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Logistics Management of Flood Disasters by The Regional Disaster Management Agency (BPBD)

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ABSTRAK

Penelitian ini mengkaji proses manajemen logistik bencana banjir yang diterapkan oleh Badan Penanggulangan Bencana Daerah (BPBD) Kota Padang, yang memiliki tanggung jawab penting dalam pendistribusian logistik selama bencana. Logistik memainkan peran krusial dalam upaya penanggulangan bencana, terutama pada tahap prabencana, kesiapsiagaan, dan respons. Studi ini menyoroti pentingnya pemanfaatan peta rawan bencana serta koordinasi, dan penggunaan peralatan seperti pompa portabel, perahu karet, dan perahu fiber dalam operasional BPBD. Meskipun BPBD telah membentuk Tim Reaksi Cepat (TRC) dan Kelompok Siaga Bencana (KSB), serta menjalin kerjasama dengan universitas dalam program Komunikasi, Informasi, dan Edukasi (KIE), penelitian ini menemukan tantangan signifikan, termasuk keterbatasan personil dan pengetahuan yang belum bersertifikasi. Penelitian ini juga mengevaluasi transferability manajemen logistik di BPBD melalui kesiapan peralatan, struktur organisasi, kesiapsiagaan masyarakat, dan sistem evaluasi berkelanjutan. Direkomendasikan untuk meningkatkan pelatihan, sertifikasi, dan memperkuat sistem evaluasi guna memastikan manajemen logistik yang lebih efektif dalam menghadapi bencana banjir di masa depan.

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Keywords:
Logistics management, Disaster Logistics, BPBD Padang City

ABSTRACT

The Padang City Regional Disaster Management Agency (BPBD), which plays a significant role in allocating logistics during disasters, is examined in this study for its implementation of the flood disaster logistics management method. In disaster management operations, logistics is vital, particularly in the pre-disaster, preparedness, and response phases. This study emphasizes how crucial it is to use catastrophe danger maps, coordinate efforts, and employ tools like fiber boats, rubber boats, and portable pumps for BPBD activities. Even though BPBD established a Disaster Preparedness Group (KSB) and Quick Reaction Team (TRC), and worked with universities in the Communication, Information, and Education (KIE) program, this investigation discovered several major obstacles, such as a staffing shortage and uncertified expertise. Additionally, using equipment, this study assessed how transferable logistics management is in BPBD.

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INTRODUCTION

Indonesia is situated in a region that is vulnerable to natural disasters, including storms, landslides, earthquakes, tsunamis, volcanic eruptions, and floods. Indonesia is comparatively prone to natural disasters. One location where floods is more likely to occur is Padang City. The Padang City area is traversed by numerous small and major rivers, based on the hydrological circumstances. In the Padang City region, there are no fewer than 23 rivers that flow, totaling 155.40 km (10 large rivers and 13 little rivers). The Padang City area's major and minor rivers are generally about the same height as the sea. Many areas of the Padang are affected by this problem.

The following table provides an overview of the annual increase in flood incidences based on data from the Padang City Regional Disaster Management Agency.

Table 1: Padang City Flood Data Summary, 2020–2023

Year	Location		Impact
	Amount	Subdistrict	
2020	14 Locations	Padang Utara, Padang Selatan, Kuranji, Lubuk Begalung, Koto Tangah dan Bungus Teluk Kabung	Destroy public structures, infrastructure, and property
2021	24 Locations	Padang Utara, Padang Timur, Padang Selatan, Nanggalo, Kuranji, Lubuk Begalung, Lubuk Kilangan dan Koto Tangah	Damage to motorized vehicles, equipment, homes, and electronics ladder for a house
2022	16 Locations	Nanggalo, Koto Tangah dan Bungus Teluk Kabung	Home and equipment damage Ladder for the house and motorized car
2023	36 Locations	Lubuk Kilangan, Lubuk Begalung, Padang Selatan, Padang Barat, Pauh dan Koto Tangah	Disrupt community economy, collapse bridges, undermine infrastructure for worship, disrupt education, impede public transit, and cause general facility damage

Source: *BPBD Padang City*

A crucial part of the entire disaster management process is played by disaster logistics management. Planning, acquiring, storing, distributing, and controlling the supplies and machinery required to handle an emergency are all included in disaster logistics. Effective logistics management is crucial for flood control because it guarantees that relief supplies reach victims of disasters in a timely, appropriate, and adequate manner.

In this region, disaster logistics are coordinated and managed by the Padang City Regional Disaster Management Agency (BPBD). BPBD is involved in the planning of flood disaster preparedness measures, resource management, and help distribution. Using maps of disaster-prone areas to distribute supplies, using tools like fiber boats, rubber boats, and portable pumps, and coordinating with related organizations like the Disaster Preparedness Group (KSB), Rapid Reaction Team (TRC), and educational institutions are all part of this logistics management process.

LITERATURE REVIEW

Logistics Management

Abbas (2012) defines logistics management as a functional activity process for managing materials, encompassing planning and need assessment, budgeting, procurement, storage and upkeep, disposal, and control. Subagya (1994) defined logistics management as the set of operations intended to maximize the efficiency with which commodities and services are utilized. Siahaya (2012) states that logistics management is

a subset of supply chain management that organizes, carries out, and regulates the efficient and successful flow of goods from the point of origin to the point of consumption, including storage, distribution, transportation, and related services and information.

Ensuring that the items or materials required for the manufacturing process or operational operations are available in the most efficient amount and quality feasible is the primary goal of logistics management. Additionally, logistics management keeps track of the products' journey from the point of packaging to the customers' hands.

Disaster Management

The goal of disaster management is to limit the number of casualties and losses by responding to all catastrophic situations in a timely, precise, and accurate manner. Disaster management aims to:

a. Prepare for any unanticipated catastrophe or disaster.
b. To draw attention to the potential losses and casualties that result from a disaster or incident.
c. To make everyone in society or in organizations more aware of catastrophes so that they can participate in the process of disaster management.
d. To shield community members from hazards or the effects of calamities in order to lessen the number of casualties and suffering.

Disaster Logistics Management

The process of planning and overseeing the logistical support required to mitigate the effects of natural catastrophes is known as disaster logistics management, or DMS for short. A method known as catastrophe logistics management outlines the logistics involved in dealing with calamities before, during, and after they occur. During pre-disaster, preparedness, and disaster response phases in particular, logistics is crucial to disaster management efforts because it guarantees seven rights:

a. the right kind of aid goods;
b. the right quantity
c. the right quality;
d. the right target;
e. the right time;
f. the right reporting; and
g. the right cost.

Flood Disaster

In accordance with the Head of the National Disaster Management Agency's Regulation Number 13 of 2008 concerning Guidelines for Logistics Management and Disaster Management Equipment, a disaster is defined as an occurrence or sequence of occurrences that endanger and disturb the community's lives and means of subsistence and are brought on by both natural and/or man-made factors, resulting in fatalities, property losses, environmental harm, and psychological effects.

What constitutes a disaster A disaster is defined by Law No. 24 of 2007 as the convergence of three elements: the potential for disaster, vulnerability, and capacity activated by an incident. While an earthquake, tsunami, volcanic eruption, flood, landslide, and other natural disaster are examples of events or sequences caused by nature that cause property damage, human casualties, infrastructure and facility damage, and environmental harm.

What is a flood A flood, as described by Khotimah et al. (2013), is a water flow or pool that results in property damage or even fatalities; technically, a flood is a river flow that beyond the capacity of the river. Rahayu (2009) defines a flood as the inundation of an area brought on by water that overflows and surpasses the capacity of the area to dispose of it, resulting in losses to property, society, and economy.

METHOD

This study is conducted in the field using a qualitative approach, which is a technique to accurately and

precisely determine what occurs in the course of daily community life at a given moment. Research that aims to comprehend the phenomenon that the research subject is experiencing is known as qualitative research (Moleong, 2006: 6). to gather information by disclosing information and accurately reporting events or phenomena that take place in the field. Data collection procedures are used in research to get data, such as: interviews, observation and documents.

As one of the research tools, in-depth interviews with different people who are capable of and have expertise with the concerns in this study will be undertaken. Seven people served as sources or informants for this investigation, including:

Table 2: BPBD sources or informants in Padang City

No.	Sumber/Informan	amount
1	Secretary of Padang City BPBD	1 person
2	Head of Emergency and Logistics Division of Padang City BPBD	1 person
3	Head of Logistics Section of Padang City BPBD	1 person
4	Head of Prevention Section	1 person
5	Logistics Staff of Padang City BPBD	1 person
6	Community	2 person
	Jumlah	7 person

Source: *Researcher (2024)*

According to Miles and Huberman (1984), interactive, ongoing work is done on qualitative data analysis tasks until the data is saturated. In the process of analyzing data, three processes are involved: Data Display, Verification/Conclusion, and Data Reduction.

The data analysis method used in this study is Fishbone, Fishbone diagram is also known as fishbone diagram or cause-and-effect diagram. Fishbone diagram is a method used to analyze the causes and effects of a problem. This diagram helps in identifying the various causal factors that contribute to the problem and formulating effective corrective actions. Fishbone diagram illustrates the relationship between the problem to be solved and the various possible causal factors. This diagram usually looks like a fishbone, with the head of the fish representing the problem and the bones representing the different causal factors.

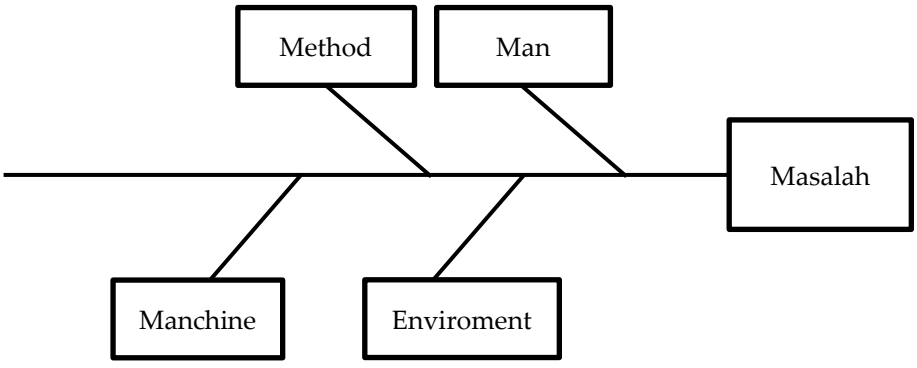

Figure 1: Fishbone Diagram

RESULTS AND DISCUSSION

Interviews and observations support the idea that BPBD Padang City plays a significant role in disaster

logistics management, particularly in the event of flooding. The needs during a crisis and the availability of resources are the two basic perspectives from which this function might be seen. The three most important things to have in a flood emergency are food, clothing, and shelter. BPBD Padang City does, however, only have a limited supply of supplies and shelter, like as blankets and beds. It also has some logistical assets, including tents and generators, but these are only available for loan and cannot be provided to the community directly. Additionally, BPBD and the Social Service have divided up the work when it comes to food demands; the Social Service is in charge of providing food logistics, particularly for refugees. The government's primary concern is for individuals who are in evacuation centers because those who reside in their own homes are typically self-sufficient in meeting their needs.

Based on data from prior years and an analysis of the rain cycle and flood potential, Padang City BPBD has developed a flood catastrophe management plan. With the use of a vulnerability map that plots the locations of households who might be impacted by flooding, BPBD is better able to anticipate logistical requirements. With the help of this map, BPBD can prioritize locations that are most susceptible to floods, which is a crucial tool in aid distribution planning.

Padang City BPBD has a multi-step logistics management process for flood disasters. They maintain the pumping machinery and rubber boats used for evacuation that are essential for disaster management. Padang City BPBD additionally keeps up the fleet required for flood disaster management. Additionally, Padang City BPBD organizes a swift response squad that is equipped to handle flooding emergencies. This team has received the necessary training and has the information and abilities to act swiftly and efficiently in an emergency. To improve its logistical capabilities, Padang City BPBD also works with other agencies and groups, including the corporate sector, TNI/Polri, and NGOs. The goal of this partnership is to better distribute and make more logistics available for flood catastrophe management.

Human resources (HR) are a crucial factor in determining the efficacy of preparedness and reaction in the context of disaster management. With about 70 employees made up of contract laborers and civil servants (PNS), the Padang City BPBD has many difficulties. This figure is not similar to Padang City's population of 954,177, suggesting a staffing deficit that would hinder effective disaster management. In order to address these deficiencies, the Padang City BPBD has introduced a number of creative HRD approaches. The creation of catastrophe cadres, such as the catastrophe Preparedness Group (KSB), the Rapid Reaction Team (TRC), and other volunteer groups, is a crucial first step. These cadres serve as field-based BPBD extensions, contributing significantly to disaster relief efforts and relieving some of the BPBD's few staff of their duty. Furthermore, the BPBD makes use of the human resources that are already available at the sub-district and district levels, particularly in disaster-affected areas. Through local government mobilization, the BPBD may increase its operational efficacy and reach in disaster management.

An essential component of BPBD's HR strategy is cooperation with other universities, including State Islamic University (UIN), Health Polytechnic (Poltekes), Andalas University (Unand), and Padang State University (UNP). BPBD works in partnership with several educational establishments to offer community and disaster cadres guidance, training, and supplies through the Communication, Information, and Education (KIE) program. This partnership improves community capacity and fortifies Padang City's network of preparedness for disasters in addition to aiding in addressing the KIE program's staffing deficit. By using this strategy, Padang City BPBD has been able to maximize its current human resources, improve cooperation with regional partners, and increase community resilience to disasters.

There are still issues with Padang City BPBD's logistics management, particularly with regard to knowledge and abilities that haven't yet resulted in certification. This is especially important for BPBD because, at the moment, logistics managers rely solely on experience rather than certified expertise. Logistics are well-organized, but because of staffing constraints, larger-scale arrangements like needs analysis, maintenance analysis, and other management are not at their best. Only two individuals handle logistics in its entirety; the others only make use of the staff that is already in place.

The Social Service, Sub-district, and Village handle all aspects of basic logistical needs such food, clothing, and medication. Rubber boats, diving gear, and life jackets are among the technical and emergency

equipment that the Padang City BPBD specializes in delivering. This delegation of duties guarantees that the BPBD may concentrate its resources on gear that facilitates disaster management activities, with affiliated entities with relevant expertise handling basic logistical requirements. Following the emergency response phase following the calamity, the Padang City BPBD has the primary role in coordinating the logistics delivery.

One of the cornerstones to disaster management success is effective coordination, and Padang City BPBD has put in place a robust plan in this area. Many stakeholders come together for regular gatherings, such monthly coffee mornings, to initiate coordination well in advance of a crisis. These gatherings provide a venue for coordinating views and obtaining data from a range of stakeholders in the penta helix catastrophe concept, including the public sector, corporate sector, academic institutions, and media. These sessions involve a thorough discussion of a range of community concerns related to disasters, as well as the collection and analysis of data necessary for responding to future disasters. Better information sharing as well as more effective use of personnel, supplies, and logistics in disaster management are the outcomes of this collaboration.

During the flood, the Padang City BPBD was able to borrow crucial equipment, including rubber boats, from other agencies, including Lantamal, Polda, Kodim, and Korem. This is a real-world illustration of how effective their coordination was. Good coordination makes it possible for all parties to rapidly and readily provide their resources and assistance. This improves disaster management's general efficacy and efficiency while also hastening the reaction to the calamity. The Padang City BPBD can guarantee that different aspects of disaster management, from human resources to logistics, can be mobilized swiftly and on target in order to reduce the impact of the flood disaster through planned coordination and strong collaboration amongst stakeholders.

A specialized Standard Operating Procedure (SOP) for disaster relief logistics management has been created and put into use by the Padang City BPBD. All BPBD employees can use this SOP as a reference while conducting logistical distribution, ensuring that the aid distribution process is conducted consistently, effectively, and in compliance with the values of accountability and transparency. This SOP has been successfully implemented in logistics distribution, and it serves as the foundation for BPBD operations in all crisis situations, including floods. The SOP addresses a number of topics, including the requirement for planning, obtaining, storing, and distributing logistical support to areas affected by disasters. By following this SOP, BPBD may ensure that help is distributed quickly and in an orderly manner while also lowering the possibility of distribution errors leading to delays or inaccurate aid goals.

Though the SOP has been executed effectively, there are still areas that require improvement according to the Padang City BPBD. To guarantee that any flaws or challenges in the logistics distribution process may be promptly fixed, a routine assessment of the SOP's application is conducted. Enhancing stakeholder cooperation, making the most of technology in logistics management, and providing staff with frequent training to help them comprehend and apply SOPs effectively are a few changes that might be required. The Padang City BPBD works to maximize logistics distribution results by continuously improving current SOPs. This ensures that logistics assistance can reach affected populations in a timely way and in accordance with demands.

A challenge confronting BPBD Padang City is the scarcity of vehicles available for the purpose of distributing supplies to regions impacted by flooding. Road access is frequently cut off as a result of prolonged flooding, disrupting vehicles and making assistance distribution challenging. BPBD finds it challenging to manage numerous flood locations at once with its small fleet of trucks, particularly when delivering supplies and logistics to impacted areas. These difficulties make it more difficult to respond quickly to emergencies and provide relief to underserved communities.

Data Analysis

At this point, the author will illustrate the issues with a fishbone diagram.

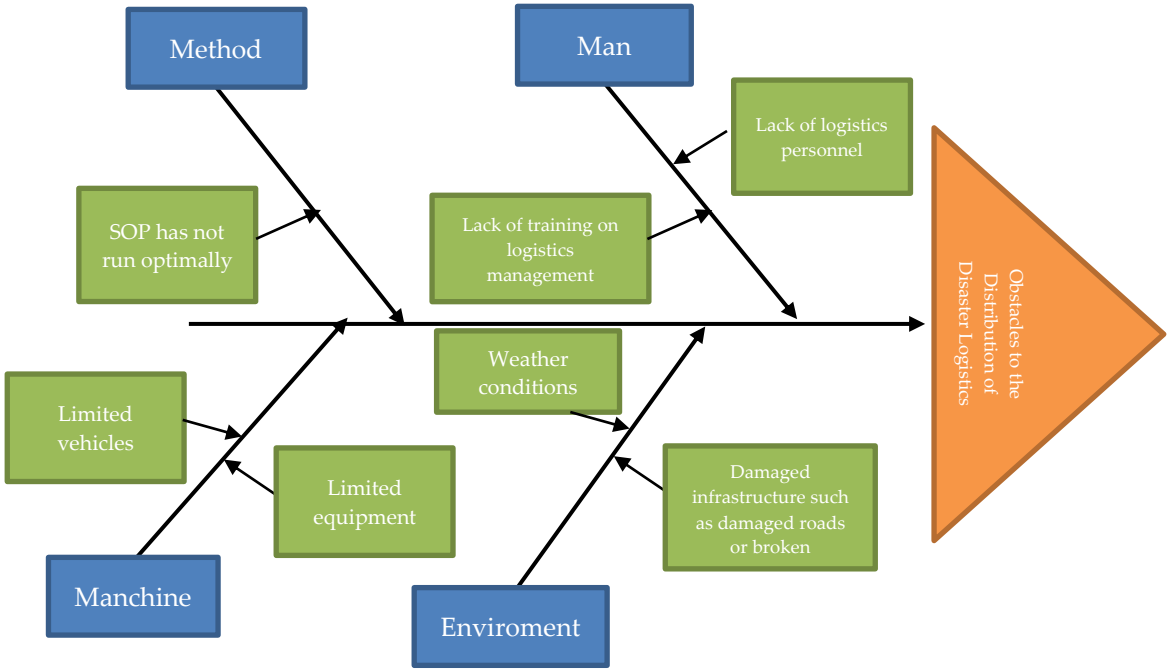

Figure 2 Fishbone Diagram of Obstacles to Disaster Logistics Distribution

It is evident from the Fishbone Diagram above that BPBD Padang City's Flood Disaster Logistics Management issue is being caused by four sources. The four components' specifics are as follows:

Table 3: Flood Disaster Logistics Management Problem Factors

Factor	Problems
Method	Although they have been put into place and are functioning effectively, Standard Operating Procedures (SOPs) in disaster relief logistics management have not yet reached their full potential.
Menchine	Fewer vehicles and pieces of equipment
Man	Lack of personnel and inadequate logistical management training
Enviroment	weather patterns and deteriorated infrastructure, including deteriorated roads and bridges

Source: *Researcher Analysis (2024)*

The subsequent phase subsequent to the Fishbone analysis. The next step is to apply the 5W + 1H analysis technique to improve this stage. An explanation of applying 5W +1H based on the fishbone problem's root is given below.

Table 4: Analysis procedures for 5W + 1H.

Indicator	Method	Menchine	Man	Enviroment
What? (What) needs to be fixed?	SOP implementation is not yet at its best.	Fewer vehicles and pieces of equipment	Insufficient staffing and inadequate training in logistics management	weather patterns and deteriorated infrastructure, including deteriorated roads and bridges
Who? (Who) is responsible for carrying out the repairs?	Sectors of Emergency and Logistic	Emergency and Logistics Sectors, as well as the General Subsection	Sectors of Prevention and Preparedness and General Sub-Section	Sectors of Emergency and Logistic
Where? (Where) will the repairs be made?	Make any required adjustments after conducting routine assessments of SOPs' efficacy.	Organize disaster-related activities with organizations and stakeholders.	Provide volunteers and disaster personnel with ongoing training. pertaining to crucial elements including inventory control, emergency communications, and the delivery of commodities.	Keep an eye on the weather in real time and make precise forecasts. Plan backup routes for the distribution of logistics in case the main thoroughfares and bridges are compromised.
When? (When) will the repair be done?	carried out following the flood disaster assessment	held at the monthly coffee morning gathering	conducted the next year so that funding for training in disaster logistics management can be allocated.	carried out following the flood disaster assessment
Why? (Why) should improvements be made?	Because it promotes more optimal SOP implementation	because it improves strong coordination, which facilitates more effective and efficient disaster management.	because it enhances both fundamental and sophisticated logistics management skills.	Since it facilitates the more efficient provision of disaster logistical support
How? (How) is the implementation of the improvement plan?	Assessments conducted on a regular basis lead to improvements.	Coordination meetings over coffee in the morning lead to improvements.	Volunteers and disaster personnel receive ongoing training, which leads to improvements.	Accurate prediction-making and real-time weather situation monitoring lead to improvements.

Source: *Researcher Analysis (2024)*

The next stage is to develop corrective steps after determining the reasons of the issues that arose in the Padang City BPBD's management of flood catastrophe logistics. A corrective action plan based on the cause categories found

in the fishbone diagram is as follows:

Table 6 Corrective Actions from Fishbone Problems

Factor	Problems	Corrective action
Method	Although they have been put into place and are functioning effectively, Standard Operating Procedures (SOP) in disaster relief logistics management are still not at their best.	Periodically assess the efficacy of SOPs and, if required, implement adjustments.
Menchine	Fewer trucks and equipment Utilization	cooperation with organizations and parties involved in disaster relief.
Man	Lack of personnel and inadequate logistical management training	Provide volunteers and disaster personnel with ongoing training. Concentrate on crucial elements including inventory control, emergency communications, and product delivery.
Enviroment	weather patterns and deteriorated infrastructure, including deteriorated roads and bridges	Accurately predicting weather conditions and keeping track of them in real time. Organizing backup plans for logistics distribution in case major highways and bridges are damaged

Source: *Researcher Analysis 2024*

CONCLUSION

When a flood disaster strikes, the Padang City Regional Disaster Management Agency (BPBD) plays a crucial role in logistics management, which consists of two primary components: monitoring resource availability and meeting needs during a disaster. For the impacted neighborhoods, Padang City BPBD is in charge of making sure that tools and essentials like blankets and beds are available, as well as renting tents and generators. In order to provide for people' fundamental necessities throughout the emergency response phase, BPBD also contributes to emergency infrastructure support. In terms of distributing food to victims of disasters, Padang City BPBD splits duties with the Social Service. While the Social Services are in charge of providing food and public kitchens, BPBD concentrates on providing non-food equipment and logistics. The more efficient and well-coordinated provision of catastrophe victims' needs is ensured by this teamwork.

BPBD Padang City developed a plan to address flood disasters in the city by analyzing rain patterns and probable floods using data from the previous year. They produced a vulnerability map that shows the locations of locals who might experience flooding. Using this map, logistics requirements can be predicted more precisely and effectively.

Padang City BPBD uses a number of calculated measures to handle the logistics of flood catastrophe management, such as: Rubber boats and outboard engines are among the equipment utilized for disaster management that Padang City BPBD regularly maintains. In order to guarantee that the equipment is always ready for use in an emergency, this maintenance is crucial. In addition to equipment, BPBD keeps a fleet of cars that are required for flood control. BPBD can maximize mobility and reaction in a variety of flood-affected areas with a well-maintained fleet. A quick response team has also been established by Padang City BPBD, and they are

always prepared to handle flood disasters. This crew has emergency response training so that it can offer a prompt and efficient first response in the field.

One of the problems Padang City BPBD is facing is a lack of people for disaster management. Padang City BPBD established catastrophe cadres like the catastrophe Preparedness Group (KSB) and Rapid Response Team (TRC) in addition to enlisting the help of other volunteers in order to address this issue strategically. These cadres have received the necessary training to handle emergencies in their specialized fields first. Additionally, BPBD makes use of the human resources already in place at the subdistrict and subdistrict levels impacted by the calamity. BPBD may expeditiously and effectively broaden the scope of disaster management by engaging local governments and communities. as well as Padang City BPBD works with several Padang City universities under the Knowledge, Information, and Education (KIE) program. Students participate in outreach, education, and community empowerment initiatives linked to disaster preparedness as part of this curriculum.

skills and knowledge that haven't yet resulted in certification. Logistics managers operate without formal training, relying instead on their expertise. The disaster relief logistics management Standard Operating Procedure (SOP) of Padang City BPBD has been put into place and is functioning effectively.

Obstacles that Padang City BPBD faces in adopting flood catastrophe logistics management include the loss of road access and transit routes, which makes it challenging to distribute commodities to impacted areas. There aren't enough cars to manage multiple flood locations at once in terms of transportation. The Padang City BPBD organizes and upholds positive relationships with the relevant SKPD, improves logistics management infrastructure, and regularly provides staff and volunteers with training on disaster logistics management procedures in order to overcome obstacles to disaster logistics management.

SUGGESTION

Following study, the author offers the following recommendations:

a) Personnel with certification in logistics management are needed to handle disaster logistics. In order to have a licensed logistics manager, the Padang City BPBD is therefore obliged to offer specialized training in the field of logistics.
b) There are still not enough cars in BPBD Padang City to accommodate all of the vehicles. Because of this, it is anticipated that the Padang City BPBD budget plan for the upcoming year will include a proposal for more operational cars.

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