# Implementation of Digital Governance Policy of Earthquake and Tsunami Information System in Cilegon City, Banten Province

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#### Abstract

To facilitate bureaucratic reform, state administration began to change the bureaucratic work pattern, which was originally oriented towards service to bureaucrats, changing to an orientation towards service to the community. The paradigm of reinventing government and good governance not only triggers the emergence of the concept of autonomy, participation, efficiency and public service, but also policy networks. A society that lives in a healthy public administration that can achieve public interests will form a deliberative society that lives in deliberative public policies. This study aims to describe how the Implementation of Digital Governance Policy for Earthquake and Tsunami Information Systems in Cilegon City, Banten Province. Qualitative descriptive research method with literature study to collect data and information. The results of the study indicate that the implementation of digital governance policy for earthquake and tsunami information systems in Cilegon City generically follows the Broadcasting/Wider-Dissemination Model which provides valuable information to the general public and determines the priority of future actions.

**Keywords:** Public Administration, Deliberative Public Policy, Implementation Of Digital Governance, Broadcasting/Wider-Dissemination Model.

#### Introduction

Indonesia is a country prone to tsunamis, especially in the archipelago bordering the Eurasian, Indo-Australian, and Pacific plates, namely western Sumatra, southern Java, Nusa Tenggara, northern Papua, Sulawesi and Maluku, and eastern Kalimantan. The Aceh tsunami that occurred on December 26, 2004 has claimed the lives of around a quarter of a million people in the area around the Indian Ocean. The history of tsunamis over the past two decades shows that at least 10 tsunamis have occurred in Indonesia during this period, including the tsunami in Flores on December 12, 1992 which claimed more than 2,000 lives, the tsunamis in Banyuwangi, East Java (1994), Biak (1996), Maluku (1998), Banggai, Central Sulawesi (2000), Ransiki, West Papua (2002), the megatsunami in Aceh (December 2004), and the tsunamis in Nias (2005), West Java (2006), Bengkulu (2007), and Mentawai (2010). Nine of these tsunamis resulted in loss of life and property. (BMKG, 2012)

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Di wilayah Indonesia sudah terjadi lebih dari 99 kali tsunami dalam berbagai intensitas.

#### Figure 1. History of the Indonesian Tsunami

The Meteorology, Climatology, and Geophysics Agency (BMKG) has warned the Banten Provincial Government regarding the threat of earthquakes and tsunamis that have the potential to hit the Banten region. Meanwhile, the city of Cilegon, which is located at the western tip of Java Island, on the edge of the Sunda Strait, is not only strategic but also has the potential for quite large dangers if an earthquake and tsunami occur at any time. In fact, Cilegon is known as an industrial city with various vital objects including Merak Port, Cigading HBeam Center Port, Krakatau Steel Industrial Area, Suralaya PLTU, Krakatau Daya Listrik PLTU, Water treatment plant, Sunda Strait Bridge Construction, and Sunda Strait Bonded Industrial Area. (Ibrahim, 2022)



Figure 2. Earthquake and Tsunami Threats in Banten Province

The very short arrival time of a tsunami, which is 10-60 minutes, is a challenge for tsunami early warning. This also has a direct impact on evacuation procedures and means that evacuation times are also very short. Therefore, a tsunami early warning system in Indonesia requires not only technology, but also the active participation of the communities at risk, as well as relevant authorities at all levels who build community capacity to anticipate disasters. A tsunami early warning system can achieve its primary goal of saving lives and livelihoods, and reducing injuries and damage, only if proper procedures governing the processing of earthquake information and the dissemination of tsunami warnings are followed; and only if local governments receive timely warnings and then provide prompt direction, to ensure that evacuation of affected communities, if necessary, is carried out as quickly as possible when ordered by the local government.

*Digital government*(e-government) is defined as the use of government information and communication technology in the process of producing and delivering information and services. In applying the concept of digital governance, it contributes to the improvement and development of work and social structures in organizations. (Amane et al., 2023)

This article is intended to describe how the Implementation of Digital Governance Policy for Earthquake and Tsunami Information Systems in Cilegon City, Banten Province.

Theoritical Review

#### Public Administration

According to Muhammad (2019), in 1978 there was a new phenomenon in government or state administration that forced the state administration to reform. In California there was resistance to tax payments caused by inflation and dissatisfaction with state companies. Under this financial pressure, regional and state leaders were forced to reform their state administration systems by opening a 'publicprivate partnership' system. This is the forerunner of Reinventing government or bureaucratic entrepreneurship. To facilitate this reform, the state administration began to change the bureaucratic work pattern, which was originally oriented towards service to bureaucrats to a service orientation to the community.

Bureaucratic entrepreneurship must be run based on the principles of good governance, then the principles of good governance emerge. The concept of governance (UN ESCAP, 2006) is defined as the process of decision-making in which decisions are implemented or not implemented. Good governance is created when all actors are actively involved in the decision-making process and implementation or not implemented. There are 8 characteristics for good governance, namely participation, rule of law, accountability, transparency, responsiveness, effectiveness and efficiency, consensus orientation and equity and inclusiveness. The good governance paradigm assumes that a good government is one that is oriented towards the community and no longer towards bureaucrats or in other words a government that is reforming itself is implementing bureaucratic entrepreneurship. In order to avoid KKN (Corruption, Collusion and Nepotism) in its implementation, it must base itself on the principles of good governance.

Ted Gabler and David Osborne (2001) with the concept of reinventing government, have changed the paradigm of public administration where the operation of public organizations must be based on professionalism like business organizations. The performance of public organizations has changed from bureaucratic orientation to public service. Efficiency, effectiveness, cheap, fast, quality in serving the public by placing public satisfaction as stakeholders are the main goals of public organizations.

The paradigm of reinventing government and good governance not only triggers the emergence of the concepts of autonomy, participation, efficiency and public service, but also policy networks. Good governance has three (3) pillars, namely government, private sector and society. The policy network formed between the three pillars will further strengthen the implementation of good governance.

The different strengths of networks due to actor interactions will cause different levels of public interest achievement. A society that lives in a healthy public administration that can achieve public interests will form a deliberative society. A deliberative society is a society that lives in deliberative policies, namely public policies that are made based on:

- The most acceptable exchange of information and arguments,
- Inclusive and open to the public, no one has absolute power over others,
- Free from internal or external coercion that reduces the equality of participants,
- Decision making is based on consensus and not on voting under pressure from the majority institution,
- Equality and equality of interest groups' rights to participate,
- There is room for fair bargaining and compromise, as well as anti-generalizing interests, which take place outside non-deliberative institutional arrangements.

According to Satispi (2023), the definition of public policy as stated by Thomas R. Dye can only be determined by the government, other parties or better known as public policy actors can only influence the public policy process within the limits of their respective authorities, this is due to 3 things from the authority held by the government, namely:

- Only the government has the power and ability to enforce public policies universally to the target public group;
- Only the government has the power and ability to legitimize or ratify public policies so that they can be applied universally to the target public group;
- Only the government has the power and ability to enforce public policies on the target group.

According to Supendi et al (2023), the high level of seismicity in West Java and Sumatra and its surroundings occurs due to the meeting of the Indo-Australian plate and subducting under the Sunda plate. The large megathrust event associated with this process is likely to pose a major earthquake and tsunami hazard to the surrounding community, but further efforts are needed to help understand the possibility and frequency of such events. The results of his study revealed a large seismic gap in the southern part of West Java and the southeastern part of Sumatra, this is in accordance with previous GPS studies which found that the area has the potential to be a source of megathrust earthquakes in the future. To investigate this further, tsunami modeling was carried out in the area for two scenarios based on estimates of the seismic gap and the presence of backthrust faults. The results showed that the maximum height of the tsunami could reach 34 m along the western coast of southern Sumatra and along the southern coast of Java near the Ujung Kulon Peninsula.

The threat of earthquakes and tsunamis is what prompted the Cilegon Regional Government to issue the Cilegon City Regional Regulation No. 7 of 2017 concerning the Implementation of Disaster Management with the aim of: providing protection to the community from the threat of disaster; ensuring the implementation of disaster management in a planned, integrated, coordinated and comprehensive manner; protecting cultural heritage and the entire natural environment and its biodiversity; reducing vulnerability and increasing community capacity in dealing with disasters; building public and private participation and partnerships; encouraging the spirit of mutual cooperation, solidarity and generosity; and creating peace in community life and preventing the emergence of natural, non-natural and social disasters and minimizing the impact of disasters.

#### Meteorology, Climatology and Geophysics Agency (BMKG)

The history of meteorological and geophysical observations in Indonesia began in 1841, starting with observations conducted individually by Dr. Onnen, Head of the Hospital in Bogor. Year after year, his activities developed in accordance with the increasing need for weather and geophysical observation data.

In 1866, the individual observation activities were formalized by the Dutch East Indies Government as a government agency named Magnetisch en Meteorologisch Observatorium or Magnetic and Meteorological Observatory led by Dr. Bergsma. In 1879, a rain gauge network of 74 observation stations was built in Java. In 1902, observations of the earth's magnetic field were moved from Jakarta to Bogor. Earthquake observations began in 1908 with the installation of the horizontal component of the Wiechert seismograph in Jakarta, while the installation of the vertical component was carried out in 1928. In 1912, meteorological observations were reorganized by adding a secondary network. Meanwhile, meteorological services began to be used for lighting in 1930. During the Japanese occupation between 1942 and 1945, the name of the meteorological and geophysical agency was changed to Kisho Kauso Kusho. In 1949, after the transfer of sovereignty of the Republic of Indonesia from the Netherlands, the Meteorologisch en Geofisiche Dienst was changed to the Meteorology and Geophysics Service under the Ministry of Transportation and Public Works. Furthermore, in 1950 Indonesia officially entered as a member of the World Meteorological Organization (WMO) and the Head of the Meteorology and Geophysics Service became the Permanent Representative of Indonesia with WMO. In 1955 the Meteorology and Geophysics Service was changed to the Meteorology and Geophysics Institute under the Ministry of Transportation, and in 1960 its name was returned to the Meteorology and Geophysics Service under the Ministry of Air Transportation. In 1965, its name was changed to the Directorate of Meteorology and Geophysics, its position remained under the Department of Civil Aviation. In 1972, the Directorate of Meteorology and Geophysics was renamed the Center for Meteorology and Geophysics, an echelon II agency under the Department of Transportation, and in 1980 its status was raised to an echelon I agency with the name Meteorology and Geophysics Agency, with its position remaining under the Department of Transportation. In 2002, with Presidential Decree No. 46 and 48 of 2002, its organizational structure was changed to a Non-Departmental Government Institution (LPND) with the permanent name of the Meteorology and Geophysics Agency. Finally, through Presidential Regulation No. 61 of 2008, the Meteorology and Geophysics Agency changed its name to the Meteorology, Climatology, and Geophysics Agency (BMKG) with the permanent status as a Non-Departmental Government Institution. On October 1, 2009, the Republic of Indonesia Law Number 31 of 2009 concerning Meteorology, Climatology and Geophysics was ratified by the President of the Republic of Indonesia, Susilo Bambang Yudhoyono. (https://www.bmkg.go.id/profil/?p=historidownloaded July 27, 2024)

The Aceh Earthquake and Tsunami, December 26, 2004 were like two sides of a coin for Indonesia. One side became a bitter history for the nation, but on the other side also became a valuable lesson in disaster preparedness and mitigation. This incident opened everyone's eyes that a similar disaster is very likely to happen again. Especially Indonesia's position in the Pacific Ring of Fire.

The turning point was also experienced by BMKG, whose existence was often looked down upon at that time. After the disaster that made Aceh seem to be erased from the geographical map, BMKG immediately improved and experienced an extraordinary transformation until now.

This momentum was utilized by BMKG to build the Indonesia Tsunami Early Warning System (InaTEWS). Earthquake sensors that previously only numbered 20, were increased to 175 units spread across a number of earthquake and tsunami prone areas. The addition of these sensors is to improve the precision and accuracy of BMKG data.

Over time, InaTEWS has developed and its benefits as a tsunami early warning system have not only been felt by the Indonesian people but also by the international community in the ASEAN region, around the Indian Ocean and the Southwest Pacific and the South China Sea.

The transformation that has been carried out allows BMKG to analyze and verify earthquake data and potential tsunamis in less than 5 minutes. Imagine when Aceh used to take two hours, or at the latest 30 minutes. This is a very drastic change, with a very large area, ideally Indonesia has 600 earthquake sensors. In 2019, it is planned to add 196 sensors so that the total reaches 371. Although not ideal, this number is an extraordinary change.

Japan has more than 1000 earthquake sensors. The current priority for sensor placement is earthquakeprone areas. Along the West coast of Sumatra to the South, along the South coast of Java to East Nusa Tenggara, then along the North coast of Papua, these are areas where earthquakes often occur,

Previously, BMKG only relied on telephone and fax to disseminate data and information. Now, BMKG utilizes all available communication channels, especially the internet and social media. The use of popular social media such as Twitter and Instagram is considered more effective in amplifying information and early warnings. BMKG also builds Android and iOS mobile applications.

# Digital Governance

Avianti and Syahrir (2020) stated that in general, governance prioritizes integrity because it must convey or report something as it is, without having to be engineered. Governance can also be interpreted as openness, because it must be visible and readable by anyone who needs it. Furthermore, governance must be accurate because it is needed to measure and as a control tool so that there are no deviations, both internally and externally. In addition, governance can also be understood as accountability which is a concept of responsible ethics. This is the basic essence of governance. It is not something complicated and difficult to understand. Governance is the spirit of building better governance. Governance is not just a theory but has become part of building the integrity of life. It does not only involve one party. There are various stakeholders who build it.

In the context of business, it can be understood as corporate governance. Its presence is to regulate and control the company so that it can create growing value for the stakeholders who have built it. The growth must be sustainable by providing long-term economic value. Meanwhile, in the context of government, it is understood as government governance. The governance it presents must be able to be a bridge for the interests of business actors and the public. It must have a sensitive ear to be able to produce regulations that can be accounted for. In the context of the public, governance is also understood as public governance. Here the role of individuals becomes very important in building governance. Individuals with integrity are real examples of instilling and implementing governance in more real life. That is governance. It is not a rhetoric of a complicated definition. Governance is a noble value of life that prioritizes integrity.

Indonesia, which uses a rule-based approach, has certainly felt the steep path that must be taken to ground this governance principle into a good culture. So far, we still often see facts on the ground how the rigid and numerous rules can still be circumvented. Or, in other facts, we often see, in order to survive in tight business competition, not a few companies end up getting caught up in practices that are contrary to the principles of governance. This means that there is no guarantee that the rule-based approach used in this country has given birth to governance practices in our daily lives.

According to Amane et al. (2023), digitalization can be interpreted as a process of storing all the properties and information of text, sound, images, or multimedia in an electronic string of zeros and ones. Digital activities are closely related to electronic storage and transmission of information through data carriers, regardless of time and location constraints. All data can be stored and transferred to various parts of the world relatively easily and quickly. Digital government is given different meanings. However, in general it can be interpreted as the use of technology, especially information technology for governance.

*Digital government*(e-government) is defined as the use of government information and communication technology in the process of producing and delivering information and services. Digital governance involves the use of digital governance in determining accountability, tasks, decision-making powers and change management for the presence of digital in the organization. Digital governance aims to make objective and important measurements in the organization. The communication process in digital governance, it contributes to the improvement and development of work and social structures in the organization.

There are 4 basic principles in implementing digital government (e-government) in the e-government vision, including:

Full priority for all forms of public services including:

- Having a large transaction volume and involving people or HR;
- It requires interactive communication between the government and the community or two-way interaction;
- Allows for cooperation between the government, the private sector, non-governmental organizations (NGOs) and universities (pentahelix) to determine the type of service, performance measures, and measures of usefulness to determine the total investment costs required.
- Building a competitive environment, both the private sector and NGOs collaborate together in public services.
- Providing rewards/appreciation or awards to organizers who innovate and can provide opportunities for public aspirations.
- Focusing on achieving efficiency and effectiveness refers to the value of the benefits received by the community and budget revenue from the implementation of digital government (e-government).

e-Government includes a series of steps required for government agencies to ensure the successful implementation of e-government services to the wider community. e-Government is a procedural approach to cooperative administrative relations, which includes basic and standard procedures within the boundaries of public administration to ensure the successful delivery of electronic services.

The paradigm of governance management that previously developed was government as the sole organizer of government. Along with the development there are 3 (three) Pillars of Governance, each party can play its role well in order to create a safe, reliable, and trusted digital environment, previously.

- Regulators in this case the government play a role in protecting and educating business actors and the community, encouraging the availability of infrastructure, managing the balance between business innovation and community protection. Principle regulations are promoted and collaboration is created.
- Society plays a role in fairness and honesty in using digital services.
- Business actors, especially from the private sector, manage values and business models that can be profitable and grow while maintaining confidentiality, transaction and data integrity, and service availability.

Digital governance encompasses services and processes in any interaction including,

#### Government to citizen/Government-to-person (G2C)

This relationship aims to improve the interaction between the government and the community and make it easier for the community to find various information about the government.

#### Government to business/Government-to-business (G2B)

Because it really needs a very good relationship between the state and business. And the goal is to make it easier for people to do business on behalf of the business community.

Government to government/Government-to-government (G2G)

The purpose of this relationship is to fill in various information needed between governments and accelerate and facilitate cooperation between related governments.

#### *Government-to-employee*/Government-to-employee (G2E)

This relationship aims to be able to input various information needed between governments and accelerate and facilitate cooperation between related governments.

#### Government-to-Non-Profit/Government-to-non-profit-organizations (G2N)

This relationship aims to ensure that non-profit institutions or agencies can be managed well, so that the goals of these institutions or agencies can be realized in accordance with their respective functions and authorities.

Based on the principles and proposals of various international institutions (World Bank, IMF, UNDP, ODA, IDA) and practices adopted by the government to achieve good governance, the existence of the following characteristics is recognized as important to note,

• Participation

Participation is the political dimension of good governance. The active participation of all stakeholders in the development process of a society is an essential condition of good governance. All men and women, including persons with disabilities, should have a voice in decision-making, either directly or through legitimate intermediary institutions that represent their interests. From a human rights perspective, everyone has the right to participate in decisions that affect them and to have redress if these rights are denied.

• Rule of Law

The rule of law as an essential element of good governance is based on the idea that justice is no less a public good than basic education and basic health care. The rule of law is the foundation of a democratic and egalitarian society. This means that everyone in society is equal before the law, and the law is enforced impartially.

• Equity and Inclusivity

Equality means that every person is equal and has equal opportunities in a community irrespective of his caste, sex, colour, race, religion or creed and social status. It is the basis of human rights standards of a society and the essence of justice as a basic principle of governance in the human community. Inclusiveness requires that the interests, aspirations and opinions of all individuals and groups living in a society should be taken into account while formulating specific policies and programmes aimed at the society.

• Transparency

Transparency is based on the free movement of information. In other words, processes, institutions and information are directly accessible to all members of society. This promotes openness of government actions, decision-making processes and consultative processes among the public sector and all stakeholders.

• Responsiveness

Responsiveness of providers of goods and services, both in the public and private sectors, means that the demands and needs of the community are met in a timely manner. Intentional and

unnecessary delays on the part of service providers in carrying out their duties to the community must be avoided at all costs.

• Consensus and Legitimacy

Consensus and legitimacy of government are the political dimensions of good governance. Ensuring peace and harmony in a society is done by establishing consensus among various stakeholders, so that the structure and function of government gain legitimacy from the entire society. Consensus usually involves collaboration, not compromise.

• Effectiveness and Efficiency

The technical aspects of good governance focus on the effectiveness and efficiency of policies, programs, and the resources that will be used to implement them. Good governance means the processes and programs implemented by an organization to produce beneficial outcomes that meet the needs of its stakeholders, while making the best use of resources.

• Accountability

Accountability means that decision makers in government, the private sector, and civil society organizations must be held accountable to the public and institutional stakeholders for their inaction or deliberate misconduct. At the heart of the accountability principle is information sharing and transparency, which government structures must promote.

The e-Governance system in Indonesia is regulated in Presidential Decree No. 95 of 2018 concerning the Electronic-Based Government System, 2018, where BPPT was appointed to coordinate the implementation of the Electronic-Based Government System (SPBE), which is implemented in the form of:

- Accelerating the expansion of access and improvement of digital infrastructure as well as accelerating the provision of internet services at public service points;
- Accelerating the integration of the National Data Center;
- Prepare a request for talented Digital Human Resources (HR);
- Preparing regulations, funding plans and financing for digital transformation;
- Preparing a roadmap for digital transformation in strategic areas of government, public services, social care, education, health, trade, industry and broadcasting.

The impacts of digital governance include:

- Improved citizen identify identification and authentication. Proper targeting through proper identification for social protection schemes reduces leakages and therefore lowers costs for the government and increases uptake, which in turn ensures inclusiveness;
- Stronger data and opportunities for better analysis. This will lead to efficient implementation of current policies as gaps in the process can be identified. The information will also highlight effective policies and programs to help shape or change policies for the future.
- Better tracking of all government services or workflows. This will make the government and its departments more accountable since digital information is available, increasing visibility for all stakeholders.

Information technology management is an integral part of organizational management that includes management, information structure and organizational processes. It ensures that the organization's information technology can be used to maintain and enhance the organization's strategies and objectives. The purpose of IT management is to monitor its use to ensure that IT activities meet and comply with the following objectives:

- Aligning information technology with organizational strategy and realizing the promised benefits of IT adoption;
- The use of information technology enables companies to capture existing opportunities and maximize the use of IT to maximize the benefits of IT adoption;
- Responsible for the use of IT resources;
- Proper management of existing IT risks.

Therefore, a good performance-based management information system should provide various information about the core (ultimate outcomes), outputs, processes, and inputs ranked to calculate this efficiency.

Malik (2024) revealed that overall, the data shows a positive trend in the effectiveness of the Indonesian government from 2020 to 2022, with a consistent increase in estimates and effectiveness ratings, as well as confidence intervals indicating increased certainty in the assessment of effectiveness. This can be an indication of improvements in several aspects such as the quality of public services, the independence of the bureaucracy from political pressure, and credibility in policy implementation, as shown in the following graph:





Source: Worldwide Governance Indicators, World Bank 2023

Meanwhile, globally, Indonesia's governance index ranking is ranked 44th, below Serbia and above the Russian Federation.

Ranks	Country	Score	Ranks	Country	Score	Ranks	Country	Score
1	Singapore	0.868	19	Australia	0.728	37	Hungary	0.581
2	Denmark	0.833	20	United Arab Emirates	0.722	38	Croatia	0.573

Table 1. World Good Governance Index Rankings

						DOI: <u>http</u>	<u>s://doi.org/10.62754/j</u> e	<u> 26.v3i8.5658</u>
3	Finland	0.832	21	Iceland	0.713	39	Bulgaria	0.572
4	Switzerland	0.830	22	Belgium	0.701	40	China	0.571
5	Norway	0.814	23	Slovenia	0.689	41	Georgia	0.564
6	Sweden	0.805	24	Czech Republic	0.678	42	Romania	0.549
7	Netherlands	0.804	25	Portugal	0.667	43	Serbia	0.547
8	Germany	0.794	26	Spain	0.664	44	Indonesia	0.538
9	New Zealand	0.763	27	Israel	0.658	45	Russian Federation	0.536
10	United Kingdom	0.759	28	Lithuania	0.645	46	Kazakhstan	0.532
11	Ireland	0.755	29	Poland	0.644	47	Thailand	0.531
12	Austria	0.747	20	Chile	0.641	48	Greece	0.529
13	Japan	0.747	31	Latvia	0.627	49	Rwanda	0.525
14	South Korea	0.741	32	Malaysia	0.618	50	Vietnamese	0.520
15	Estonia	0.740	33	Italy	0.617			
16	France	0.740	34	Uruguay	0.604			
17	United States	0.738	35	Mauritius	0.582			
18	Canada	0.734	36	Costa Rica	0.581			

Source: Chandler Government Index, 2023

#### Tsunami Early Warning System(TEWS)

According to BMKG. (2012), the second edition of the "InaTEWS Tsunami Early Warning Service Guide" is a publication of the Meteorology, Climatology, and Geophysics Agency (BMKG) in its function as a warning provider in the Indonesian Tsunami Early Warning System (InaTEWS). The purpose of this guidebook is to support the efforts of national and regional institutions in carrying out their functions as public service providers to disseminate tsunami warnings to communities at risk and other institutions responsible for disaster management, especially in preparedness and emergency response at the regional level. The 12 Principles in the Tsunami Early Warning System Guidebook for InaTEWS discuss the following topics:

- Principles 1 to 6 outline the roles and responsibilities of national-level institutions in early warning systems.
- Principles 7 to 10 describe the roles and responsibilities of local governments in early warning systems.
- Principle 11 describes the roles and responsibilities of communities at risk in early warning systems.
- Principle 12 provides recommendations for increasing awareness and preparedness for earthquake and tsunami hazards at the local level.

Details of the twelve principles of the Tsunami Early Warning System Guidelines for InaTEWS are as follows:

• Indonesia Prone to Local Tsunami

Indonesia is prone to local tsunamis because its coastlines are generally very close to tsunami sources. Local tsunamis can reach the coast in less than 30 minutes after an earthquake occurs.

• InaTEWS - Indonesian Tsunami Early Warning System and Community Empowerment

Early warning is a combination of technology and the capacity of communities to respond to the information provided by that technology. As a component of disaster risk reduction, early warning requires not only the production of timely and technically accurate warnings, but also an understanding of the risks, reliable relationships between warning providers and users, and the capacity, on the part of communities and authorities, to respond appropriately to warnings. Failure in any of these elements can mean failure of the entire warning system.

• The Role and Responsibilities of Institutions and Communities in the Tsunami Early Warning Communication Chain

BMKG provides earthquake information and tsunami warnings to BNPB, local governments, and the media. Local governments are responsible for directing public reaction to this information and deciding whether or not to request evacuation.

• Earthquake and Tsunami Observation Instruments

There are three types of observation instruments, namely seismographs for earthquake observation, GPS for observation of earth plate deformation, and tide gauges, buoys, CCTV, and tsunami radar for tsunami observation. Through the communication network, data from these instruments are sent to BMKG to be processed and used as a basis for compiling tsunami threat scenarios.



Source: BMKG (2012)

#### Figure 4. INA TEWS Design

• Tsunami Warning Sequence and Content

BMKG issues earthquake information or tsunami warnings five minutes after an earthquake, followed by several updates and/or safety messages. The warning messages contain the tsunami threat level by district: 'Great Warning' (Awas), 'Siaga' (Warning), and 'Waspada' (Warning).



Source: BMKG (2012)

#### Figure 5. Indonesian Seismic Station Network

# • Dissemination of Earthquake Information and Tsunami Early Warning by BMKG

BMKG sends earthquake information and tsunami warnings to the public through local governments, intermediary institutions, and the media, using various communication channels.

• Local Governments – Key Actors in Providing Tsunami Early Warning Services for Communities at Risk

The local government is required to provide guidance on community reactions to earthquake shocks around the location based on information received from BMKG.

• Reception of Tsunami Warnings by Local Governments

Regional governments are required to ensure that they can receive earthquake information or tsunami warnings and advice from BMKG accurately and at all times (24 hours/7 days) via various communication devices.

• Decision Making by Local Government

Local governments are expected to have the capacity to make decisions about actions to be taken in their areas (e.g. whether or not to request evacuation) in a timely manner, based on earthquake information, tsunami warnings and advice from BMKG, as well as local standard operating procedures (SOPs).

• Dissemination of Tsunami Warnings and Guidance by Local Governments

Local governments are required to use various communication devices that allow them to disseminate earthquake information or warnings, and evacuation guidance, to the public. Sirens are one of the few effective tools for calling for evacuation. A continuous tsunami siren for three minutes means immediate evacuation.

• Standard Strategy for Community Reaction to Natural Tsunami Warning Signs, Earthquake Information, Tsunami Warnings from BMKG and Guidance from Local Governments

If people feel a strong earthquake, they should immediately evacuate to a safe location while seeking guidance from the local government. Earthquake information and warnings from BMKG containing estimates of threat levels and advice for emergency response are the basis for official guidance to the public confirming the need for evacuation or canceling evacuation if there is no tsunami threat.

• Recommendations for Local Tsunami Preparedness

Tsunami preparedness depends on the readiness of local institutions and communities at risk. Local governments, together with other stakeholders, are responsible for analyzing tsunami risks, preparing tsunami contingency and evacuation plans, developing institutional capacity and infrastructure for early warning, issuing local regulations for disaster management, and raising public awareness of tsunami risks and the proper way to respond.

The following is a list of several laws and regulations that serve as the legal basis for the implementation of tsunami early warning in Indonesia. This list will change according to changes in laws and regulations in force in Indonesia.

• Law

Law 24/2007 concerning Disaster Management

Law Number 31 of 2009 concerning Meteorology, Climatology, and Geophysics

Law Number 32 of 2004 concerning Regional Government

• Government regulations

Government Regulation Number 21 of 2008 concerning the Implementation of Disaster Management

• Ministerial Regulation

Regulation of the Minister of Communication and Information Technology Number 20 of 2006 concerning Early Warning of Tsunami and Other Disasters Through Broadcasting Institutions Throughout Indonesia

Regulation of the Minister of Home Affairs Number 27 of 2007 concerning Disaster Management Facilities and Infrastructure

Regulation of the Minister of Home Affairs Number 46 of 2008 concerning Guidelines for the Organization and Work Procedures of the BPBD

• Regulation of the Head of BNPB

Regulation of the Head of BNPB Number 4 of 2008 concerning Guidelines for the Establishment of BPBD

Regulation of the Head of BNPB Number 4 of 2008 concerning Guidelines for the Preparation of Disaster Management Plans

• Decision

Decree of the Coordinating Minister for Social Welfare as Chair of the National Coordinating Agency for Disaster Management (BAKORNAS PB) 21/2006 concerning the Appointment of Government Agencies as Focal Points and the Establishment of the Indonesian Tsunami Early Warning System Development Team (InaTEWS)

With the formation of BNPB in 2008, in accordance with Law 24/2007, the Decree of the Coordinating Minister for Social Welfare 21/2006 should have been null and void. However, the InaTEWS Development

Team continues to operate. As a replacement for the decree, a draft presidential instruction is being prepared to strengthen InaTEWS.

# Implementation of Digital Governance Policy

UNESCO (2023) states that the digital governance ecosystem is comprised of diverse stakeholders, bodies and regulatory arrangements across the world. While some existing governance systems, such as in the case of elections or data protection, must be interpreted and considered in light of the changes and challenges posed by the digital era, new governance systems are also being created in various contexts to directly regulate digital platforms. However, these regulatory mechanisms may have profound implications for freedom of expression and access to information and diverse cultural content online.

Depending on the context, accountability and compliance mechanisms for digital platform governance may include complementarities and convergences across different regulatory arrangements, such as:

- Self-regulatory structures and mechanisms, where regulations can be monitored and enforced by non-state actors, such as industry bodies or social media councils.
- Co-regulatory structures and mechanisms, in some cases codes of ethics that can be given legal force, then function as regulation.
- A regulatory framework in which one or more independent regulators make the final decision in setting rules for platforms.

The principles of the digital platform policy implementation governance system consist of:

- First, transparency should be an overarching general principle. In all governance systems, digital platforms are expected to be transparent about the terms, systems and processes they use to moderate and curate content on their platforms, as well as about their human rights due diligence in line with the provisions of these Guidelines and the UN Guiding Principles on Business and Human Rights. They should be able to explain how their systems and processes meet their terms of service and their effective implementation, and whether this is consistent with international human rights standards.
- Off-platform governance systems and procedures must also be transparent. Any external regulatory actions must be proposed, openly and widely discussed, and ultimately implemented under public scrutiny, with open and clear delineation of authority and responsibility for decision-making.
- Second, a general regulatory principle is that checks and balances between different interests should be formally institutionalized. Governance systems should always have a multistakeholder approach across all forms of regulation and their combinations. This means providing for broad and inclusive participation among all stakeholders who can represent different interests and values, including diverse gender and intersectional perspectives. Multistakeholder participation should be meaningful in terms of representation and in creating, implementing, monitoring, and reviewing governance processes (rules, principles, and policies). Public awareness campaigns, targeted outreach, respect for cultural diversity, and the use of inclusive language and formats in governance processes can facilitate effective participation.
- Third, governance processes should be open and accessible to all stakeholders, especially groups affected by the proposed structure or type of regulation. Public consultations, public hearings, and online platforms should be utilized to provide opportunities for public input and feedback. The

concerns of vulnerable and marginalized groups, as well as women and girls, should be adequately represented in decision-making processes.

- Governance systems must ensure that digital platforms actively engage with children, protect their freedom of expression and other rights, implement appropriate safeguards, and take their views into account when developing products and services.
- Governance systems should also promote dialogue with the media, including for investment in independent news media, and support the media ecosystem by providing data and supporting actions to improve media sustainability, diversity and plurality.
- Fourth, inclusion of diverse expertise should be a common feature of all regulatory arrangements. Governance systems require that stakeholders have the necessary capacity through training and regulatory instruments to understand human rights frameworks and take into account technological developments. They should have the capacity and technical knowledge to make informed decisions and implement the Guidelines. Each governance system should be encouraged to report publicly and assess the risks and opportunities associated with new and emerging technologies.
- Stakeholders in governance systems should share regulatory expertise and knowledge across jurisdictions. National, regional, and global governance systems should be able to work together and share practices to achieve the goals of protecting freedom of expression, access to information, and other human rights, while addressing content that may be legitimately restricted under international human rights law and standards.
- Fifth, governance systems must ensure that digital platforms engage in protecting and promoting cultural diversity and the diversity of cultural expressions in the creation, production, distribution, dissemination, access and enjoyment of cultural goods and services online, including by ensuring fair discovery and representation.

Regulatory arrangements should be effective and sustainable, taking into account local resources available and key priorities that need to be addressed (e.g., whether to address issues around elections, public health, advertising, or data protection, etc.). Independent oversight is required for all forms of regulation. The regulatory development process should be open, transparent, and evidence-based.

A multi-stakeholder approach to legislation should be reflected in an arrangement that:

- Relevant state authorities, including official independent regulatory authorities, establish legitimate regulatory objectives through participatory and inclusive legislative processes.
- Digital platforms report publicly to official regulatory authorities.
- Civil society organizations, artists, independent researchers, and other relevant institutions provide input into regulation-making, contribute to oversight, and achieve necessary checks and balances through institutionalized engagement and oversight.

Any specific decision on the legality of particular content must follow due process and be open to review by an impartial and independent judicial body. Any regulatory intervention under the law must be evidencebased, proportionate and include procedural safeguards, including by ensuring that platforms have access to all the facts and considerations on which they base their decisions. This process must involve a diverse group of stakeholders, taking into account a broader view of the sustainability, effectiveness and impact of the intervention. Calls for evidence-based processes cannot be an excuse to delay regulatory action that is necessary to protect human rights. All relevant stakeholders, including platforms, should have the opportunity to make representations and/or appeal non-compliance decisions. Regulatory systems should be required to issue and consult on enforcement measures and follow due process before directing platforms to implement specific measures.

Governments should continue to consider promoting media and information literacy, including online safety skills, for users, especially all groups in vulnerable and marginalized situations, as well as women and girls. This enables users to engage critically with content and technology, navigate the rapidly evolving media and information landscape characterized by digital transformation, promote human rights, and build resilience in the face of related challenges.

Platforms should train their product development teams on media and information literacy, including online safety, from a user empowerment perspective and based on international standards, and implement internal and independent monitoring and evaluation mechanisms.

Both governments and digital platforms should implement media and information literacy programs in close collaboration with organizations and experts independent of the platforms, including but not limited to: public authorities responsible for media and information literacy, academics, civil society organizations working with vulnerable and marginalized groups, researchers, librarians, teachers, special educators, journalists, artists and cultural professionals. Special measures should be taken for users and non-users as well as audiences from vulnerable and marginalized groups.

Governments and digital platforms must collaborate and ensure that users understand their rights online and offline, including the role of media and information literacy in enjoying and protecting the right to freedom of expression and access to information.

Nath (2003) divides the Digital Governance Model generically as follows:

• Broadcasting/Wider-Dissemination Model

This model is based on the dissemination of information through the dissemination of public space to other public spaces through the use of information and communication technology and other media. The characteristics of this model are: (a) used for dissemination (dissemination of information); (b) distributed from the public domain to other public domains widely; (c) using ICT and media convergence, namely the flow of content across various integrated media platforms.

Examples of implementation of this model include: (a) containing laws and government regulations; (b) providing online the names, contact addresses, emails and fax numbers of government officials; (c) providing important information regarding government work plans, budgets, performance reports and budget implementation online; (d) informing about court decisions/statements online. This information is valuable to the general public and determines the priority of future actions.

• Critical Flow Model

This model is based on the dissemination of information of significant value to the target audience or disseminating it to a wider public space through the use of information and communication technology. The characteristics of this model are: (a) used to convey important and strategic information; (b) transferred from the private domain to the domain that is the subject of the information; (c) using information and communication technology, and media convergence.

Examples of the implementation of this pattern are: (a) providing information on evidence and allegations of corruption committed by certain institutions and officials to certain target audiences; (b) providing information on research and research findings, and reporting the results of investigations into government programs and policies to relevant groups; (c) providing information on human rights violations and crimes committed by officials to relevant NGOs or citizens; (d) providing information on the environment due to

the impact of development, for example information on radioactive spills, river waste disposal, company assessments of environmental management (green rating).

• Comparative Analysis Model

This model is based on the discovery of information available in the public or private domain, which is then compared with a collection of valid information to draw lessons and strategic arguments. The feature of this model is comparing current information and past situations to measure effectiveness and knowledge gain.

Examples of its application include: (a) information on the comparative effectiveness of public institutions and government officials in disaster management or other government programs; (b) information on the comparison of judicial and court decisions to influence future decision-making.

• Mobilization and Lobbying Model

This model relies on a planned, directed, and strategic flow of information to build strong virtual alliances and enhance real-world action. The characteristics of this model are: (a) conveying information to attract attention and form virtual communities that can be realized in real action; (b) building inter-regional virtual networks and turning them into pressure groups; (c) conducting mass campaigns on certain issues; (d) opening public debates and conferences and gathering public opinion.

The following are examples of the application of this model: (a) empowering disadvantaged groups to speak up and communicate their ideas; (b) encouraging broad community participation in decision-making.

• Interactive- Service Model

This model uses information technology to open up more direct involvement of individuals in the government process, making government functions more efficient and transparent, and saving time and costs in the decision-making process. The characteristics of this model are: (a) providing opportunities for individuals to participate directly in government; (b) using IT to increase participation, efficiency and transparency in government; (c) the public can access government services; (d) forming a flow of government-to-citizen (G2C2G) interactions.

The following are examples of the application of this model: (a) government procurement of goods and services; (b) tax refund claim services; (c) official online election services and provision of public opinion on the selection and election of officials; (d) video conferences and online dialogues with policy makers; (e) Public debates and opinion polls on issues of public interest.

# Implementation of Digital Governance in Cilegon

According to Prasetyo et al. (2023), the Cilegon City Government has provided online public services for its citizens. This is done as a consequence of the implementation of the smart city concept. This study aims to find a model for implementing digital governance in online public services carried out by the Cilegon City Government. The problem found is that online public services have not been integrated into one platform, and not all regional apparatus organizations provide interactive online services, but are still one-way. The method used in this study is a descriptive qualitative method by conducting research on 27 regional apparatus organization websites including the Cilegon City Government website, and interviews with the Head of the Cilegon City Communication, Informatics, Statistics and Cryptography Service. The results of the study show that the digital governance model used on the Cilegon City public service website is a broadcasting model, but the fulfillment of the criteria for implementing the digital broadcasting governance model in online public services is only 55.4% on average. Meanwhile, for other digital governance models, there is no significant evidence of their implementation. Thus, the public service website in Cilegon City is

still a one-way information provider from the public area to a wider area and there has not been intensive participation and interaction with residents.

Wahyuningsih et al (2024) revealed that the Cilegon City Government has launched around 117 programs to realize a smart city in Cilegon City. The success rate of implementing a smart city in Cilegon City itself until 2022 is 72%. Of the 117 planned programs, 84 programs have been implemented. The implementation of a smart city in Cilegon City began in 2019. Mayor Regulation Number 68 of 2016 which supports the implementation of a smart city, and the lack of human resources who master technology are inhibiting factors in the implementation of a smart city. However, regulations that support the implementation of a smart city are factors that support the implementation of a smart city. In this study, the authors used a very subjective methodology. according to the findings of this study, 15 of the 17 sustainable development goals have been implemented in Cilegon City, the implementation of a smart city in Cilegon City is in line with the goals of sustainable development.

According to Setyadi et al (2019), one of the supporting factors for the success of the bureaucracy in carrying out its function as a public service implementer is the existence of quality bureaucratic leadership. As a means of improving the quality of public services provided by the bureaucracy, several developed countries have implemented Electronic Government. This study aims to explore new concepts for the development of the theory of Bureaucratic Leadership and the Implementation of Electronic Government on the Quality of Public Services. The research design used a quantitative approach to test the truth of the theory against the empirical reality of the influence of bureaucratic leadership variables (X1) and the implementation of Electronic Government (X2) on the quality of public services (Y). The results of this study, Bureaucratic Leadership has been shown to have a positive effect on the Quality of Public Services, by 39.6%. The implementation of Electronic Government has been shown to have a positive effect on the Quality of Public Services, by 33.9%. Bureaucratic Leadership and the Implementation of Electronic Government together have a positive effect on the quality of Public Services for Population and Civil Registration at the Population and Civil Registration Office of Cilegon City by 28.6%. In order to maintain the sustainability of this positive influence, the leaders of the Cilegon City Bureaucracy are advised to continue to improve: Employee Motivation, Employee Quality, Effectiveness of Socialization of Electronic Government-based Services, Electronic Government-based Organizational Culture, and e-Leadership.

According to Suharyana (2017), the implementation of e-Government to provide services to the public is highly expected in order to establish communication between the government and the community. However, there is still a balance between the information expected by the community and the information presented by the government, especially information through electronic media. This study aims to analyze the implementation of e-Government in the Banten Provincial Government based on policies on public services and evaluation of e-Government policies with qualitative research methodology. This is done by comparing the mandate of Presidential Instruction No. 3 of 2003 concerning the development of e-Government implementation, with public service content on the bantenprov.go.id website. The results found from this study are the existence of an information service system needed by the community but is still not available in the system. To improve the implementation of e-Government, it is necessary to provide recommendations that support efforts to improve e-Government services through the provision of regulations or e-Government management policies, improving software management, hardware, human resources (brainware).

These previous studies provide input regarding the implementation of digital governance in the city of Cilegon as follows:

• Public services provided online have not been integrated into one platform, and not all regional apparatus organizations provide interactive online services.

- The lack of human resources who master technology is a factor inhibiting the implementation of smart cities in supporting sustainable development.
- Bureaucratic Leadership has been proven to have a positive influence on the Quality of Public Services.
- The information management system is not yet integrated with other work units, in addition there is still an information service system that is needed by the community but is not yet available in the system.

# **Research Methods**

This research is a qualitative research. According to Moleong (2021), qualitative research is research that produces analysis procedures that do not use statistical analysis procedures or other quantification methods. Even if there are numbers, they are only for supporting purposes. Data collection is carried out by literature study. According to Sugiyono (2019), literature study is a theoretical study, references and other scientific literature related to culture, values and norms that develop in the social situation being studied.

# Results

Referring to its function as a warning provider in the Indonesian Tsunami Early Warning System (InaTEWS), as well as efforts to support national and regional institutions in carrying out their functions as public service providers to disseminate tsunami warnings to communities at risk and other institutions responsible for disaster management, especially in preparedness and emergency response at the regional level, and considering the generic digital governance models proposed by Nath (2003), it can be identified that the implementation of InaTEWS digital governance in Cilegon is a broadcasting/Wider-Dissemination Model, namely the dissemination of information through dissemination from one public space to another through the use of information and communication technology and other media. The characteristics of this model are: (a) used for dissemination (dissemination of information); (b) channeled from the public domain to other public domains widely; (c) using ICT and media convergence, namely the flow of content on various integrated media platforms.

These findings are in line with research by Prasetyo et al. (2023) which shows that the digital governance model used on the Cilegon City public service website is the broadcasting/Wider-Dissemination Model.

# Conclusion

The implementation of the digital governance system policy for earthquake and tsunami information in the city of Cilegon generically follows the Broadcasting/Wider-Dissemination Model which provides valuable information to the general public and determines priorities for future actions.

# Recommendation

The government can develop mobile applications and web portals that provide up-to-date information on earthquakes and tsunamis, including evacuation guides, shelter locations, and safety tips. These applications and portals can also be equipped with early warning notification features. By providing easy access to information and education through digital platforms, the public will be better prepared for disasters. These applications and portals can also increase public awareness and knowledge about the steps to take before, during, and after a disaster occurs.

Quoting Riyadi's opinion (BMKG), Building public awareness and capacity is the key to the success of an early warning system because no matter how good an early warning system is, if the community at risk does not understand or accept it, the system will not be effective.

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