

ABSTRACT

Water quality is critical in fish farming, and PT Helmi Farm Mandiri reports a fish mortality rate of 7% due to inadequate monitoring. Currently, pond water quality is monitored and managed manually by farmers who visit each pond, and the available measuring equipment is expensive.

This research developed an IoT-based system to monitor tilapia biofloc water quality, utilizing WiFi for remote communication and enabling real-time monitoring. Sensor data is transmitted from nodes to a gateway and an IoT platform. The Mamdani fuzzy method is employed for water quality data processing, while an if-else method controls each parameter, activating controllers when conditions are non-ideal.

The test results show that the system is able to retrieve and send data 48 times per day, maintaining each parameter in ideal conditions, namely pH between 6.5 - 8.5, temperature 25-30°C and turbidity 0 - 300 ppm. The controller successfully restores water conditions from non-ideal to ideal within 30 minutes. The system successfully determines the status of water quality using fuzzy methods with 100% accuracy, as evidenced by the comparison between expected fuzzy results and obtained results obtained from 20 random data, the average percentage error of measuring pH and temperature parameters <2% and turbidity parameters <5%. The system effectively reduces fish mortality, as evidenced by the comparison of fish mortality in ponds that use the system with those that do not use the system.

Keywords: Water quality, Monitoring, IoT, Fish farming, Monitoring system, Biofloc, Fuzzy.