



Risk Communication on Disaster and Environmental Protection as Muhammadiyah *Jihad* of The Second Century

Tria Patrianti*, **Sa'diyah El Adawiyah****, **Nani Nurani Muksin*****,
Dezan Ziandhani****

**Communication Department, Universitas Muhammadiyah Jakarta, Jl. KH. Ahmad Dahlan, Cireundeu Ciputat, Tangerang Selatan 15419*
E-mail: tria.patrianti@umj.ac.id

***Communication Department, Universitas Muhammadiyah Jakarta, Jl. KH. Ahmad Dahlan, Cireundeu Ciputat, Tangerang Selatan 15419*
E-mail: sadiyah.eladawiyah@umj.ac.id

****Communication Department, Universitas Muhammadiyah Jakarta, Jl. KH. Ahmad Dahlan, Cireundeu Ciputat, Tangerang Selatan 15419*
E-mail: naninuranimuksin@umj.ac.id

*****Communication Department, Universitas Muhammadiyah Jakarta, Jl. KH. Ahmad Dahlan, Cireundeu Ciputat, Tangerang Selatan 15419*
E-mail: dezanzd@gmail.com

Article Info

Article history:
Received: 24th March 2022
Accepted: 16th June 2022
Published: 30th June 2022

DOI:
<https://doi.org/10.33102/jiccom.vol2no1.35>

ABSTRACT

Indonesia has experienced extreme climate events such as floods and droughts, as well as the long-term effects of rising sea levels. Eighty per cent of disasters in Indonesia are caused by climatic or hydrometeorological disasters. Disaster is defined as a serious disturbance caused by both natural and human factors and can paralyze the functions of society that are built to support survival, protect assets, preserve the environment and ensure its dignity as part of religious orders. The paralyzed function is due to the occurrence of losses from the human, material, economic, or environmental side that extend and exceed the community's ability to overcome them. In disaster mitigation efforts, the Muhammadiyah Environmental Council has tried to communicate disaster risks through various communication programs. Although it is not optimal, this effort is considered as a form of Muhammadiyah preoccupation with sustainability of life, even becomes jihad in the second century to save the environment. This study aims to explore the risk communication carried out by the Muhammadiyah Central Leadership Environmental Council as the Second Century Muhammadiyah Jihad. Through interview techniques, literature study and document review, the results state that Muhammadiyah Environmental Council does not yet have a sustainable communication strategy, even though a series of activities have been carried out such as socialization, education, and advocacy that focus on saving the environment.

Keywords: *Climate Change, Hydrometeorological disasters, Risk Communication, Jihad Muhammadiyah*

INTRODUCTION

Indonesia's strategic geographical location has made it a centre of civilization, as well as containing natural potential that is dangerous and poses a risk of disaster. Indonesian Disaster Information Data (DIBI)-BNPB, shows that more than 1,800 disaster events in the period 2005-2015, consisting of 78% (11,648) hydrometeorological disasters and only about 22% (3,810) were geological disasters. Hydrometeorological disasters include floods, extreme waves, land and forest fires, droughts, and extreme weather. Meanwhile, geological disasters that often occur are earthquakes, tsunamis, volcanic eruptions, and landslides. The trend of the total number of disaster events for these two types of groups continues to increase relatively and has a major impact on the economic, social, and environmental sectors (BNPB, 2016). As one of the largest Islamic civil society movements in Indonesia, Muhammadiyah has always cared about and involved itself in the humanitarian context. After a century of successfully managing and tackling issues of education, health, and social welfare, Muhammadiyah focuses on tackling environmental problems, including disaster management. Even in 2016, Muhammadiyah published a Disaster Fiqh guidebook which symbolizes the collective efforts of Muhammadiyah leaders to reshape their religious views on contemporary issues (Latief & Nashir, 2020).

The role of Muhammadiyah in communicating disasters is very relevant in an era that is full of the complexity of environmental problems. Risk communication carried out by one of the largest Islamic organizations in Indonesia can encourage public perceptions and attitudes and understanding to believe that the environment must be saved. Kar & Cochran (2019) stated that risk communication involves the exchange of information among stakeholders about impending hazards and the associated risks, with a view to helping local communities take appropriate actions to reduce their impacts. After a disaster occurs, there is a continuing need to disseminate verifiable, accurate and up-to-date information to affected communities to assist relief and response efforts (Patrianti, 2020). The purpose of risk communication is to convey clear and concise messages about hazard events and risks associated with the affected population (Krimsky, 2007). Therefore, risk communications should provide information about hazard events in the form of risk messages or risk messages related to warnings using various communication channels to promote the scope of the disaster based on the applicable regulations (Reynolds & Seeger, 2005). The society at risk is made up of a heterogeneous group of people. They are a diverse group and their response to messages is influenced by the perception of risk. Successful risk communication must take into account the unique needs of this population and allow the exchange of information and opinions between them (Janoske & Liu, 2012)(Majelis Lingkungan Hidup, 2018).

Due to the increasing frequency of natural disasters caused by human-inflicted environmental damage, the Environmental Council has carried out risk communication through various channels. During the pandemic, the environmental Koran format has been packed with messages of disaster risk due to environmental damage. Relations between stakeholders have also been carried out to provide a persuasive message to protect the environment. An important resource person from vice chairman of the leadership of the United States Muhammadiyah branch named Nana Firman, was presented in the format of environmental disaster risk communication. Although not optimal, this research will explore how disaster risk communication is carried out and is in line with Muhammadiyah's commitment to support environmental protection as Muhammadiyah jihad in the second century (Fandi, 2018).

Research on risk communication contains the significance and contribution in the communication science based on disaster management or disaster reduction and communication in the disaster sector related to environmental impacts due to human activities. This research on risk communication in environmental disasters is related to the exploration of risk communication from a religious-based civil society, namely Muhammadiyah. Similar research that has one or several concepts can be described as follows; 1) Artificial Intelligence in Disaster Risk Communication: A Systematic Literature Review (Ogie, Rho, & Clarke, 2019), is a disaster risk communication study carried out with the SLR approach and only examines the technology used in disseminating disaster risk information. Similar to research Earthquake Country: A Qualitative Analysis of Risk Communication via Facebook (Lambert, 2020) which emphasizes the use of Facebook to communicate disaster risk in Alaska. Both studies have a study of disaster risk communication that observes social media and information technology aspects. Furthermore, the search results on risk communication in environmental disasters have never been studied in a large organization such as Muhammadiyah and how they play a role in communicating environmental disaster risk. Islamic scholars dominate the field of Muhammadiyah studies as follows: *Local Dynamics and Global Engagements of the Islamic Modernist Movement in Contemporary Indonesia: The Case of Muhammadiyah (2000-2020)*, which explains how Muhammadiyah is involved in international arenas. Meanwhile, another article entitled *Muhammadiyah: The political behavior of modernist Muslim elite in Indonesia* (Nashir, Jinan, & Setiaji, 2019), *The Muhammadiyah criticism against Mawlid tradition over centuries* (As'ad, 2019) are some of the results of research on Muhammadiyah as modern Islam in Indonesia in a political and cultural approach.

None of the research results on Muhammadiyah were conducted through a disaster risk communication approach or research results to explore the Muhammadiyah jihad in the second century in saving the environment. This encourages researchers to contribute to the science of communication, especially disaster risk communication in Muhammadiyah, as one of the largest Islamic organization in Indonesia.

LITERATURE REVIEW

Climate Change and Hydrometeorological Disasters

Climate and weather-related extreme events, such as floods, droughts, heat waves and wildfires, are increasing in frequency and intensity in many parts of the world. Climate change, rapid urbanization and urban migration, and environmental degradation put populations at greater risk of climate change events and their impacts. The World Economic Forum even states that extreme weather events and natural disasters are the two global risks that occur with the greatest impact (Raikes, Smith, Jacobson, & Baldwin, 2019). Similar to Indonesia, the largest archipelagic country in the world is also very vulnerable to the consequences of climate change. Some of the visible threats from the impact of climate change are rising sea levels, extreme weather, increasing air pollutants (Patrianti, Shabana, & Tuti, 2020). In Indonesia, 80% of disasters that occur are categorized as hydrometeorological disasters or disasters caused by climate change. This figure is quite fantastic when compared to geological disasters such as earthquakes, tsunamis and volcanic eruptions. In the last 10 years, hydrometeorological disasters, such as floods, landslides and cyclones, have dominated. The type of season that is taking place greatly influences the disasters that occur, such as the beginning of the rainy season until the beginning of the dry season, often floods, landslides and tornadoes always occur. On the other hand, in dry months, drought and forest and land fires become a scourge for the community. Landslide is a deadly disaster in the classification of hydrometeorological disasters. Landslide material that immediately buried everything underneath caused limited time to save themselves (BNPB, 2016). The latest data for the period January - April 2020 stated that hydrometeorological disasters still rank at the top of disaster events in Indonesia. A total of 437 floods, 355 tornadoes, 267 landslides and one drought. Meanwhile, other disasters are forest and land fires 119. When compared to the number of geological disasters in the same period, there are fewer, such as four earthquakes and three volcanic eruptions. 3 and tidal waves and abrasion 2. Therefore, hydrometeorological disasters are still a threat in Indonesia (National Disaster Management Authority, 2020)

Risk Communication

The study of risk communication is embedded in the long history of human adaptation to climate and environmental risks. Prior to the 1980s, risk communication was defined as a top-down flow of information. With more reflection on the environment and social movements in the mid to late 20th century, attention to risk has shifted to human subjectivities such as the perception and interpretation of risk, risk knowledge, cultural factors, social relationships, and beliefs that all can have an influence on behavior. individuals to face risks (Lin, Khan, Acosta, Alaniz, & Olanya, 2020) . In disaster management, risk is an aspect that must be recognized,

understood so that its impact can be reduced. Individual or community knowledge about the risks of a disaster threat is the key for individuals/communities to act in dealing with the disaster risk. In Indonesia, the Minister of Home Affairs Regulation Number 101 of 2018 concerning Basic Service Technical Standards on the Minimum Service Standards for District/City Regional Disaster Sub-Divisions includes, a risk communication in dealing with disasters and disaster-prone information services (BNPB, 2021)

Muhammadiyah and Jihad

As the power of civil society and the largest Muslim ummah in Indonesia, Muhammadiyah has a great responsibility to respond to the challenges of environmental damage caused by prolonged human activities. This responsibility, both at the philosophical level in contributing ideas for new management of natural resources in Indonesia, as well as at the practical level, is involved in solving existing environmental problems and seeking the formation of an Islamic society that is friendly to the environment. This responsibility is interpreted as a form of Muhammadiyah awareness, as a form of worship and da'wah for Muhammadiyah residents, and furthermore as a form of Muhammadiyah jihad in the second century (Ramdani, 2019) . In the first century, Muhammadiyah was successful with the jihad of education, health and social services. So in this second century, the jihad of Muhammadiyah that must be inflamed is the jihad to save and improve the quality of the environment, to minimize the risk of disaster. Improving the environment, by providing awareness that the environment is a mandate that Allah has entrusted to guard and preserve is the main task of Muhammadiyah's da'wah (Fandi, 2018)

RESEARCH METHODOLOGY

The research is conducted using a qualitative approach and uses data collection techniques through observations, interviews, literature studies, and the study of Muhammadiyah documents containing programs and policies. Data is collected naturally through inductive and deductive data analysis to establish a pattern or theme (Creswell & Poth, 2018). Collecting data through literature studies are literature reviews and documents reports owned by the Tarjih and Tajdid Councils, Muhammadiyah Environmental Council, and related stakeholders, as well as in-depth interviews with Muhammadiyah Central Leadership, relevant assemblies, and communication practitioners. Quotations from the literature study are used to understand the important issues in this research (Harris, 2020). It is also explored the study of government documents containing disasters and policies related to its mitigation, and the relevant Muhammadiyah publications about Fiqh Disaster. To explore the disaster risk communications conducted by the Muhammadiyah Environmental Council, we traced publications of online and offline activities in the

past five years. Information about community service activities for high school students was found in several schools before the pandemic. We also identified related documents issued by the Tarjih Council, namely Disaster Fiqh, and others. During the pandemic, we observed and participated in various webinars held by the Environmental Council to raise awareness of Muhammadiyah residents in dealing with the impacts of climate change. The resource persons featured were varied; from Government officials to Environmental activist. To complete the data, we conducted interviews with Muhammadiyah Environmental Council administrators who have actively communicated disaster risks related to climate change, as well as confirmed them through triangulation of sources with journalist and environmental activist who are both members of Muhammadiyah

FINDINGS AND DISCUSSION

It is discovered through literature reviews and in-depth interviews with informants that environmental disasters are the result of human conduct and acts, as well as a reflection of the perpetrators' behavior, implying that environmental issues are not only technical issues.

Since the beginning, Muhammadiyah has realized that saving and protecting the environment is an obligation as well as a mandate that must be carried out in order to build society towards a prosperous society blessed by Allah SWT (God Almighty). This movement to raise awareness and change people's behavior can be done through da'wah and environmental education to millions of students and students at Muhammadiyah educational institutions and to all stakeholders and the entire community in the country. The importance of protecting the environment to avoid disaster, and in providing an understanding of disasters, Muhammadiyah is committed to educating the ummah through the book of Disaster Fiqh. This publication, which was published in 2015, contains about how Muslims must understand and interpret disasters, perspectives on disaster management, fulfillment of the rights of disaster victims, and issues of worship in disaster situations.

Fiqh of Disaster is not in the sense of fiqh about concrete law (al-ahkam al-far'iyah), but includes a set of Islamic provisions regarding basic values (al-qiyam al-asasiyah) and general principles (al-ushul al-kulliyah). This collective ijtehad is carried out within the framework of exploring these three provisions (Suara Muhammadiyah, 2021) . Muhammadiyah has realized that to communicate the risk of disasters is to educate with producing narratives through publications. Fiqh of Disasters is among others. Furthermore, Muhammadiyah's responsibility in raising awareness of environmental protection and disasters is through the establishment of the Environmental Council as the official organ of the Muhammadiyah Central Executive in charge of dealing with environmental problems. Muhammadiyah is also directly

involved in dealing with environmental issues in collaboration with the Ministry of Environment and Forestry,, Ministry of Education and Culture, centers for environmental studies and national and international environmental NGOs.

Secretary General of the Environmental Council (MEC) PP Muhammadiyah, Ir. H. Gatot Supangkat, M.P stated that MEC has a movement to increase knowledge and awareness for people about environmental conservation.

"MEC must actively participate in environmental (nature) conservation efforts. This effort is packaged in a da'wah movement, entitled "Muhammadiyah Movement Cools the Earth" with the motto "Cool, My Earth is Comfortable, My Life is Safe and Peaceful for My Children's Future."

Furthermore, Gatot explained that the decision of the 47th congress in Makassar (South Sulawesi) which had been declared on strategic issues related to Muhammadiyah's concern for the environment. There are three issues that have been determined, namely: 1) Public Issues that emphasize the importance of a sustainable clean lifestyle in families and communities. 2) National Issues, emphasizing on Water and Drought, that Muhammadiyah cares about and actively participates in preventing water and water crises. handling of droughts that occur throughout Indonesia through the infrastructure of Muhammadiyah organizations from the center to the regions, 3) Universal Issues, which emphasizes Climate Change Issues, and Muhammadiyah cares and actively participates in inhibiting global climate change. Participation is carried out through building cooperation for climate change disaster mitigation programs (hydrometeorology), and other inhibition efforts.

"So, the work program designed includes three approaches, namely socialization, education, and advocacy. Socialization and education are carried out through formal (schools) and non-formal institutions about the importance of disaster mitigation due to climate change. This Awareness Strategy is also carried out through mass media and social media", Gatot further explained.

Communication that is done through education, outreach, and advocacy is included in the realm of risk communication because according to its definition, risk communication includes taking action to reduce risk (Krause, Freiling, Beets, & Brossard, 2020). MEC makes every effort to transmit the information about natural catastrophe risk and the dangers it entails. Individuals are gathered in a formal program through environmental community service and the distribution of danger information via mass media and social media. One of the attempts to communicate environmental and disaster control hazards is MEC's official website,

www.lingkunganmu.com. ("your environment" in Indonesian) as one of the efforts to communicate environmental and disaster control risks.

The quality of knowledge about the threat of natural disasters, such as the dangers of climate change, is conveyed through various two-way communications such as Krause's statement that disaster risk response communicators can engage with the "audience" actively to increase public knowledge (Krause et al., 2020). Muhammadiyah Environmental Council (MEC) member, Ir. Hidayat, strengthened Secretary General Gatot's statement that Muhammadiyah's active participation in environmental management and saving is regulated within the framework of progressive Islam towards the enlightenment of civilization, related to environmental issues, namely Keumatan (Building a Clean and Healthy Living Culture), Nationality (Overcoming Water and Energy Crisis) and Universal (Climate Change Adaptation and Mitigation). However, in developing risk communication for audiences who will be affected, planning and program sustainability have not yet been carried out:

"We do not yet have a systematic and periodic communication pattern regarding environmental problems, currently they are incidental and partial."

According to the researcher's observations, this is due to the absence of risk messages conveyed to the public in a planned and programmed manner. From a communication perspective, risk communication is the exchange of messages that create or change the perception of the possibility of a negative event. That risk communication is not unidirectional (where one entity sends a message to an audience) but rather a dynamic and ongoing exchange of thoughts and feelings to increase understanding of a hazard. Persuasive messages that are built to communicate the risks of climate change and disasters due to environmental factors have not yet been held. Several webinars were held to provide increased understanding in the context of da'wah. There is no persuasive message as an element of risk communication. In conveying the message of environmental disaster risk, MEC took the form of compiling books (13 titles) both general guidelines and practical guidelines, as well as environmental awareness movements such as the Development of an Earth Conditioning Area in Barito Regency, Kuala South Kalimantan, Development of an Arboretum for Local Fruit Crops in Banjarmasin, Muhammadiyah Center for Biological Diversity in Sorong Regency, Shodaqoh Trash Movement (GSS), Assessment of Environmentally Friendly Muhammadiyah Buildings through Muhammadiyah Independent Environmental Audit (ALiMM), Radio Broadcasts/Podcasts/Talkshows on Muhammadiyah television, Publishing of Friday sermon material books on environment, MEC Social Media Development (FB, Instagram, Twitter, website environmentmu.com). Based on the triangulation of sources, the statement from Makroen Sanjaya, Director of TV Muhammadiyah (TVMU) stated:

"MEC had not submitted a policy regarding efforts to save the environment in a comprehensive, systematic and continuous manner through TVMU, which is the Muhammadiyah Official Broadcaster. If there is any kind of attitude or response regarding a certain issue, it is at the initiative of TVMu. For example, when the issue of the threat of natural disasters due to environmental damage was discussed through the "TVMu Dialectic" program, TVMu invited the MEC management as one of the resource persons representing Muhammadiyah elements according to their field of duty. "

Nana Firman, the Deputy Chair of the United States head of Muhammadiyah Branch who has been involved several times as a resource in MEC risk communication to save the environment, stated that the relationship between MEC and MDMC (Muhammadiyah Disaster Management Center) must be improved.

"For example, their cooperation and coordination between MEC and MDMC to jointly conduct out socialization within Head of The Muhammadiyah Center internally and while speaking externally with external parties, so that it appears as a unit."

CONCLUSION AND IMPLICATIONS

Muhammadiyah as a da'wah group and one of the largest Muslim organization in Indonesia understands that disasters such as floods, landslides, droughts, forest fires, land degradation, biodiversity loss, air and water pollution, and other disasters are caused by human conduct and acts. The Environmental Council is concerned about the said disasters as the impact of global warming and climate change as it will determine the destiny of the global community, nation, and human life. Climate change's effects and consequences will be a watershed moment for human civilization. As a result, a serious, vast, planned, tiered, and regular public awareness campaign is required to prevent the negative impact from worsening. Muhammadiyah as a da'wah movement for *amar makruf nahi munkar* or a call to maintain what is right and forbid what is wrong, has a strategic role in the awareness movement.

In general, Muhammadiyah's program approach model, as executed by the Environmental Council, consists of three elements: a) Socialization (communication-internalization-implementation) which focuses on direct understanding of various matters related to the environment and disasters, b) Education, which focuses on changing attitudes and behavior through education and training by combining learning about the environment and disasters while enjoying biodiversity and the preservation of other living things, c) Advocacy that focuses on building commitment and concern in increasing public awareness of the importance of environmental and

natural resource management nature, improving community skills and creativity through synergy and collaboration with stakeholders. MEC did not carry out the risk communication program in the execution of the Muhammadiyah Jihad in the second century. It is still conducted by communicating as usual.

Environmental da'wah carried out by the Environmental Council also has considerable challenges and becomes a discussion that is always actual and popular because it is directly related to the life of all creatures on earth. Communication messages used in risk communication for environmental conservation have not been constructed in a persuasive or long-term manner. Climate change has become a big concern for the Muhammadiyah Central Executive, especially with the founding of the Muhammadiyah Disaster Management Center (MDMC) unit, which is always on the go, going down to disaster sites.. However, in the aspect of the risk communication agenda, Head of Muhammadiyah Center does not yet have a systematic and structured communication strategy.

REFERENCES

- As'ad, M. (2019). The Muhammadiyah Criticism Against Mawlid Tradition Over Centuries. *Journal Of Indonesian Islam*, 13(2), 350. <https://doi.org/10.15642/JIIS.2019.13.2.350-372>
- BNPB. (2016). *Risiko Bencana Indonesia*. Jakarta.
- BNPB. (2021). Komunikasi Risiko Bencana. Retrieved May 31, 2021, from <https://elearning.bnpb.go.id/courses/course-v1:BNPB+KRB100+2021/about>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry & Research Design_Choosing Among Five Approaches* (4th ed.). California: SAGE.
- Fandi. (2018). Penyelamatan Lingkungan: Jihad Muhammadiyah di Abad Kedua. Retrieved May 11, 2021, from <http://lingkungan.muhammadiyah.or.id/berita-14461-detail-penyelamatan-lingkungan-jihad-muhammadiyah-di-abad-kedua.html>
- Harris, D. (2020). *Literature Review and Research Design*. New York: Routledge. <https://doi.org/978-0-429-28566-0> (ebk)
- Janoske, M., & Liu, B. (2012). *Understanding Risk Communication Theory: A Guide for Emergency Managers and Communicators*. College Park. Retrieved from www.start.umd.edu.
- Krause, N. M., Freiling, I., Beets, B., & Brossard, D. (2020). Fact-checking as risk communication: the multi-layered risk of misinformation in times of COVID-19. *Journal of Risk Research*, 23(7–8), 1052–1059. <https://doi.org/10.1080/13669877.2020.1756385>
- Krimsky, S. (2007). Risk communication in the internet age: The rise of disorganized skepticism. *Environmental Hazards*, 7(2), 157–164. <https://doi.org/10.1016/j.envhaz.2007.05.006>
- Lambert, C. E. (2020). Earthquake Country: A Qualitative Analysis of Risk Communication via Facebook. *Environmental Communication*, 14(6), 744–757. <https://doi.org/10.1080/17524032.2020.1719176>
- Latief, H., & Nashir, H. (2020). Local Dynamics and Global Engagements of the Islamic Modernist Movement in Contemporary Indonesia: The Case of Muhammadiyah (2000-2020). *Journal of Current Southeast Asian Affairs*, 39(2), 290–309.
- Lin, K. H. E., Khan, S., Acosta, L. A., Alaniz, R., & Olanya, D. R. (2020). The dynamism of post disaster risk communication: A cross-country synthesis. *International Journal of Disaster Risk Reduction*, 48. <https://doi.org/10.1016/j.ijdrr.2020.101556>
- Majelis Lingkungan Hidup. (2018). Penyelamatan Lingkungan: Jihad Muhammadiyah di Abad Kedua. Retrieved from <http://lingkungan.muhammadiyah.or.id/berita-14461-detail-penyelamatan-lingkungan-jihad-muhammadiyah-di-abad-kedua.html>
- Nashir, H., Jinan, M., & Setiaji, B. (2019). Muhammadiyah: The political behavior of modernist muslim elite in indonesia. *Humanities and Social Sciences Reviews*, 7(4), 837–844. <https://doi.org/10.18510/hssr.2019.74111>
- National Disaster Management Authority. (2020). Hydrometeorological Disasters Still

- Afflict Several Areas of Indonesia. Retrieved January 12, 2020, from <https://bnpb.go.id/berita/bencana-hidrometeorologi-masih-melanda-beberapa-wilayah-indonesia>
- Ogie, R. I., Rho, J. C., & Clarke, R. J. (2019). Artificial Intelligence in Disaster Risk Communication: A Systematic Literature Review. In *2018 5th International Conference on Information and Communication Technologies for Disaster Management*. Wollongong. <https://doi.org/10.1109/ICT-DM.2018.8636380>
- Patrianti, T. (2020). Risk Messages dan Perspektif Risk Communication di Masa Pandemi Covid-19. In *Covid - 19, Pandemi Dalam Banyak Wajah* (pp. 55–64). Depok: Rajawali Pers,.
- Patrianti, T., Shabana, A., & Tuti, R. W. (2020). Government Risk Communication on Greenhouse Gas Emission Reduction To Tackle Climate Change. *Jurnal Penelitian Komunikasi Dan Opini Publik*, 24`2), 156–170. <https://doi.org/10.33299/jpkop.24.2.3416>
- Raikes, J., Smith, T. F., Jacobson, C., & Baldwin, C. (2019, August 1). Pre-disaster planning and preparedness for floods and droughts: A systematic review. *International Journal of Disaster Risk Reduction*. Elsevier Ltd. <https://doi.org/10.1016/j.ijdr.2019.101207>
- Ramdani, R. (2019). Penyelamatan Lingkungan Sebagai Jihad Muhammadiyah di Abad Kedua. In *Politik Inklusif Muhammadiyah; Narasi Pencerahan Islam untuk Indonesia Berkemajuan*. Yogyakarta: UMY Press.
- Reynolds, B., & Seeger, M. W. (2005). Crisis and emergency risk communication as an integrative model. *Journal of Health Communication*, 10(1), 43–55. <https://doi.org/10.1080/10810730590904571>
- Suara Muhammadiyah. (2021). Fikih Kebencanaan Muhammadiyah. Retrieved June 3, 2022, from <https://suaramuhammadiyah.id/2021/01/13/fikih-kebencanaan-muhammadiyah/>