ABSTRACT

The agricultural sector plays a strategic role in Indonesia's economy, particularly in high-value horticultural commodities such as chili peppers. However, productivity and efficiency in chili pepper farming still face numerous challenges, including price fluctuations, pest and disease attacks, changing weather conditions, and limited technological support for real-time monitoring and decision-making. To address these challenges, this study aims to develop a back-end system for an interactive web-based dashboard integrated with IoT devices, enabling real-time monitoring of chili plant environmental conditions as part of a precision agriculture system.

The method used is an iterative incremental approach conducted in two iterations, encompassing requirements analysis, system design, implementation using the Laravel framework, and testing. The system is designed to manage data from IoT sensors (temperature, humidity, pH, soil nutrients) and connect it to the dashboard via REST API, with database handled by MySQL. API testing was performed using Postman to ensure all endpoints operated according to specifications, which was confirmed by consistent HTTP 200 OK responses. In addition, load testing was conducted to evaluate system performance under high-demand conditions. The results indicated that the system could maintain an average response time below 2000 ms and stable throughput of around 2–2.3 requests per second during testing with 10 virtual users.

The findings of this study indicate that the developed back-end system successfully manages and presents chili plant sensor data in real-time with stable performance. The system includes both environmental monitoring and an AI-based consultation service, thereby supporting a more comprehensive application of precision agriculture practices. With these achievements, the system holds potential as an initial solution toward the digital transformation of chili farming management that is adaptive and informative.

Keywords – ***Back-End, Chili Plant, Interactive Dashboard, Iterative Incremental, Precision Agriculture***