

## **ABSTRACT**

Air pollution is a serious problem that affects human health, ecosystems, and climate. In Indonesia, air quality monitoring is still limited by the limitations of air quality measuring stations. This is due to the high price of reference measuring stations which then encourages the creation of innovations in making low-cost sensor-based AQMS (Air Quality Monitoring System) measuring stations. However, low-cost sensor-based AQMS has weaknesses in the form of low data accuracy and durability so that a support system is needed to improve data accuracy and durability. This research aims to develop a software support system for multi-station AQMS that meets SNI 9178:2023 standards. The main focus is on the implementation of data validation, data processing according to the standard, and the provision of services such as pollutant prediction, early warning system, SOP document, and dashboard monitoring system.

In this Capstone Design work, a support system for air quality monitoring integrated with AQMS based on low-cost sensors with software output was designed. The data validation sub-system works according to the system design, but it is recommended to improve the data validation performance. In prediction, the model produces an underestimate output so that model evaluation is needed. The results of testing the monitoring website and dashboard monitoring system show that in terms of user satisfaction tests and unit testing, both have met expectations and are functioning properly. However, there is still a need to improve website performance to reduce long page load times. It is recommended to optimize the way data is retrieved from the API, such as using pagination, gradual data retrieval, or caching, so that the user experience becomes better and access to the website is faster and more responsive. In this capstone design, Quality of Service (QoS), availability, and performance were also analyzed. During implementation, the system was able to transmit data well during the test period, resulting in high QoS values. By using such a support system, it is expected to improve the reliability and functionality of AQMS in the long run.

**Keywords: AQMS, air, validation data, prediction data, dashboard**