

CHAPTER I

INTRODUCTION

I.1 Background

With the rapid development of smart technology, dashboard systems are becoming increasingly popular in companies and organizations. Currently, the need for information that is fast, accurate, and precise is essential as one of the materials for decision-making. The advancement of technology in the field of information has had a very broad impact on various sectors of life, including institutions or companies. Of course, data management requires a system like a dashboard that can capture and manage data automatically (Sofyan et al., 2020).

A dashboard is a tool used to present and analyze data, including many systematic technologies, such as: management decision support, data analysis, human-machine interface (HMI), networking and communication, and computational security (Wang & Lee, 2024). Although dashboards are very popular in the business world, they are not widely used in the field of education. However, they can be successfully applied in the education system at various levels of analysis and visualization: educational management, educational process management, accreditation, institutional assessment and inspection, as well as the realization of inter-institutional relationships at various levels, and then the promotion of community-based activities and educational services.

Many universities are now developing dashboards as data visualization tools to monitor performance achievements set in the institution's strategic plan, such as the number of student achievements, participation in competitions, and other indicators. According to Damyanov & Tsankov (2019), proper data visualization can help managers or employees make decisions and take necessary actions. Data visualization should highlight answers to known questions. Data visualizations are dynamic, interactive, and not limited to a single piece of information. They provide a view of the main information. Developing a dashboard as part of a corporate or academic/educational web application can be a long and difficult

process. Currently, there are several services on the market that offer dashboards, so we can talk about dashboards as a service.

Dashboards like this provide data in a structured manner and make it easier for management to understand the achievements. One example is the Belmawa competition dashboard developed to monitor the achievements of Industrial Engineering Faculty students in various competitions held at the national to international level.

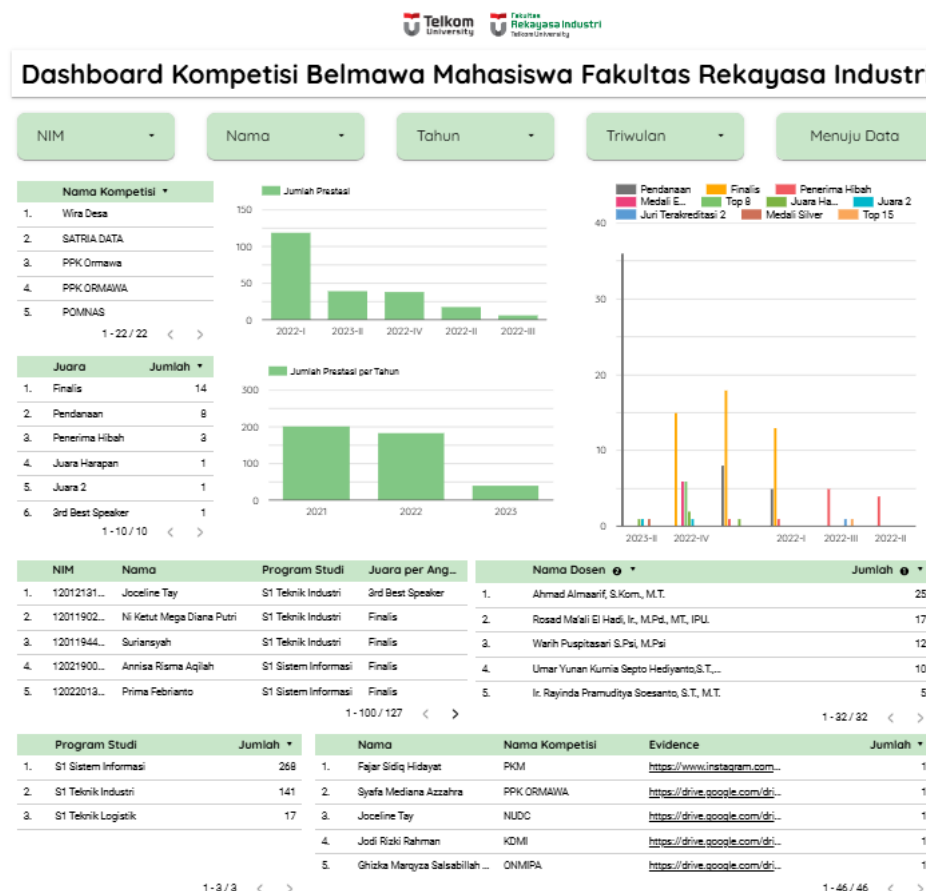


Figure I-1. Belmawa competition dashboard FRI

The Belmawa Competition Dashboard used in the Faculty of Industrial Engineering at Telkom University currently has several weaknesses that limit its capability as a strategic tool to support decision-making. In addition to the limitations in presenting descriptive data, this dashboard is not yet equipped with

supporting technologies such as Artificial Intelligence (AI), which can provide in-depth analysis and insights for users. This causes the process of analyzing and evaluating student performance achievements to be less effective and time-consuming.

The integration of AI into the dashboard enables deeper analysis, including performance trend predictions, identification of historical data patterns, and relevant data-driven recommendations. AI can also assist faculty in recognizing improvement opportunities interactively and support the formulation of strategic policies.

I.2 Problem Statements

Based on the background above, the problem statements to be examined in this research is as follows:

1. How to develop a dashboard to monitor the achievements of student Belmawa Competitions in the Faculty of Industrial Engineering that is integrated with AI to provide interactive analysis?
2. How to implement AI to provide relevant insights and strategic recommendations to support decision-making related to student competition achievements?
3. How to validate the functionality, usability, and stakeholder acceptance of an AI-integrated dashboard system for monitoring and analysis student competition achievements?

I.3 Research Objectives

This research aims to:

1. Develop an AI-integrated dashboard to monitor and provide interactive analysis of the Belmawa Competition achievements data.
2. Implement Flowise AI technology and the OpenAI API to support data analysis and generate recommendations for insights to aid decision-making.
3. Validate the functionality, usability, and stakeholder acceptance of the AI-integrated dashboard system through comprehensive testing methods.

I.4 Research Limitations

To ensure that this research is focused and can be completed within the specified timeframe, the research limitations are as follows:

1. This research only covers the development of a dashboard for the Belmawa Competition in the student affairs sector of the Faculty of Industrial Engineering.
2. The AI technology implemented using Flowise AI integrated with the OpenAI API is limited to the ability to interact with student competition data and provide responses in the form of analysis or identification results and valuable insights to support more strategic decision-making.
3. The data used is historical data within the scope of the Faculty of Industrial Engineering, with a maximum period of the last 5 years.

I.5 Research Benefits

This research is expected to provide the following benefits:

1. For the Student Affairs of Faculty of Industrial Engineering, This integrated AI system can assist in managing student competition data, expedite achievement reporting, and provide transparent access to information to support strategic decision-making in student program development. The Flowise AI-based chatbot feature, integrated with the OpenAI API, allows student affairs staff to access data analysis interactively without requiring technical expertise in data processing.
2. For Telkom University, the results of this research can serve as a reference in the development of dashboards in other fields that require achievement monitoring and analysis.
3. For other researchers, this study can serve as a reference for conducting similar research related to the development of dashboards or student competition achievement information systems in higher education environments.

I.6 Research Systematics

This research is outlined with the following writing systematics:

Chapter I Introduction

This chapter contains a description of the problem context, research background, problem formulation, research objectives, research limitations, research benefits, and writing systematics.

Chapter II Literature Review

This chapter contains literature relevant to the research problem and also discusses the results of previous studies. At a minimum, there should be more than one methodology/method/framework included in this chapter to address the problem or minimize the gap between the existing conditions and the target. At the end of the chapter, an analysis of the selection of the methodology/method/framework must be explained to determine the methodology/method/framework that will be used in this research.

Chapter III Methods

Research methodology is the strategy and steps that will be taken in the research to address the problem formulation of AI dashboard development previously outlined. This chapter explains the research steps in detail, including: the conceptual framework of the dashboard system, the systematic problem-solving approach based on Waterfall, the method of collecting student competition achievement data, the data processing method, and the justification for the choice of the Waterfall methodology used.

Chapter IV Problem Resolve

This chapter discusses the system analysis process and the design of information technology solutions. The analysis phase includes the evaluation of the existing system conditions, identification of stakeholders, and analysis of functional, non-functional, and data requirements. The design phase encompasses system architecture design, user interface design, and the creation of system workflow diagrams. This chapter also explains the implementation process of the design results, starting from infrastructure configuration, system component integration, to application development that unites all elements into a cohesive and functional solution.

Chapter V Result, Validation and Implication

This chapter discusses the results of the implementation of the AI-integrated dashboard system and the testing process to validate the system's quality. It covers the implementation results of the system features, the validation process through automated testing, user acceptance testing with stakeholders, and the evaluation of the system's usability. The test results are analyzed to evaluate the success level of the developed system.

Chapter VI Conclusion and Suggestions

This chapter concludes the research findings based on the achievement of the established objectives and provides suggestions for the further development of the system. The conclusion summarizes the research findings, the effectiveness of the methodologies used, and the contributions of the research. Suggestions are given for system improvements, further development, and recommendations for future research.