

## ***ABSTRACT***

*Geographically, Indonesia is located at the meeting point of three tectonic plates, making the country highly susceptible to natural disasters. This research aims to propose a logistical aid allocation strategy for the Regional Disaster Management Agency (BPBD) of West Java Province using Random Forest Regression. In disaster management, the efficiency and accuracy of logistical aid distribution are crucial to ensure that aid reaches those who need it most in a timely manner and according to their needs. However, initial analysis reveals that the current aid fulfillment ratio is still suboptimal, with fulfillment percentages varying between 68% and 88% depending on the type of aid.*

*This modeling approach is used to address the issue of uneven aid allocation that often occurs. The model utilizes the Random Forest Regression method, known for its ability to handle high-complexity data and provide accurate predictions despite data variability. This method was chosen because it can address overfitting issues and provide more stable results compared to simpler methods.*

*The study involves ten significant criteria for determining aid allocation. These factors include the Indonesian Risk Index (IRBI), population size, male and female population, number of Family Cards (KK), number of refugees, poverty level, area size, population density, and distance to aid centers. Each factor plays an essential role in the model, with IRBI as the primary factor reflecting the risk level and vulnerability to disasters.*

*Population size, both male and female, along with the number of Family Cards, provides insight into the scale of aid needs at each household. The number of refugees helps determine urgent needs in areas with large refugee populations, while the poverty level indicates the urgency of aid in areas with high poverty rates. Area size and population density are crucial for planning the scale and intensity of distribution, while distance affects distribution efficiency and costs.*

*The model is designed with a 10% prediction error tolerance, which is expected to improve aid allocation accuracy by accounting for potential data uncertainty. This strategy aims to ensure that aid allocation is closer to actual field needs, reducing the risk of unevenness and inaccuracy in aid distribution.*

*The results of the proposed allocation indicate that the aid fulfillment ratio error 8%, demonstrating that the model is highly effective in estimating the required aid amounts. This improved accuracy contributes to distribution efficiency, ensuring that aid is allocated more evenly and in line with expected needs across various regions.*

*Comparisons between predicted and actual results in different districts and cities show that the Random Forest algorithm performs better than the previous expert judgement model. This is evident from the improved aid distribution equity and higher accuracy in meeting demand.*

*Therefore, the Random Forest Regression prediction model not only addresses the imbalance in aid allocation but also provides better guidance for distribution planning. This proposed allocation is expected to enhance the disaster response capabilities of BPBD and related agencies, offering significant contributions to more precise and responsive decision-making for affected communities.*

*This study also suggests that the model can serve as a reference for developing aid allocation strategies in other regions with different disaster characteristics. Future research could explore the application of this model in broader contexts and identify potential improvements to enhance model performance in more complex scenarios.*

***Keywords – Humanitarian, Aid Allocation, Random Forest, Disaster Logistics.***