

CHAPTER I

INTRODUCTION

1.1. Background

Educational institutions such as pesantren (Islamic boarding schools) play a strategic role in shaping the quality of future generations. However, as times have progressed, the operational effectiveness of pesantren is often hampered by administrative and data management that is still manual, making it prone to delays and data loss. Therefore, the application of information technology has become a necessity, since the direct use of technology can improve the efficiency of educational planning management and support pesantren leadership in making more strategic decisions [1].

An Enterprise Information System is an integrated platform designed to unify all of an organization's functions and business processes through the concept of Enterprise Resource Planning in order to improve operational effectiveness and efficiency [2]. In educational institutions, this system consolidates various previously separate functions, such as academic, financial, and staffing affairs, into a single unified information system to support institutional performance and management as a whole [1].

The implementation of an EIS in an educational environment provides various significant benefits in improving the quality of educational management. Through an enterprise information system, a pesantren can manage student, teacher, and financial data more efficiently, maintain administrative transparency, and strengthen communication among the pesantren, students, and student guardians. With the implementation of this enterprise information system, a pesantren can create a management system that helps with the recording and management of academic data. However, despite its great potential, many pesantren in Indonesia have not yet implemented or utilized an EIS to improve the quality of education [3].

Pondok Pesantren Modern As-Sholihin is a private educational institution in the city of Surabaya that has not yet implemented an enterprise information system in its school management. Based on interview results, the absence of this system gives rise to a number of significant operational obstacles in various aspects. Administratively, the recording of data and examinations still relies on physical documents, manual attendance recording slows down the workflow, leave permits are

prone to miscommunication, tuition fee (SPP) management is inefficient, and there is no adequate publication platform. Beyond these daily operational obstacles, the pesantren's management also faces managerial difficulties in quickly and objectively determining the ranking of the best students, both for the purpose of selecting competition representatives and for targeting the provision of assistance. This occurs because data on academic achievement, discipline, and other assessment criteria is still scattered and has not been systematically integrated.

This study aims to design an enterprise information system for pesantren management at Pondok Pesantren Modern As-Sholihin Surabaya as a comprehensive solution to the operational problems described above. In addition, to resolve the managerial obstacles in decision-making, this system will be equipped with a Decision Support System (DSS) using the Simple Additive Weighting (SAW) method. A decision support system is defined as a computer-based system that generates various decision alternatives to help management handle structured or unstructured problems using data and models. The implementation of this system is fundamentally intended to facilitate the decision-making process so that decisions are not made subjectively [4]. The choice of the SAW method in this system is based on its ability to perform accurate assessments because it is based on predetermined criteria values and preference weights. In addition, SAW is one of the Multi Attribute Decision Making (MADM) methods that is easiest to apply because its algorithm is not overly complex [5].

The application of a structured methodology is essential to guarantee quality control and the flow of enterprise information system development. Currently, the two methodologies that are the dominant standards in the industry are the Waterfall model and the Agile approach. The Waterfall model has good, structured planning but a very low capacity to respond to change [6]. The Agile approach focuses more on providing a rapid response to stakeholder needs, but its planning is less structured and difficult to apply to complex systems such as those involving artificial intelligence [6]. Considering the dynamic needs and requests of the management of Pondok Pesantren Modern As-Sholihin, the Agile approach was deemed more relevant. Within the Agile approach there are various system development methodologies, with Scrum and Kanban being the most dominant in the industry [7]. Referring to a literature study conducted by Necmettin Ozkan, Kanban has been shown to be implemented more

often than Scrum because of its more flexible and adaptive characteristics [7]. Therefore, the development of this system will apply the Kanban methodology so that the team can respond optimally to the pesantren management's requests.

In addition to the appropriate methodology, determining the platform and architecture is also a crucial factor. This enterprise information system will be developed on a web basis to provide ease of access for users in the pesantren environment whenever needed. The web platform offers cross-device compatibility and has a wider and more flexible reach compared to mobile applications, which are generally limited to a specific operating system. To support the performance of this platform, a robust development architecture is required. One development architecture is the MERN stack, which integrates MongoDB, Express.js, React.js, and Node.js [8]. This suite of JavaScript- and JSON-based technologies is considered highly efficient for building interactive and scalable web applications, encompassing front-end, back-end, and database management in an integrated manner [8]. With these advantages, the MERN stack architecture was chosen as the technological foundation for building the system at this pesantren.

1.2. Problem Formulation

The problem formulation derived from the background described above includes the following:

1. How should an enterprise information system for pesantren management be designed and built at Pondok Pesantren Modern As-Sholihin Surabaya using the MERN architecture?
2. How can the Simple Additive Weighting (SAW) method be implemented within the enterprise information system to determine the ranking of the best students?
3. What is the level of functionality and usability of the enterprise information system for pesantren management at Pondok Pesantren Modern As-Sholihin Surabaya?

1.3. Problem Limitations

Based on the background described previously, the problem limitations can be outlined as follows:

1. The enterprise information system developed is a web-based system for Pondok Pesantren Modern As-Sholihin Surabaya.
2. The information system is developed using the MERN architecture with the Agile SDLC.

3. The modules designed include the academic, finance, staffing, publication, registration, and authentication modules. Specifically in the academic module, the system is equipped with a Decision Support System (DSS) feature using the SAW method.
4. The application of the Simple Additive Weighting (SAW) method is focused on determining the ranking of the best students based on criteria that have been determined by the pesantren.
5. The system applies standard security mechanisms such as login authentication, but does not include in-depth security penetration testing.
6. The designed actors include Guest, Student, Student's Guardian, Teacher, Administrative Staff (TU), and Principal, as well as one abstract actor used to inherit its properties, namely User.

1.4. Research Objectives

The objectives of this research are as follows:

1. To design and build an enterprise information system for pesantren management at Pondok Pesantren Modern As-Sholihin Surabaya using the MERN architecture.
2. To implement automated calculation of the Simple Additive Weighting (SAW) method within the system to provide an objective recommendation for the ranking of the best students.
3. To determine the level of functionality and usability of the enterprise information system for school management at Pondok Pesantren Modern As-Sholihin Surabaya using Black Box Testing and the System Usability Scale (SUS).

1.5. Research Benefits

The benefits of the research entitled “Design and Development of an Enterprise Information System for Pesantren Management and a Decision Support System for Determining the Best Student Using the Simple Additive Weighting Method” are as follows:

1. Benefits for the pesantren

Improves the pesantren's image as a modern educational institution that is managed transparently and professionally. In addition, this system optimizes daily operational efficiency and helps pesantren leadership in strategic decision-making, particularly in determining the best students more quickly, objectively, and based on data.

2. Benefits for teaching staff

Makes it easier for teaching staff to manage academic administration, such as recording grades and attendance. This centralized storage system can prevent the risk of data loss and reduce administrative work time, allowing teachers to focus more on the teaching and learning process.

3. Benefits for students

Makes it easier for students to independently access their educational information, such as viewing grade records, schedules, and tuition fee (SPP) payment status. In addition, transparency regarding the assessment criteria for the best student is expected to boost students' motivation to learn and their discipline.

4. Benefits for students' guardians

Makes it easier for students' guardians to remotely monitor their children's academic progress and discipline. This system also provides ease and clarity in accessing billing history and managing tuition fee (SPP) payment administration more practically.

5. Benefits for the researcher

Adds insight and practical experience for the researcher in implementing the Simple Additive Weighting (SAW) algorithm into a Decision Support System. In addition, this research serves as a platform for directly applying the Agile Kanban methodology and the MERN Stack architecture in enterprise-scale software development.