ABSTRACT

Workplace accident cases in Indonesia have gone up quite a lot, from 182,835 cases in 2019 to 360,635 cases as of November 2023, based on data from BPJS Ketenagakerjaan. This study aims to find out the patterns behind PPE (Personal Protective Equipment) violations using time series clustering with the Dynamic Time Warping (DTW) method. The data on violations was collected from CCTV footage in six operational areas of PT Pelindo Marine Service, focusing on things like not wearing helmets or safety vests. Field findings showed that violations kept happening repeatedly in almost all locations, with a total of 23,258 incidents. This shows there's a consistent pattern of non-compliance across the operational areas. From the analysis, we found that grouping the locations into two clusters gave the best results, with a Silhouette Coefficient of 0.4464. Cluster 1 included locations with fewer violations and more stable patterns, while Cluster 2 had locations with a high number of violations and patterns that fluctuated a lot. On average, Cluster 2 had 107.10 violations per day, with the highest number recorded at 294 in a single day. We also created a distance matrix to see how similar the violation patterns were between locations, along with the total cumulative violations for each location during the observation period. All of these results were turned into a visualization dashboard website to help management monitor, identify risk patterns, and improve PPE compliance. Hopefully, this solution can help strengthen workplace safety strategies and reduce accident risks in the company's operations.

***Keywords**: Time Series Clustering, Dynamic Time Warping, Personal Protective Equipment, Workplace Safety, Website Analytics*