiments, evaluations, appraisals, attitudes, and emotions towards entities such as products, services, organizations, individuals, issues, events, topics, and their attributes (Liu, 2012). Sentiment analysis can be formed through single words, phrases, or sentences. Sentiment analysis generally focuses on positive and negative sentiments (Liu, 2012; Pang & Lee, 2008; Spencer & Uchyigit, n.d.).

Positive sentiment is often expressed through particular words such as “good”, “wonderful”, and “amazing” (Liu, 2012). Sentiment can be formed as negative in many ways for example “no”, “not”, “never”, etc. (Kharde & Sonawane, 2016). The classified of positive and negative sentiment are included on these sentences below as cited in Liu (2012):

Posted by: John Smith

Date: 10 September 2011

“(1) I bought a Canon G12 camera six months ago. (2) I simply love it. (3) The picture quality is amazing. (4) The battery life is also long. (5) However, my wife thinks it is too heavy for her.”

Those opinions above result both positive and negative sentiments about Canon G12 camera. Sentence (2) expresses the positive opinion about Canon G12 in general. Positive opinion also includes in sentence (3) which tells about picture quality as well as in sentence (4) which express the same sentiment, yet about the battery life. On the contrary, the negative sentiments found in sentence (5) whom the speaker criticize about the weight of the camera.

In recent years a lot of work has been done in the field of “Sentiment Analysis on Twitter” by number of researchers (Kharde & Sonawane, 2016). Spencer & Uchyigit (n.d.) proposed the Sentimentor, a tool to analyse sentiment from Twitter data. The Sentimentor offers the naïve Bayes Classifier which has purpose to divide tweets into positive, negative, and objective sets. Moreover, the experimental evaluation is also conducted in order to prove the further similar research. Wang et al (2012) proposed such a system for real-time twitter dealing with sentiment analysis of 2012 U.S. Presidential Election Cycle. The classification of the tweets following positive, negative, neutral, and unsure about the election. Bollen et al (2011) investigated that the variation of public mood can be formed in line with the condition around them including the events in the social, political, cultural and economic issues.

To conduct this research, we use the strategies of descriptive research. The source data is collected from 202 tweets on Twitter through web scrapping method with language program called Python developed by Henrique (2018). The retrieved data contains one or more relevant hashtags and keywords, i.e. #parangtritis, #explorejogja, #visitjogja, #wisatajogja. The data is collected within the three periods of tidal wave which are following before disaster (18 July 2018 – 23 July 2018), during disaster (24 July 2018 – 25 July 2018) and after disaster (26 July 2018 – 1 August 2018).

2. Results and Discussion

There are three steps containing data retrieval, data cleaning, and content analysis to generate data from Twitter. The process can be viewed as in the Figure 3.

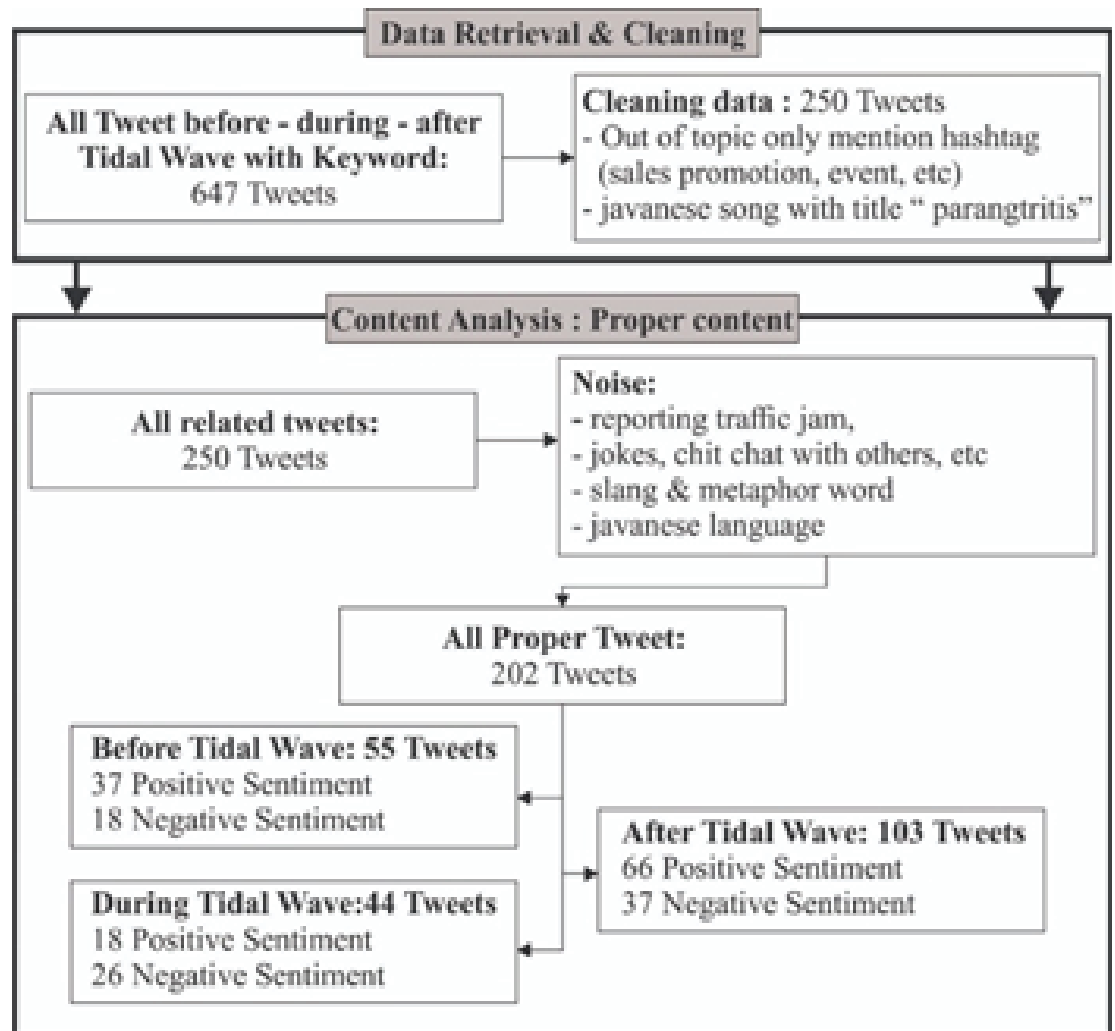


Figure 3: Twitter data processing workflow.

The first step in conducting content analysis is to filter tweet content which is relevant to Parangtritis Beach.

There are 647 tweets that use keywords such as “parangtritis” and “gelombang tinggi”. However after filtering the data twice, almost 450 tweets are irrelevant. The final finding are 202 proper tweet that contains the tidal wave contents. Those proper tweets are divided into three phases (Before tidal wave, during tidal wave, and after tidal wave) which each phase containing positive and negative sentiment.

Most people mentioned to other several users or accounts that are providers of news portals at the end of their tweets (examples are shown in Figure 3).

TABLE 1: Example of positive and negative sentiment content.

	Before Tidal Wave (18 July – 23 July)	During Tidal Wave (24 July – 25 July)	After Tidal Wave (26 July – 1 August)
Positive Sentiment	Giving positive words, comments, willing to visit Parangtritis, etc.	Information about the tidal wave, obeying the warning, etc.	Giving positive words, comments, willing to visit Parangtritis, etc.
Negative Sentiment	Expressing negative words, fear of visiting the beach, etc.	The desire to keep going to the beach, ignoring the warning, etc.	Expressing negative words, fear of visiting the beach, etc.



Figure 4: Example of tweets.

“(1) Parangtritis Beach this morning guys, (2) for those who have plan to go to the beach, please cancel your plan for a while (3) the wave is above the normal condition. (4) Hopefully the situation will be better immediately.”

Figure (4) expresses the positive sentiment, the user shares the situation of Parangtritis through the video on July 25th, while the peak of tidal wave occurs. The first sentence (1) contains the information about Parangtritis in particular time “morning”. The sentence (2) contains the warning due to the disaster on the beach. The information sentence is also found in the (3) sentence which informs about the wave and the last sentence (4) includes the wish from the user for better situation. In addition, there is example of tweet that responds towards the current Parangtritis Beach condition at that time. That tweet contains some information and expressions from the local Javenese man. The way he

uses slang word “*lur*” (from *sedulur* = brother) expresses freedom of speech in social media. Citizen journalism also shown by that tweet, awareness being a responsible adult citizen to inform netizen about the current situation of Parangtritis beach way before the government or intermediary actors did. The user @M_Syaid mentions Yogyakarta’s popular media information base account such as @merapi_news, @Jogja24jam, and @jogjamedia. This social phenomenon means civil society as a concept, exists in digital public sphere called twitter.



Figure 5: Example of tweets.

“The Parangtritis’s wave overflows until reaching the parking area.”

In Figure 5 explains the user has positive sentiment since he already knows the condition of the tidal wave at Parangtritis and responding through his tweet. That tweet also contains unusual event as the wave’s already reached the parking area. However, there are several noise mentioned by people on their tweet. Irrelevance information that is seen in the content such as the metaphor of the keyword as portrayed in Figure 6 by using Javanese word.

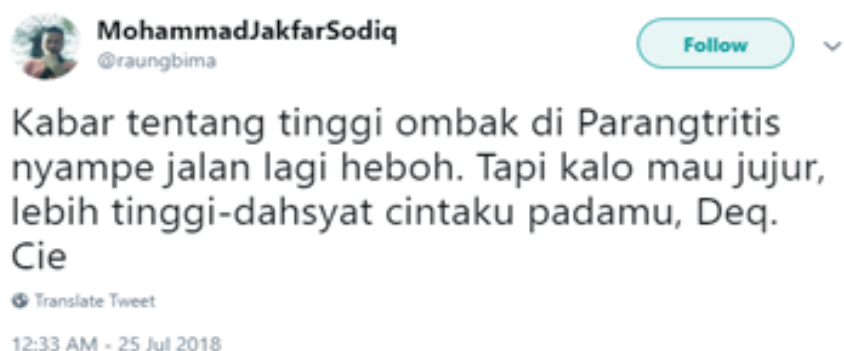


Figure 6: Example of tweets.

*“(1) News about the high of tidal wave in Parangtritis raching the road is on trending.
(2)But I would like to be honest, my love is higher for you, dear.”*

In Figure 6 there are positive sentiment and irrelevance information in a tweet. The first sentence (1) explains about the respond about the trending of Parangtritis tidal wave.

Thus, in sentence (2) the user gives the out of topic comment through the metaphor he used containing flirting words. Meanwhile, several tweets containing the willing of going to Parangtritis Beach even before and after disaster. Although this tweet contains positivity, figure (5) is less serious. This is a common phenomenon in social-media like Twitter did. With tweet like figure (5), substantial information is being delivered in a casual way.



Figure 7: Example of tweets.

“(1) Let’s go to Parangtritis”

“(2)Next week let’s go! To Parangtritis”

“(3) Let’s go to Parangtritis”

Those three tweets in Figure 7 expresses the willing of going to Parangtritis Beach. However, all tweets have positive sentiment towards Parangtritis because they post the tweets before the disaster. The sentence (1) on 23 July which is before disaster and the sentence (2) and sentence (3) are posted after the disaster.

Another example provides the tourists anxiety and they do not recommend to go back to Parangtritis due to tidal wave or personal experience as portrayed in Figure 8, Figure 9, and Figure 10 below.

“(1)The wave at Parangtritis, Pangandaran, “(2)Beaches are as not as safe as the mountains,

*and Rancabuaya Beach are dreadfull. yesterday I just lost my bag with the
What happens on these recent the goods in it at Parangtritis”
days at the beaches?*

How’s about the next August?”

*“(3)I am not feeling okay anytime I hear about ‘Parangtritis’. And things related to it.
God, give me the strength.”*

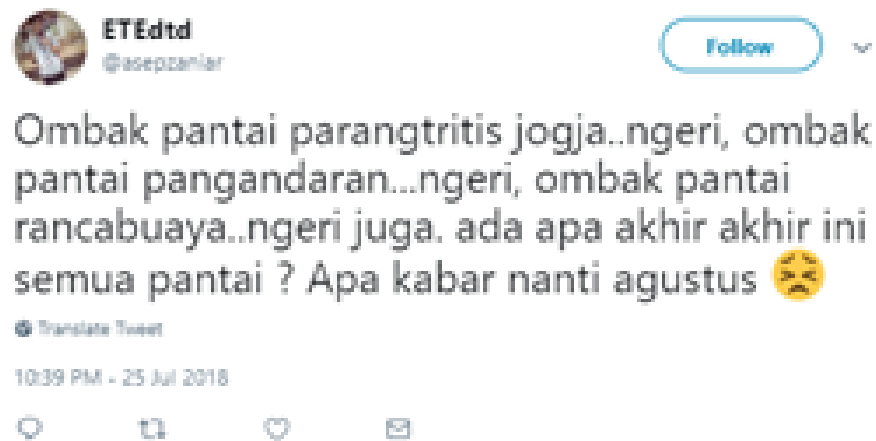


Figure 8: Example of Tweets.



Figure 9: Example of Tweets.



Figure 10: Example of Tweets.

Sentence (1) in Figure 8 that is posted during the disaster expresses both positive and negative sentiments. On the first sentence has positive sentiments because the user knows about the news of tidal wave happens along the southern coast of Java Island, not only at Parangtritis. In addition he also includes the negative sentiments about August which he may think that the condition will be getting worse. Sentence (2) in Figure 9 has the negative sentiment content. The user just faces bad experiences at Parangtritis which he loses his bag, As the result he gets anxiety and thinks that beaches are not

safer than mountains. Figure 10 which contains sentence (3) also includes the negative sentiment. The tweets is posted one day after the disaster so she may hear about the tidal wave. Furthermore the user sounds having traumatic experience about Parangtritis through the sentences “*I am not feeling okay anytime I hear about ‘Parangtritis’*”, then she wishes to God to be given the strength.

On the contrary, there is also a user who has high motivation to go to Parangtritis Beach although he is forbidden by his mom as can be shown in Figure 8 below.



Figure 11: Example of tweets.

“(1) Mom said that I am prohibited for bathing at Parangtritis Beach, so I’d rather to sit on the beach and write (on the sand) ‘I Love Zanetti’.”

In sentence (1) in Figure 11 expresses the negative feeling towards Parangtritis through the warning from his mom. Even though he is one of the visitors he is rather to sit on the beach not go to the water. Figure (11) shown us that tourist in the beach can do anything, not only swimming or playing with the waves.

3. Conclusion

Based on the key findings from the literature review and the results of the Parangtritis Beach case study, twitter data has benefits including the selected information. Analysis of Twitter content found various types of information related to tourist perceptions of tourist sites. Content analysis can also be used when people post tweets and use a few sentences in it so that we can identify the sentences whether it includes positive or negative sentiments. Content analysis can also take time and print to reduce time

efficiency. Determining the right keywords is one of the important things in analyzing content from Twitter data. The first factor is filtering content on Twitter that is considered a synonym for each keyword. In some cases, some people use other words but have the same meaning. Popular slang words must also be paid attention as well especially young users. Other factors can be formed as metaphorical words and Javanese languages. Tourist perceptions such as positive and negative expressions utterly useful for research and development of tourist sites. Twitter as a public sphere is commonly known for its freedom of speech. In some particular cases like disaster in tourist sites, Twitter shown us the existence of civil society as a manifestation in a digital world. The netizen of “twitland” act dan response event way faster before the government did. The netizen of “twitland” is an important part of digital society especially in this industrial revolution 4.0 era which the border of real world and digital world are so subtle.

References

- [1] BNPB, 2013. *Indeks Risiko Bencana Indonesia 2013-2015*. Jakarta: Badan Nasional Penanggulangan Bencana.
- [2] Bollen, J., Mao, H & Pepe, A., 2011. *Modeling Public Mood and Emotion: Twitter Sentiment and Socio-Economic Phenomena*. s.l., s.n., pp. 450-453.
- [3] BPS, 2016. *Bantul Dalam Angka 2016*. BPS – Statistics of Bantul regency. Yogyakarta: Badan Pusat Statistik.
- [4] Budiharsono, S., 2001. *Teknik Analisis Pembangunan Wilayah Pesisir dan Lautan*. Jakarta: PT. Pradnya Paramitha.
- [5] Carley, K. M. et al., 2015. *Twitter Usage in Indonesia*. Thesis Carnegie Mellon University, Pittsburgh, Pennsylvania: Carnegie Mellon University.
- [6] Chris Cooper, et al., 1993. *Tourism Principles & Practice*. United Kingdom: Longman Group Limited.
- [7] DIY, D., 2016. *Statistik Kepariwisata*, Yogyakarta: Dinas Pariwisata Provinsi Daerah Istimewa Yogyakarta.
- [8] Goodchild, M. F., 2007. Citizens as sensors: The world of volunteered geography. *GeoJournal*, 69(4), p. 211–221.
- [9] Hartato, E., Delikostidis, I. & De Róiste, M., 2017. *Volunteered Geographic Information (VGI) for Disaster Management A Case Study for Floods in Jakarta*. Msc Thesis University of Canterbury, Christchurch, Canterbury: University of Canterbury.
- [10] Henrique, J., 2018. *Get Old Tweets-python*. [Online] Available at: <https://github.com/Jefferson-Henrique/GetOldTweets-python> [Accessed 26 August 2018].

- [11] Kharde, V. A. & Sonawane, S. S., 2016. Sentiment Analysis of Twitter Data: A Survey of Techniques. *International Journal of Computer Applications*, 139(11), pp. 5-15.
- [12] Kusumo, A. N. L., Reckien, D. & Verplanke, J., 2017. Utilising volunteered geographic information to assess resident's flood evacuation shelters. Case study: Jakarta. *Applied Geography*, 88(1), pp. 174-185.
- [13] Liu, B., 2012. *Sentiment Analysis and Opinion Mining*. s.l.:Morgan & Claypool Publishers.
- [14] Pang, B. & Lee, L., 2008. Opinion mining and sentiment analysis. *Foundation and Trends in Information Retrieval*, 1-2(2), pp. 1-135.
- [15] PGSP & BIG, 2016. *Buku Deskripsi Peta Desa Parangtritis (PSGP & BIG)*. Yogyakarta: PSGP & BIG.
- [16] Rosser, J. F., Leibovici, D. G. & Jackson, M. J., 2017. Rapid flood inundation mapping using social media, remote sensing and topographic data. *Natural Hazards*, 87(1), p. 103–120.
- [17] Saxton, G. D., Oh, O. & Kishore, R., 2013. Rules of Crowdsourcing: Models, Issues, and Systems of Control. *Journal of Information Systems Management*, 2(30), pp. 2-20.
- [18] Sönmez, S. F., 1998. Tourism, Terrorism, and Political Instability. *Annals of Tourism Research*, Volume 22, pp. 416-456..
- [19] Spencer, J. & Uchyigit, G., n.d. *Sentimentor: Sentiment Analysis of Twitter Data*, Brighton: University of Brighton.
- [20] Statista, 2018. *Global Digital Population as of July 2018 (In Millions)*. [Online] Available at: <https://www.statista.com/statistics/617136/digital-population-worldwide/> [Accessed 25 September 2018].
- [21] Sunarto, Marfai, M. & Mardiatno, D., 2010. *Multirisk Assessment of Disasters in Parangtritis Coastal Area: A Comprehensive Analysis to Build Public Awareness Towards Various Events of Disasters*. Yogyakarta: Gadjah Mada University Press.
- [22] Wang, H. et al., 2012. *A System for Real-Time Twitter Sentiment Analysis of 2012 U.S. Presidential Election Cycle*. s.l., s.n., pp. 115-120.
- [23] Wu, L. & Hayashi, H., 2014. An Analysis of Tourist Perception and Attitude toward Disasters: A Case Study of Recent Chinese Large Earthquake Disasters. *Journal of Social Safety Science*, 24(1), pp. 311-320.