

ABSTRACT

Indonesia is one of the most disaster-prone countries in the world, mainly due to its geographical location along the Pacific Ring of Fire. This condition causes Indonesia to frequently experience various types of natural disasters, such as earthquakes, volcanic eruptions and tsunamis. Java Island, as a densely populated region, records a high frequency of disaster events, especially in West Java Province. In 2021, West Java accounted for 54% of the total disaster events in Java, with landslides and extreme weather being the most dominant types of disasters. This high number of disaster events highlights the importance of preparedness and the role of the West Java Province Regional Disaster Management Agency (BPBD) in disaster impact management and mitigation. BPBD West Java is the agency responsible for the management and distribution of logistical assistance to 27 regencies/cities in the province. However, data from 2021 shows that there are inequities in the allocation of logistical assistance, with an average error of 22-28% in various categories of assistance such as food, clothing and shelter. To address this problem, this study aims to design a logistics assistance prediction model that can improve the accuracy of the supply and demand ratio at the district/city level. This research uses historical data on demand and logistics allocations for 2021/2022 as the basis for model design.

This research aims to propose a prediction model for the allocation of disaster logistics assistance to the BPBD of West Java Province using the Artificial Neural Network algorithm. Currently, BPBD West Java relies on an aid allocation prediction model based on expert judgment with a factor weighting method. Criteria factors used in the actual model include warehouse, IRBI, human resources, and distance (chain of control).

This research involves eight criteria factors based on literature relevant to the allocation of disaster logistics assistance. The criteria factors used include IRBI (Indonesian Disaster Risk Index), number of refugees, distance (chain of control), population, population by gender, population density, and poverty level.

The application of the proposed disaster logistics assistance allocation model shows promising results. There is a 16% decrease in the error ratio, which indicates a significant improvement in the accuracy of predicting aid needs. This

increase in accuracy has a positive impact on distribution efficiency, allowing for a more equitable distribution of aid that matches the specific needs in different regions.

When comparing the prediction results with actual data in various districts and cities, it can be seen that the Artificial Neural Network algorithm outperforms previous models that rely on expert judgment. This superiority is reflected in two main aspects: first, a more equitable distribution of assistance, and second, a higher level of accuracy in meeting the demand for assistance in the field. Overall, the new model shows substantial performance improvements in predicting and allocating aid, which in turn can improve the effectiveness of responses to emergency or disaster situations. A comparison between the prediction results and the actual results in 27 districts/cities showed that the Artificial Neural Network algorithm produced more optimal results than using the previous model based on the expert judgment method.

It is expected that the prediction model designed in this research can help BPBD West Java in improving the efficiency of logistics distribution, so that the basic needs of disaster victims can be met in a timely and equitable manner. The expected benefit of this research is to improve the quality of BPBD services in disaster management, especially in optimizing the ratio of fulfilling the allocation of logistical assistance in each affected area.

Keywords— [Humanitarian Logistic, Artificial Neural Network, Disaster Relief Aid Allocation]