EFFECTIVENESS OF IT APPLICATIONS ON CONSUMER COMPLAINTS FOR IMPROVEMENTS IN WATER SUPPLY: A CASE STUDY WITH ANALYTIC HIERARCHY PROCESS

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Consumer complaints are crucial to improve the quality of any service. These complaints mean expressions of consumers' dissatisfaction with the services they receive. Not handling consumer complaints efficiently and neglecting the complaints can delay the service provider's work. On the other hand, successful attendance to these complaints helps to increase the reliability of the services and reduce negative attitudes of consumers, which in turn boosts the reputation of the service provider. In the context of the National Water Supply and Drainage Board (NWSDB), customer complaints have been instrumental in identifying pipeline leakages. The objective of this study is to identify the factors that affect leakages and, accordingly, develop a susceptibility map for the Biyagama area of the Gampaha district.

According to past studies, various factors contribute to leakages in water distribution networks, such as pipe age, diameter, pressure, length, and depth of placement. In this study, the United States Environmental Protection Agency Network Evaluation Tool (EPANET) was used to model the water distribution system in Biyagama area and analyse the hydraulic properties. Considering the qualitative nature of some of the influential factors, multi-criteria decision analysis (MCDA) was employed. The analytical hierarchy process (AHP), which is one of the MCDA techniques, was used to assess the significance of influential factors for pipe leakages. Actual weights for each factor were calculated and normalised. The AHP values were adjusted accordingly and compared with the actual leakage data to calculate the error margin. The weightages with the minimum error were selected for the susceptibility analysis. Accordingly, the analysis reveals the most vulnerable locations for pipe leakages and the importance of influential factors.

The AHP results indicated that the depth of placement, pressure, diameter, pipe length and the water velocity, in accordance with their significance, play a crucial role in identifying leakage locations. The analysis classified the study area based on level of susceptibility for low, moderate, and highly vulnerable classes. The results demonstrated that under highly vulnerable conditions, 415 predicted leakage points out of 2207 (19%) matched the actual leakage points. When considering both high and moderate categories, the accuracy rate was increased to 81%. The study was able to identify the critical areas of the Biyagama water distribution system to efficiently attend to customer complaints. The developed methodology can be applied in other areas of the country to act proactively, which lessens the maintenance cost and avoid or reduce impact of damages.

Keywords: Biyagama, Leakage, Susceptibility Analysis, Urban Water Distribution

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A comparison of results between actual leakage points and AHP model simulations in Biyagama area

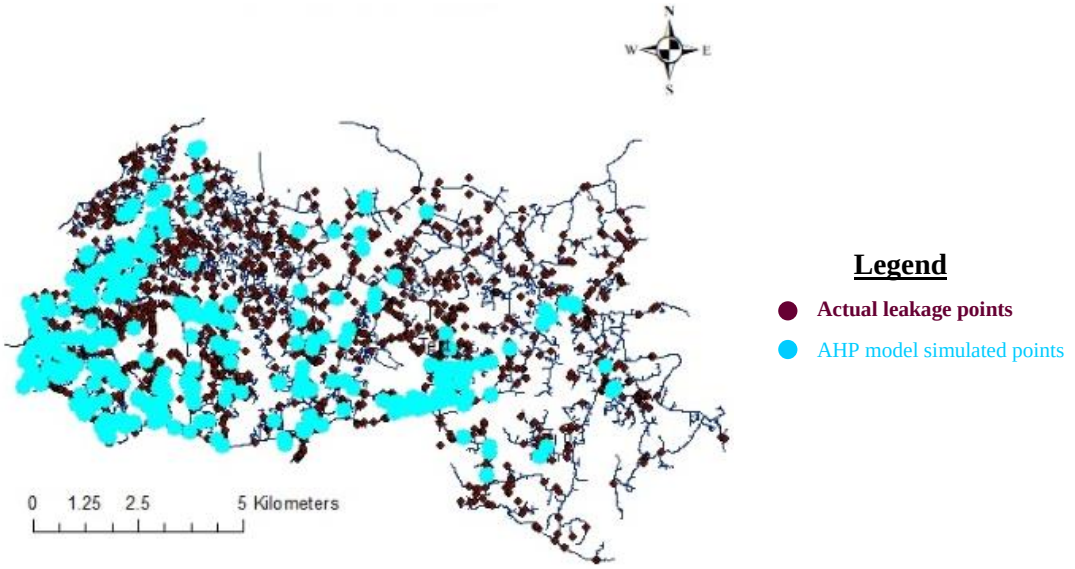

Figure 1: Model simulation under highly vulnerable category with a 19% accuracy level

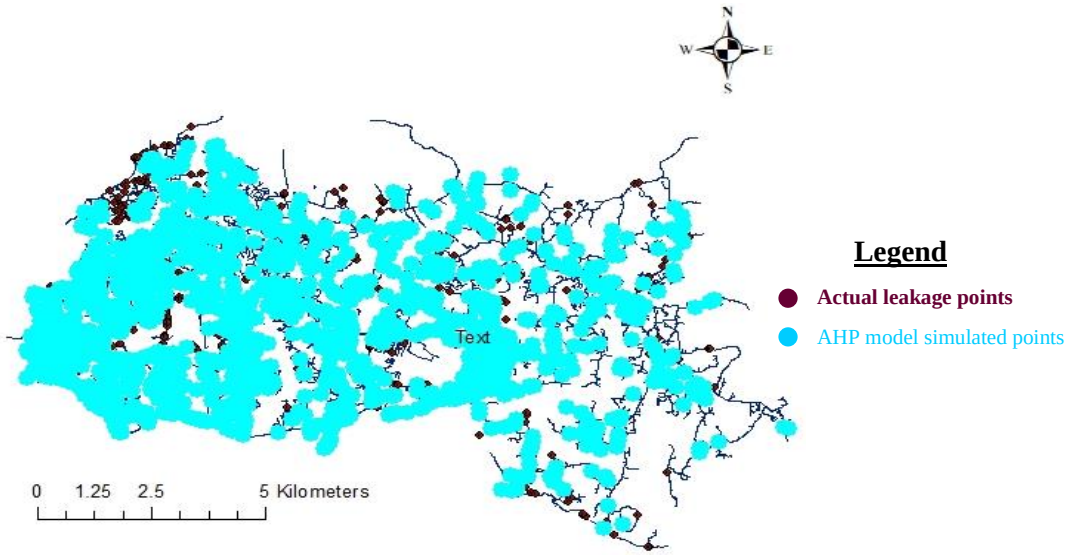

Figure 2: Model simulation under both high and moderately vulnerable categories with an 81% accuracy level