

Implementation of Artificial Intelligence by the Government of West Nusa Tenggara (NTB) in Disaster Management

Cahyadi Kurniawan^{1,*} Suswanta Suswanta²

¹ Student of Master's Program of Government Affairs and Administration, University of Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

² Lecturer of Master's Program of Government Affairs and Administration, University of Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

*Corresponding author. Email: Cahyadikurniawan215@gmail.com

ABSTRACT

This research aims to see how the implementation of the NTB government's Artificial Intelligence disaster management. The descriptive research method was used in this study as a qualitative approach to describe the ongoing phenomenon and understand the meaning of an ongoing event. The data collection of this study is field data involving websites, literature studies, and social media. A qualitative analysis using a computer, a document analysis tool, and data can be analyzed by sending data to Nvivo 12 plus, a qualitative document analysis application. According to the findings of this study, the government implementation of Artificial Intelligence (AI) in disaster management, it is more about educating the public at the time before a disaster occurred through websites and applications and the considerations prepared in the launch of the AI, namely administrative policies, to achieve the mission of the West Nusa Tenggara (NTB) government.

Keywords: Government, Disaster Management, Artificial Intelligence

1. INTRODUCTION

Internet technology has developed very rapidly. The communication process should be a target of it[1]. In recent years, information and communication technology (ICT) has experienced very rapid growth. The rapid growth of ICT on the internet as the primary communication tool resulting in great demand by the public is the background for the communication technology transformation from the conventional ones to the modern and all-digital. Modern communication has made the world easy to grasp.[2] It is noted that 63 million people in Indonesia are internet users and 95% of them use social networking sites. Indonesia is in the 4th ranked country with the most number of Facebook users in the world with 65 million

active users and in the 5th ranked country with the most users of Twitter globally with 19.5 million active users. Indonesians also use other networking sites, such as Tumblr, Path, Instagram, Line, and other networks.[3]

Artificial Intelligence is perhaps the oldest and most extensive field of technology dealing with all aspects of imitating cognitive functions to develop, solve real-world problems, and build systems that learn and think like humans. That is why it is often called machine intelligence[4]. Artificial Intelligence is also a precious technology to support everyday social and economic life. This activity contributes to sustainable economic development and uncovers various social problems in most of the last years and Artificial Intelligence (AI) has got a lot of press as a

potential development driver. In both industrialized and emerging, Europe and the United States are examples of such countries, as well as China and India[5].

Natural disasters occur worldwide and represent a valuable aspect that affects human life and growth, responds to various types of natural disasters, and develops appropriate coping methods and procedures that are useful for controlling their character, phases, and constituents.[6]. The cycle in disaster management, Carter's suggestion, defines the significant activities during a disaster organization's life cycle. The framework has been implemented and changed; it is divided into two phases: assistance, the development of four actions, preparation, response, recovery, and mitigation and delivering service. This phase comprises response and recovery activities, the preparation and mitigation efforts are part of the development phase [7].

West Nusa Tenggara Province is a disaster-prone area; the Government West Nusa Tenggara, as the provincial government administrator, also has the authority in disaster management based on law No. 24 of 2007 of the Republic of Indonesia on Disaster Manage[8]. During disasters, the help of disaster responders is displayed in real-time or low-latency situational understanding data. Various emergency groups, on the other hand, are interested in multiple types of messages. Reports, for example, on infrastructure destruction must be addressed to some institutions, whereas reports about water or food shortages must be addressed to others.[9] Disasters are often in harmony with civilization.

With advanced technology, development plans have created large amounts of infrastructure and permanent heritage[10]. A natural disaster is defined as a series of natural risks and vulnerabilities that occur due to biological processes that emerge together harming vulnerable communities that cannot withstand the distress that arises from them. Humans often experience the threat of natural disasters or unnatural disasters, which always occur, resulting in massive destruction, human suffering, and adverse economic consequences. The main characteristics of natural disasters are unpredictable, limited availability of energy resources in affected areas, and dynamic change of areas of uncertainty, implying severe impacts on humans and infrastructures as long as natural disasters cannot be predicted with acceptable accuracy.[11]

This research is significant because NTB is prone to disasters. Many people should know about the implementation of Artificial Intelligence by the NTB government because tragic mental health is based on preventive medicine in a catastrophe. This principle requires a paradigm shift from post-disaster management centered on aid to disaster management. Holistic, multidimensional integrated community approaches such as prevention, preparedness, and mitigation of disasters are all essential aspects of health promotion [12]. In a disaster study, the main thing to do is assess the disaster risk, namely calculating the level of damage and loss from a disaster event or event. Since the earthquake, which had a magnitude of 7,00 on the Richter scale, rocked Lombok Island, NTB Province, on August 19, 2018, leaving 555 people dead, the NTB provincial government launched various development programs to mitigate future disasters. In 2019, through the NTB Regional Disaster Management Agency, the government implemented Artificial Intelligence to manage disasters in West Nusa Tenggara (NTB) by realizing a glorious NTB, one of which missions is disaster-resilient NTB.

2. METHOD

This research took a descriptive qualitative approach, which entails documenting ongoing events and deciphering the significance of a current event [13]. Qualitative research is a sort of study that collects genetic information and uses observers to combine qualitative research material detailing the study's action and consequences to disclose holistic, contextual features.[14] It clarifies what is essential in a precise sense. This study was carried out in the province of West Nusa Tenggara. West Nusa Tenggara is a disaster-prone province.

Technique field data taken from a website and social media was used in this study. The Library was supplemented with Artificial Intelligence's implementation in disaster management in West Nusa Tenggara and at the same time, this article's focus was on tas. Applicant's data analysis used Nvivo 12 plus software by transferring data using a computer device, inputting the data into Nvivo 12, a qualitative document analysis application. Artificial Intelligence was applied in this study as an analysis component of disaster management related to its implementation.

3. BASIC THEORY

3.1 Artificial Intelligence

Indonesia is located in an archipelago that has a very high potential for disasters, and also in terms of the types of disasters, there are significant differences. Natural disasters, unnatural catastrophes, and complex emergencies are all possible due to these biological factors and the diversity of Indonesia's population. This means, on the contrary, it is also rich in natural resource potential. Therefore, Artificial Intelligence (AI) is a sort of innovation that the government requires.[15]. For the fifty years after artificial intelligence became an established and active field[16], Artificial Intelligence can be defined as the branch of computer technology that deals with automatic, genius behavior. Or another definition of Artificial Intelligence is computer programming to carry out tasks that usually require human intelligence, including the skills to master and monitor information visually, the auditory alibi to make predictions, correlate with humans and machines, and continue to learn to improve themselves.[17].

3.2. Disaster Management

All activities, programs, and actions that can be taken before, during, and after a disaster to avoid a catastrophe, mitigate its impact, or recover from its losses are included in disaster risk management. The following are the three crucial stages of catastrophe risk management activities:[10]

Before Disaster (Pre-Disaster)

Pre-disaster actions include conducting awareness efforts to reduce human and property losses caused by probable threats at the household and communal levels. Mitigation and readiness activities are the risk reduction measures conducted during this stage.

When a Disaster Occurs (Disaster Occurrence)

This comprises action done to meet the needs and requirements of victims while minimizing suffering. The operations carried out during this stage are referred to as emergency response activities.

Post Disaster

As for the initiatives taken in response to disasters to achieve early recovery and

rehabilitation of the affected communities immediately after the Disaster struck, these are referred to as response and recovery activities.

3.3. Application of Artificial Intelligence by the Government

Governments have a lot of room for improvement in technological advances for many systematic reasons, and Artificial Intelligence will not solve the problem. In addition, there is a hype around many modern tools, while most government offices are still standing trying to achieve more basic current operating standards. There are, however, advantages to preparing for the inevitable future and investing in technology to keep abreast of trends in how citizens prefer to engage with service delivery. The government can start thinking about the application of Artificial Intelligence by learning from the government's transformation efforts before and after the application in the private sector of Artificial Intelligence and Government sectors.[18] The use of Artificial (AI) deployment in government systems can be distinguished in several parts in this field, such as administrative policy, Responsiveness, assessment, and Accountability for using this technology in government public administration.[19].

3.4. Theoretical Framework

This research focused on the use of artificial intelligence by the government in disaster management. There are several indicators of quality assessment of the service and performance of Artificial Intelligence in government systems that can be distinguished in several sections in this field, such as administrative policy, Responsiveness, assessment, and Accountability for using this technology in government public administration.

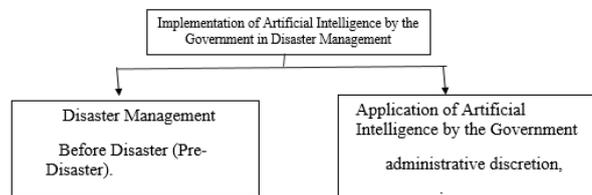


Figure 1 Theoretical Framework

4. FINDINGS AND DISCUSSION

4.1 West Nusa Tenggara Disaster Management

Disaster management is one of the responsibilities of the government and the community, together with the residents, to realize optimal protection for residents along with social, economic, and environmental assets from the possibility of a disaster forming[20]. Disaster management is based on three aspects: before disaster (pre-disaster), post-disaster, when a disaster occurs (disaster event); this can be done by looking at the indicators on the government’s official website for applying Artificial Intelligence to manage disasters.[10].

Figure 2. Crosstab Query rate (%)

Variable	Disaster Management	Total
Before Disaster (Pre-Disaster)	52%	52%
Post-Disaster	25%	25%
When a Disaster occurs (Disaster event)	22.5%	22.5%
Total	100%	100%

Source: Nvivo 12 plus software for Coding Analysis

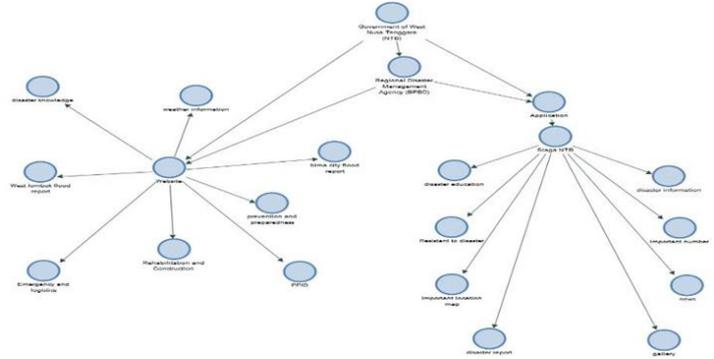
52% on a variable based on crosstab query-rate Before Disaster (Pre-Disaster) explains that in disaster management, the NTB government is more about educating the public about disasters and reducing losses and the number of victims caused by future disasters. Query-Rate results of 25% on the variable Post-Disaster, where at the time of post-disaster the government is responsive in responding to disasters to achieve early recovery and rehabilitation of those affected by the Disaster, and the government also takes the initiative to ensure that the needs and conditions of victims are met. While the variable When a Disaster occurs (Disaster event) with a percentage of 22.5%, the Government through BPBD is enthusiastic about the community to minimize disaster victims.

4.2. Artificial Intelligence in E-Government Implementation of Disaster Management

The Government of West Nusa Tenggara (NTB)

makes technology services rely on official documents, websites, and applications that can be accessed by the people of West Nusa Tenggara (NTB) to make it easy for the residents of NTB to get disaster information.

Figure 3. Project coding for services on Disaster by the Government



Source: Nvivo 12 plus software for coding analysis

The government's coding a services project on Disaster shows one application, namely Siaga NTB, which informs disaster services. In the application, various features can be accessed, namely the disaster report part where a disaster occurs, witnessed by the community, and the community can inform the disaster through the disaster report feature. Furthermore, the weather information feature can inform the public about the latest weather, disaster information is a feature that informs the public of disasters that have occurred, important location maps are featured to inform maps of disaster-prone locations in West Nusa Tenggara (NTB), news accessing detailed news about disasters that occurred, disaster education, and educating the public about the types of disasters.

The West Nusa Tenggara (NTB) government service and the West Nusa Tenggara Regional Disaster Management Agency (BPBD) on their official website provide eight disaster services for the community consisting of PPID to find out news and documentation of the NTB government and West Nusa Tenggara BPBD, disaster resilience, Prevention and preparedness, emergency and rehabilitation and construction logistics, disaster knowledge, flood reports for the city of Bima, flood reports for West Lombok. This Artificial Intelligence is implemented by the West Nusa Tenggara government.

4.3. Application of Artificial Intelligence by the Government

Based on the duties and functions of BPBD and the Government of West Nusa Tenggara in the application of Artificial Intelligence, of course, many things need to be prepared, as shown in the image below.

Figure 4. Crosstable Query-Rate (%)

Variable	Application of Artificial Intelligence by the Government	Total
Accountability	25.58%	25.8%
Administrative discretion	32.56%	32.56%
Assessment	23.26%	23.26%
Responsiveness	18.6%	18.6%
Total	100%	100%

Source: Nvivo 12 plus software for coding analysis

The Government of West Nusa Tenggara’s deployment and use of Artificial Intelligence is described by the crosstab query rate percent for disaster management. As in the table above, several things need to be considered: administrative discretion has the highest percentage with 32.56%, which means that before the government implements the AI, it is necessary to consider Administrative choice. Accountability with a rate of 25.58%, there needs to be a big responsibility for what is implemented—then followed by an assessment of 23.26%, which means evaluating the AI that will be implemented. The next is Responsiveness, with 18.6%, which requires government responsiveness in implementing Artificial Intelligence.

5. CONCLUSION

The implementation of Artificial Intelligence by the Government of West Nusa Tenggara (NTB) is indispensable in the development of technology of disaster management in West Nusa Tenggara, the government is more about educating the public before the Disaster occurs, to reduce losses and victims through the Disaster Management Agency. They launched an application called Siaga NTB to educate the public about disasters using the government’s official website. The NTB administration announced the launch of Artificial Intelligence needs many considerations to be

prepared, one of which is an administrative policy to achieve the NTB government’s mission of disaster resilience.

ACKNOWLEDGMENTS

We want to express our gratitude to the research team for their assistance in the development of this publication. We wish to express our appreciation for the Muhammadiyah University of Yogyakarta Master’s Program in Government Science and the Administration Study Program for their moral and financial support of this article. Also thanks to The Asia Pacific Society for Public Affairs (APSPA) for hosting the International Conference.

REFERENCES

[1] L. Zailskaite-Jakste and R. Kuvykaite, “Implementation of Communication in Social Media by Promoting Studies at Higher Education Institutions,” *Eng. Econ.*, vol. 23, no. 2, pp. 174–188, 2012, DOI: 10.5755/j01.ee.23.2.1550.

[2] A. C. Sari, R. Hartina, R. Awalia, H. Irianti, and N. Ainun, “Komunikasi dan Media Sosial,” *J. Messenger*, vol. 3, no. 2, p. 69, 2011, [Online]. Available: <https://journals.usm.ac.id/index.php/the-messenger/article/view/270>.

[3] H. Munandar and M. Suherman, “Aktivitas Komunikasi Pemerintahan Ridwan Kamil di Media sosial,” *J. Hub. Masy.*, vol. 2, no. 1, pp. 423–430, 2016, [Online]. Available: [http://karyailmiah.unisba.ac.id/index.php/umas/article/viewFile/3270/pdf](http://karyailmiah.unisba.ac.id/index.php/humas/article/viewFile/3270/pdf).

[4] A. Holzinger, G. Langs, H. Denk, K. Zatloukal, and H. Müller, "Causality and explainability of artificial intelligence in medicine," *Wiley Interdiscip. Rev. Data Min. Knowl. Discov.*, vol. 9, no. 4, pp. 1–13, 2019, DOI: 10.1002/widm.1312.

[5] Y. A. Joo, Y. K. Kim, T. S. Yoon, and K. A. Lee, "Microstructure and High-Temperature Oxidation Property of Fe–Cr–B Based Metal/Ceramic Composite Manufactured by Powder Injection Molding Process," *Met. Mater. Int.*, vol. 24, no. 2, pp. 371–379, 2018, DOI: 10.1007/s12540-018-0053-3.

- [6] M. Erdelj and E. Natalizio, "UAV-assisted disaster management: Applications and open issues," 2016 Int. Conf. Comput. Netw. Commun. ICNC 2016, 2016, DOI: 10.1109/ICCNC.2016.7440563.
- [7] K. H. Goldschmidt and S. Kumar, "Humanitarian operations and crisis/disaster management: A retrospective review of the literature and framework for development," Int. J. Disaster Risk Reduct., vol. 20, no. March, pp. 1–13, 2016, DOI: 10.1016/j.ijdrr.2016.10.001.
- [8] A. Nurjanah, D. Mutiarin, and A. N. Kasiwi, "The Use of Artificial Intelligent in Disaster Communication between Government and Society through E-Government in North Lombok," IOP Conf. Ser. Earth Environ. Sci., vol. 717, no. 1, 2021, DOI: 10.1088/1755-1315/717/1/012038.
- [9] M. Imran, C. Castillo, J. Lucas, P. Meier, and S. Vieweg, "AIDR: Artificial intelligence for disaster response," WWW 2014 Companion - Proc. 23rd Int. Conf. World Wide Web, no. April, pp. 159–162, 2014, DOI: 10.1145/2567948.2577034.
- [10] [10] H. KHAN, Abbottabad, and Laura Giurca VASILESCU, "Disaster Management Cycle – a Theoretical Approach," Manag. Mark., vol. 6, no. November 1, pp. 43–50, 2016.
- [11] M. Yu, C. Yang, and Y. Li, "Big data in natural disaster management: A review," Geosci., vol. 8, no. 5, 2018, DOI: 10.3390/geosciences8050165.
- [12] S. Math, M. Nirmala, S. Moirangthem, and N. Kumar, "Disaster management: Mental health perspective," Indian J. Psychol. Med., vol. 37, no. 3, pp. 261–271, 2015, DOI: 10.4103/0253-7176.162915.
- [13] N. Sun et al., "A qualitative study on the psychological experience of caregivers of COVID-19 patients," Am. J. Infect. Control, vol. 48, no. 6, pp. 592–598, 2020, DOI: 10.1016/j.ajic.2020.03.018.
- [14] M. Haradhan, "Qualitative Research Methodology in Social Sciences and Related Subjects," J. Econ. Dev. Environ. People, vol. 7, no. 1, pp. 23–48, 2018.
- [15] R. D. Yogaswara, "Artificial Intelligence As an Activator for Industry 4.0 and Its Challenges for Government and Private Sectors," J. May. Telemat. Dan Inf., vol. 10, no. 1, pp. 67–72, 2019.
- [16] E. Maulana, M. Purnomo, A. R. Wicaksono, and M. Rizal, "Analysis of the Use of Artificial Intelligence Technology on Digital Startups in Indonesia," Int. J. Adv. Sci. Technol. Vol., vol. 29(3), no. July, pp. 750–758, 2020.
- [17] S. Saluky, "Tinjauan Artificial Intelligence Untuk Smart Government," ITEJ (Information Technol. Eng. Journals), vol. 3, no. 1, pp. 8–16, 2018, DOI: 10.24235/item.v3i1.22.
- [18] H. Mehr, "Artificial Intelligence for Citizen Services and Government," Harvard Ash Cent. Technol. Democr., no. August, pp. 1–16, 2017, [Online]. Available: https://ash.harvard.edu/files/ash/files/artificial_intelligence_for_citizen_services.pdf.
- [19] D. Valle-Cruz and R. Sandoval-Almazan, "Towards an understanding of Artificial Intelligence in government," ACM Int. Conf. Proceeding Ser., 2018, DOI: 10.1145/3209281.3209397.
- [20] M. Risqi et al., "Manajemen Komunikasi Bencana Gempa Bumi Lombok pada masa Tanggap Darurat di Lombok Nusa Tenggara Barat," Electron. Theses Diss. Univ. Muhammadiyah Surakarta, pp. 1–20, 2020.