

**ANALYSIS OF THE EFFECTIVENESS OF INFORMATION
TECHNOLOGY ON DISASTERS****FLOODING IN EAST JAKARTA IN 2020****Harry Purwoko^a, Duyesna Perawati^b, Sabrina Mega Ranti^c, Putry Fidya Rosanty^a**^aFaculty of Management and Business, Institut Transportasi dan Logistik Trisakti,
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Abstract: The development of information technology has an important role in several fields, one of which is in the field of humanitarian logistics in flood disasters. The technology used in humanitarian logistics for handling floods is in the form of an early warning system or what is known as a flood warning system, to predict the arrival of floods and as an early warning regarding potential floods. Flooding is a disaster caused by high rainfall without sufficient water disposal capacity, causing the area to be inundated with water. The aim of this research is to analyze the effectiveness of the technology used to handle flood disasters. This research uses qualitative methods in the form of observations and interviews. The conclusion obtained is that information technology that can be used as humanitarian logistics must involve several human resources (HR) in the health sector, available infrastructure, and ease of accessing information through existing technology. To get better results from the use of information technology, you must collaborate with government agencies such as BAKOSURTANAL, BPBD, and BNPB.

Keywords: *flood ;humanitarian logistics; information technology*

1. Introduction

Indonesia is a disaster-prone country due to its geographical and geological conditions. In Indonesia itself, natural disasters often occur with floods dominating as the most frequent natural disaster. As a result of an increase in intensity and an increase in frequency originating from natural disasters and human behavior that can result in increased human suffering. Flooding in urban areas can occur due to a correlation between hydrometeorological factors that are exacerbated by the process of building a city, where meteorological factors are influenced by the intensity of rainfall. (Sularso et al., 2021)

With the development of the current era, the development of technology and information is increasingly rapid and has become part of human life. The development of technology is what brings humans into the world of mobility, where any desired

information is very easily accessible anywhere and anytime. So there is no doubt that information and technology play an important role in life.(Apriandini, 2021)

Flooding is the phenomenon of a place that is often dry turning into flooded water caused by very high rain intensity and the land is included in the lowlands. Flooding can also occur due to runoff or surface water runoff whose volume is greater than the capacity of the drainage system (Rahman, et al., 2000).

According to (Rikasoraya et al., 2020), Indonesia in terms of its geological and geographical structure, is an area that is disaster-prone, such as for natural disasters such as landslides, earthquakes, floods, volcanic eruptions, forest and land fires, tsunamis, hurricanes, as well as non-natural disasters such as technological failures, failed modernization, and epidemics.me.(Shafa et al., 2021)

Sumber daya manusia mempunyai peranan yang sangat penting dalam setiap aktivitas organisasi, tanpa keberadaannya aktivitas organisasi sumber daya manusia tidak akan berjalan dengan baik. Budaya dalam suatu organisasi dapat memberikan pemaksaan dan dorongan kepada pegawai untuk bertindak dan berperilaku sesuai dengan apa yang diharapkan oleh organisasi sehingga budaya organisasi yang berlaku tidak hanya akan menghasilkan pegawai yang berkualitas tetapi juga akan memberikan jaminan kepada seluruh pegawai untuk berkembang bersama organisasi. Mengembangkan budaya organisasi berarti mengembangkan sumber daya manusia dan mempertahankan budaya organisasi berarti memberdayakan sumber daya manusia.(Et. al., 2021)

Public awareness of clean and healthy living behavior is minimal. Especially communities affected by natural disasters such as floods, it can be predicted that the community is still focused on the stages of environmental improvement including housing, and still does not care about health and personal hygiene. Clean and healthy living behaviors that have not been implemented properly since the flood, can be the cause of a variety of worse problems so that continuous efforts need to be made to increase public knowledge about PHBS (clean and

healthy living behaviors) not only the local government. The operationalization or what is commonly known as the practice of humanitarianism has undergone various processes to develop since through the United Nations (UN) some have added humanitarian issues to global affairs which resulted in every country being obliged to provide assistance to anyone experiencing humanitarian problems for any reason, be it low political factors or high political factors. In operational practice, humanitarianism has experienced rapid development, starting from developing the distribution of aid when there is a disaster with the exchange of experts, the flow of goods in various countries is interconnected, and also data and information are open with the aim of humanitarian assistance. (Widjanarko, 2021)

Disasters that often occur in Indonesia cause losses of around 80% and the impacts are always borne by the community. Prevention is a very important component for effective disaster management efforts. Logistics plays an important role in overcoming challenges with large social impacts. A major disaster can have a devastating impact on human health, possibly taking thousands of lives, and damaging infrastructure with devastating socio-economic impacts.(Çelik et al., 2014).

Few humanitarian supply chains or relief chains during natural disasters are as challenging as the unpredictability of demand, timing, location, type and size of aid, fluctuations in demand with very short lead times and a wide range of supplies, scarcity of resources (supplies, people, technology, money). There may even be oversupply or even undersupply, and there may be many uncertainties. Humanitarian aid organizations can be responsible for ensuring that donations or other assistance reach the beneficiaries as expected. (Rikasoraya et al., 2020)

In logistics, there are several integrated components that need to be considered, such as facility networks, transportation, supplies, communication and storage of goods. Logistics in humanity is commonly known as humanitarian logistics, which is a logistical concept to organize the procurement, storage, and delivery of aid during the emergency response phase for people affected by disasters. The type and quantity of resources, how to procure and store supplies, how to handle tracking tools and means of transportation to disaster areas which are related to humanitarian logistics.

The era of globalization provides many challenges that will be faced by humans, one of which is the increase that occurs in the field of information and communication technology. The world's need for information technology makes this field of life cannot be abandoned by humans and makes a person able to survive in world competition. Advances in technology and information can help people to get the right and accurate information.

The effectiveness of information technology in the case taken by the researcher is where it is not yet known whether the effectiveness of information technology in natural disaster management is appropriate or there are still shortcomings in any aspect. The case above presents that in a flood disaster there is a need for an early warning system in order to know, monitor and detect early warnings in recognizing the potential for flooding in an area. Another factor that affects the suffering of the community after a disaster is the uneven distribution of relief resources due to not using new technologies and lack of transparency. Now the need to incorporate technology in humanitarian logistics is recognized. (Taryana et al., 2022)

The main purpose of this paper is, the researchers want to find out the technology used for handling flood disasters, whether the technology is effective, this is needed in Indonesia facing the same or even worse flood disasters. The researchers try to find out the efficiency of logistics distribution in providing assistance and medical equipment that is in accordance with what is needed by flood victims.

Ravianto (2014) defines effectiveness by measuring whether the work done is good or not and how far the comparison of one's expenses with what he expects. This can be interpreted that the work whose completion process is adjusted to the planning in any case, it can be said to be effective. Meanwhile, according to Gibson et al, (2013), effectiveness is an assessment that has to do with the achievements of individuals, groups, and organizations. If their achievements are close to what they expect, then they can be considered effective.

According to (Bungkaes 2013) effectiveness is the relationship between output and goals, which means a measure of how far the level of output, policies and procedures in an organization to achieve the goals to be set. In theoretical or practical terms, there is no universal agreement on the meaning of "effectiveness". Effectiveness is related to the general approach, where effectiveness comes from the basic word effective which is defined as the effect, namely

the effect, or the result so as to achieve optimal results.

Effendy (2010) says that effectiveness is a communication with the aim that the process will be adjusted to the budget that has been prepared. It can be said that the indicator in effectiveness which is defined as a goal that has previously been set is a benchmark for the size of the goals achieved in accordance with what was previously planned.

According to (Gibson et.al in bungkaes, 2013) effectiveness is an assessment that can be linked to the achievements of individuals, groups or even an organization. The closer the expected achievement, the more effective it is in terms of assessing those who will be seen from the understanding of the point of view in the field of organization, it can be identified in three levels of analysis, namely individuals, groups and organizations of the three levels in line with the responsibilities and effectiveness of individuals, groups or even an organization.

According to O'Brien (2005), the definition of information technology is a tool that is a combination of computers and high-speed communication lines that carry a lot of data. The first is information technology which is closely related to the processes and tools used in information processing. Meanwhile, communication technology refers to equipment that is held to help transfer data from one device to another. This information technology also has a big influence on aspects of people's lives, because when looking for information or sharing information that is fast to find and disseminate. Humanitarian logistics is logistics related to disaster management systems, where it is divided into various activities, such as procurement, storage and transportation of food, water, medicines, and other supplies. Humanitarian logistics are also human resources, in the form of machinery and equipment that are needed when there are injured after before and after a disaster.(Naibaho, 2017)

Flood Warning System (FWS) is to know the arrival of floods, and can be known in a fairly simple way through natural symptoms that occur. For example, many insects come out of hiding / in the ground, the sound of frogs that are noisy and so on. This method is usually well known by the local population and will prepare all preparations to deal with the dangers of flooding.

Logistics management is to plan and coordinate all activities undertaken to achieve the desired

level of delivery. Logistics management is a process where there are functional activities used to manage materials, which includes activities from planning, storage and distribution or control.

Humanitarian logistics is the process of planning, implementing and controlling the flow of cost-effective aid from the starting point to the victim for the purpose of reducing the suffering of disaster victims (Asri et al., 2023).

Humanitarian logistics is a supply chain that will be distributed to various areas affected by disasters caused by nature and humans, one of the supply chain management activities in humanitarian logistics is a response to disasters where the response is in the form of distribution of goods and services based on the number of victims affected and the number of victims needed when a disaster occurs in the area.(Chandra & Oktarina, 2023)

Humanitarian logistics is one of several operations that perform the three stages of disaster management. The three stages are preparation, response, and recovery. Humanitarian logistics is the process of moving victims of disaster-stricken areas to safer places away from the scene of the disaster. In addition, humanitarian logistics also implements and controls the goods used efficiently and collects information from the initial place to reach the victims.

The effectiveness of information technology in the case taken by researchers is where it is not yet known whether the effectiveness of information technology in natural disaster management is appropriate or there are still shortcomings in any aspect. The information technology used is an early detection system for floods, which not all people know about. But the government also has other technologies such as coastal and river management, and building dams. From the technology that the government provides, it has not been able to handle a flood in Jakarta so that it requires other methods and from that it has not been proven that the effectiveness of information technology in logistic humanitarians.

2. Literature review

Effectiveness

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can be interpreted that the work whose completion process is adjusted to the plan in any case, it can be said to be something effective. Meanwhile, according to Gibson et al, (2013), effectiveness is an assessment that has to do with the achievements of individuals, groups, and organizations. If their achievements are close to what they expect, then they can be considered effective.

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According to (Gibson et.al in bungkaes, 2013) effectiveness is an assessment that can be related to the achievement of individuals, groups or even an organization. The closer the expected achievement, the more effective in terms of assessment which will be seen from the point of view in the organizational field, it can be identified in three levels of analysis, namely individuals, groups and organizations of the three levels in accordance with the responsibilities and effectiveness of individuals, groups or an organization.(Rochani, 2023)

Information Technology

According to O'Brien (2005), the definition of information technology is a tool that is a combination of computers and high-speed communication lines that carry a lot of data.

There are two aspects in this Information and Communication Technology. The first is information technology which is closely related to the processes and tools used in information processing. While communication technology refers to the equipment

that is held to help transfer data from one device to another.

Information technology also has a big influence on aspects of people's lives, because when looking for information or sharing information that is fast to find and disseminate. Humanitarian logistics are logistics related to disaster management systems, which are divided into various activities, such as procurement, storage and transportation of food, water, medicines, and other supplies. Humanitarian logistics are also human resources, in the form of machinery and equipment that are needed when there are injured after before and after a disaster.(Naibaho, 2017)

Supply chain systems can work efficiently, save costs, and ease the delivery process by using the latest information technology and technology systems. It can avoid business risks and build better communication with stakeholders. Based on the underlying theory and some research, information technology is a system that includes all storage and processing instruments of operating systems and the application of various networks and database instruments to store important data.(Ricardianto et al., 2022)

Humanitarian Logistics

Humanitarian logistics is the process of planning activities, implementing flow control for cost-effective assistance from the starting point to the victim for the purpose of reducing the suffering of disaster victims.(Asri et al., 2023)

Humanitarian logistics is a supply chain that will be distributed to various areas affected by disasters caused by nature and humans, one of the supply chain management activities in humanitarian logistics is a response to disasters where the response is in the form of distribution of goods and services based on the number of victims affected and the number of victims needed when a disaster occurs in the area.(Chandra & Oktarina, 2023)

Humanitarian logistics which is defined as the process of planning,

implementation, and control of the flow and storage of goods and materials and related information from the point of origin to the point of consumption in order to meet the requirements of the final beneficiaries.(Hidayat et al., 2019)

Humanitarian logistics is one of several operations that perform the three stages of disaster management. The three stages are preparation, response, and recovery. Humanitarian logistics is the process of moving victims of disaster-stricken areas to safer places away from the scene of the disaster. In addition, humanitarian logistics also implements and controls the goods used efficiently and collects information from the initial place to reach the victims.

3. Research method

This article is written with a qualitative model and the data obtained are primary data and secondary data. The focus in this research is the study of qualitative data. The flow in the research is illustrated by the picture below.

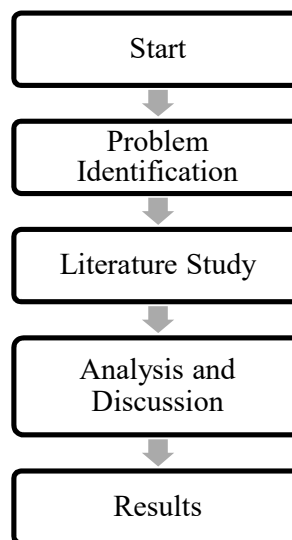


Figure 1. Researcher's framework

Sumber: (Rumetna, 2018)

This research uses a historical and sociological approach. The instruments in this research developed keywords. The development of these keywords was developed by researchers in which there were observations, literature reviews, and documentation. The data collection process was carried out related to the effectiveness of the use of information technology against flood disasters in East Jakarta. After the data collection stage is completed, the articulation stage can be carried out by referring to several supporting facts in the research process. The presentation of several facts from the research results will give rise to new knowledge, which in the process is carried out critically and carefully. The process of analyzing data is carried out deductively or inductively with the presentation of conclusions. Figure 2 will explain the data analysis conducted in the research.

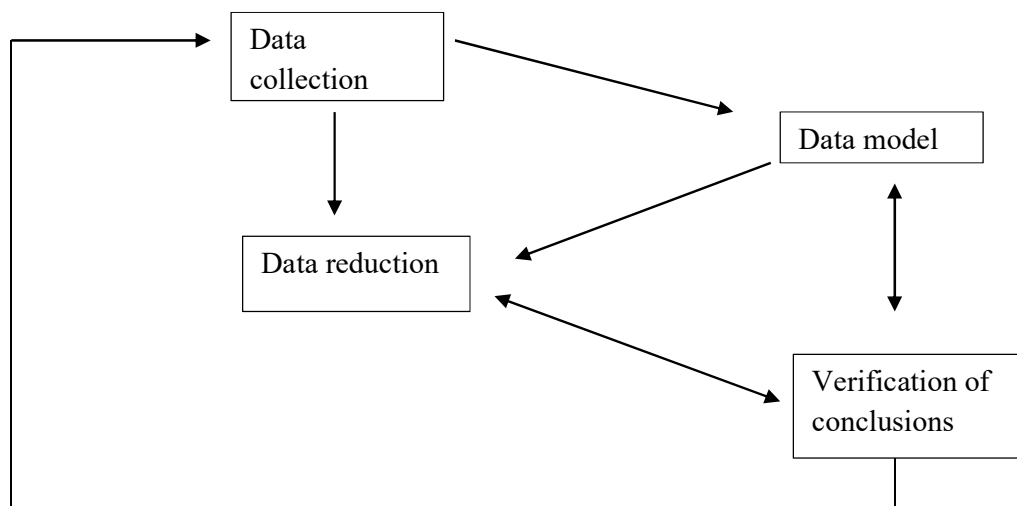


Figure 2: Data Analysis Stage

4. Results and discussion

The effectiveness of information technology or an early warning system for flood disasters called the flood warning system in the east Jakarta area refers to the process of installing an early warning system tool which works to find out the arrival of floods and can

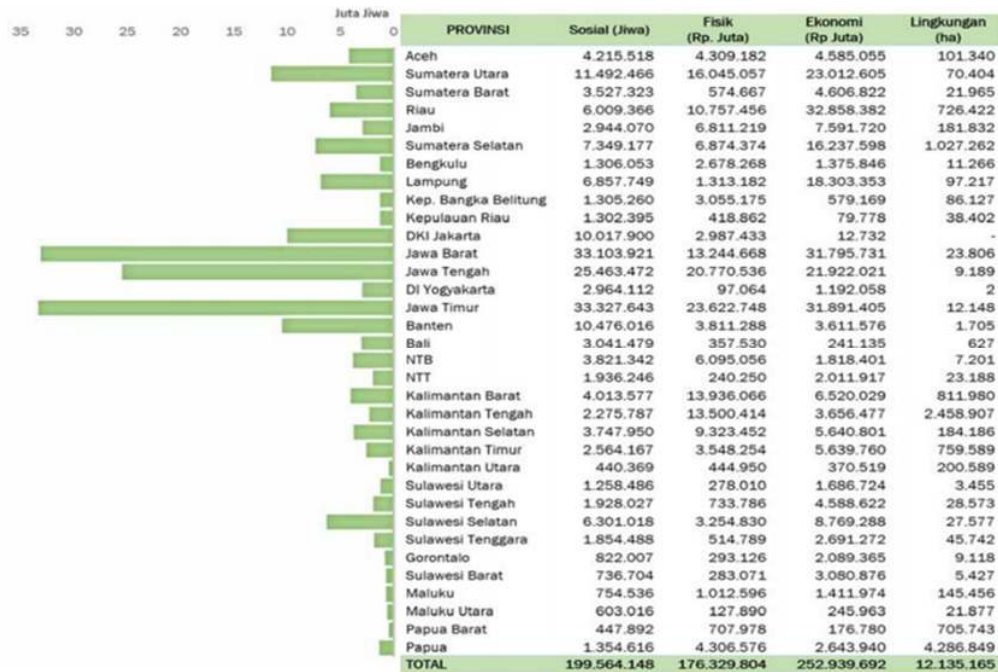
find out simply the natural symptoms that occur, as well as dissemination and communication, disaster management capabilities and flood disaster risk reduction in the east Jakarta area.

This early warning system tool or flood warning system functions properly if all the required components are installed properly. This system tool has a surveillance camera that is useful for knowing the height of the water surface and then a siren that serves to provide early warning to the community.

Flooding is a disaster caused by high rainfall without being balanced by sufficient water disposal capacity, causing the area to be inundated by water. Flooding can also be caused by the overflow of existing water reservoirs that will cause flooding in lower areas (Yulaelawati, 2008). Humanitarian logistics can be interpreted as mobilization activities carried out for disaster victims. The intended activities are in the form of fulfilling water, sanitation, medical equipment, food, drink, and so on. Indonesia is one of the areas prone to disasters.

The principles of humanitarian logistics have been carried out by the Indonesian government during disasters. There needs to be an increased focus on logistics distribution by the Indonesian government which aims to improve the distribution of logistics and equipment, especially in areas with high disaster risk (Sukoco, 2021).

Based on data owned by the National Disaster Management Agency (BNPB) launched at <https://gis.bnpb.go.id>, it is stated that at the end of 2019 on December 31, 2019 and early 2020 on January 1, 2020 there was a flood disaster in the Makasar sub-district, kel. Cipinang melayu, where the flood incident resulted in 8 people died and 1000 houses were submerged. In 2015, BNPB compiled a flood disaster risk assessment. The number of people exposed to flood risk on the islands of Indonesia is less than 180 million people with the value of assets affected is less than Rp. 800 Trillion. The product of the flood disaster risk assessment can be observed in the following table:



Flooding can also be defined as a natural phenomenon where water gathers in an area close to a river, causing the land to be inundated. Flooding is an element of the hydrological cycle where water on the earth's surface will end up in the sea. In the hydrological cycle, the level of rainfall and the ability of the soil to absorb water determine the volume of water on the earth's surface (Simanjuntak, 2014). Humanitarian logistics is also known as humanitarian logistics. In addition, humanitarian logistics can also be referred to as disaster logistics. The development of information technology related to humanitarian logistics can be done by covering several stages, including blueprinting the humanitarian logistics system, formulating work indicators, utilizing decision support systems, and strengthening disaster logistics institutions. The role of disaster logistics is very important, especially in Indonesia which often gets several natural disasters, one of which is flooding which generally occurs in the lowlands (Hadiguna, 2021).

The flood disaster risk index map in Indonesia based on the results of a disaster risk assessment by BNPB can be seen in Figure 4 below.

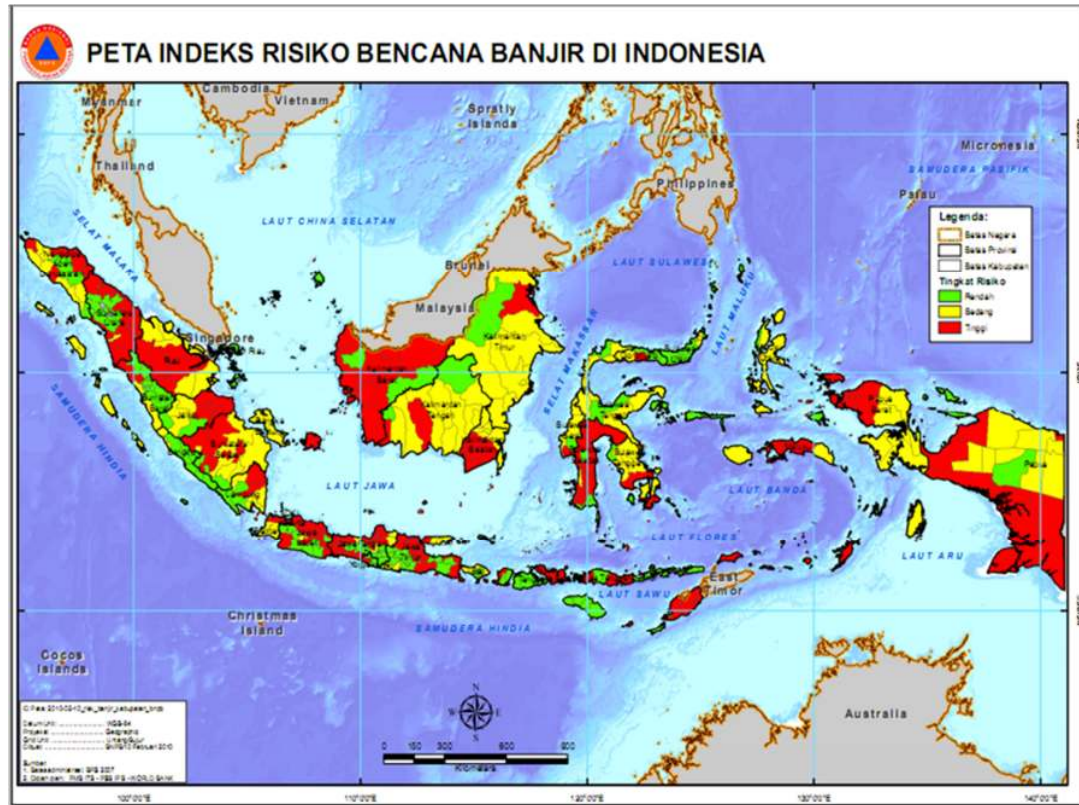


Figure 4. Map of flood disaster risk index in Indonesia

Sumber: <http://bnpb.cloud>

In Figure 4 above, red areas are areas with a high risk threshold for flooding, yellow areas are areas with a medium risk threshold for flooding, while green areas are areas with a low risk threshold for flooding. Information technology that can be utilized as humanitarian logistics must involve several human resources in the health sector, available infrastructure, and ease of accessing information through existing technology. The development of information technology must of course be balanced with the intellectual intelligence of human resources, so that the results of the information technology presented can provide benefits to the community. In addition, the development of information technology generally must have cooperation with BAKOSURTANAL (National Survey and Mapping Coordinating Agency, BPBD (Regional Disaster Management Agency), and BNPB (National Disaster Management Agency) (Emaliyawati, et al., 2016)

The following table describes the types of diseases caused by floods that require some medicines and health supplies.

Table 2: Types of diseases and types of drugs that often arise due to floods

No	Type of Disaster	Type of Disease	Medicine and Medical Supplies
1	Flood	Diarrhea	R/L infusion, ORS, metronidazole, NaCl 0.9%, abocath, wing needle, and infusion set.
		Dermatitis: Contact fungi, bacteria, scabies	<i>Prednisone, CTM, dexamethasone, hydrocortisone ointment, 3% oxytetracycline ointment, antifungal ointment, 2-4 ointment, anti-bacterial ointment, DOEN ointment, and scabsid ointment.</i>
		ISPA (Pnemonia dan Non Pnemonia)	<i>Amoxycilin, 120 mg suspension tablets, OBH, 480 mg cotrimoxazole, paracetamol tablets, CTM tablets, and dextrometorphan.</i>
		ASMA	<i>Aminopillin, ephedrine HCL tablets, and salbutamol.</i>
		Leptospirosis	<i>Ampisilin 1000 mg & amoxycilin 1000 mg.</i>
		Conjunctivitis (Bacterial, viral)	<i>Oxytetracycline, eye ointment, chloramphenicol, and sulfacetamide.</i>
		Gastritis	<i>Belladon, cimetidine tablets, and suspension and antacid tablets.</i>
		Trauma or bruise	<i>Paracetamol, phenylbutazone, absorbent, sterile gauze, and metampirone.</i>

This early warning system is a measure of how much the community understands the disaster early warning system, but the lack of public awareness in understanding information about early

warnings or various other information, so it is necessary to increase disaster risk in order to decrease.

5. Conclusion

The conclusion based on the explanation above is that the development of life today can be balanced with the development of increasingly sophisticated information technology, so that as humans entering the 4.0 revolution, they must adapt to the development of information technology. The development of information technology has an important role in several fields, one of which is in the field of humanitarian logistics in flood disasters. Flooding is a disaster caused by high rainfall without being balanced by sufficient water disposal capacity, causing the area to be inundated by water. Humanitarian logistics can be interpreted as mobilization activities carried out for disaster victims.

Information technology that can be utilized as humanitarian logistics must involve several human resources in the health sector, available infrastructure, and ease of accessing information through existing technology. The development of information technology must of course be balanced with the intellectual intelligence of human resources, so that the results of the information technology presented can provide benefits to the community. In addition, the development of information technology generally must have cooperation with BAKOSURTANAL, BPBD, and BNPB.

Then it is also suggested to the community to mitigate against several disasters in Indonesia, one of which is flooding by not littering, evaluating sewers to keep them clean, and so on.

The flood disaster early warning system turned out to be effective in East Jakarta, which can provide early warning information for flood disasters to the community and can reduce the risk of flood disasters.

6. Implications

The implications of the results and findings of the research that has been conducted explain that utilizing information technology will have a positive impact on some people and can even save many lives. The utilization of information technology in the field of humanitarian

logistics is able to increase public awareness safely, fairly, and quickly. By using information technology in the social field, individuals are indirectly able to develop and adapt to today's increasingly sophisticated technological developments. As it is known that entering the 4.0 revolution, activities or various kinds of human activities can be facilitated by the sophistication of robots or other technology.

Furthermore, from an empirical point of view, the presentation of research results through this literature review can be used as reference material or primary sources for further research. The use of technology in the current era has been widely applied from various forms of fields, so that technology can be implemented in the social field, especially humanitarian logistics. In its application to flood disasters, it will increase the enthusiasm of residents to avoid and prevent flooding that occurs. In addition, the community can also analyze related disaster management that will befall the surrounding environment, especially flood disasters.

7. Research limitations

This research has obstacles in getting a respondent so that it takes a long time because of the respondent's busyness. Therefore, researchers only get respondents from the Public Relations division due to limited access to researchers so that there are subjective respondents and researchers.

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