

## CHAPTER I INTRODUCTION

### I.1 Background

Telkom University is one of the higher education institutions in Indonesia that provides quality educational services to its students to produce competent, integrity-driven graduates who are competitive at both national and international levels. According to the 2024 university clustering released by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek), Telkom University is categorized as an independent cluster university, which is the highest university cluster. Universities that receive this designation are authorized to conduct development processes, reviews, and other activities for research and community service conducted by lecturers. Telkom University has 32 study programs under seven faculties. One of the offered study programs is the bachelor's program in Industrial Engineering. The Bachelor's (S1) Industrial Engineering Study Program at Telkom University specializes in strengthening Industrial Engineering knowledge in the field of Information and Communication Technology (ICT).

Based on the decision of the National Accreditation Board for Higher Education of the Republic of Indonesia (BAN PT) 2555/SK/BAN-PT/AK-ISK/S/IV/2022, the Industrial Engineering Study Program has achieved an accreditation of "Superior" (*Unggul*). This is due to various assessment factors, one of which is the competency profile of its graduates in their respective fields. The ability of graduates to compete in the job market is one of the important indicators in evaluating the quality of education at a university in producing outstanding graduates. One of the standard assessment criteria for graduate profiles is the waiting time for students to obtain their first job. According to the Evaluation Report and Performance Report Assessment Matrix Book of the Study Program 2019, the Waiting Time (WT) of students is considered very good if the waiting period is less than 6 (six) months. (BAN PT, 2019)

The waiting time for graduates before obtaining their first job can vary, starting from graduates who are already employed before graduating, those who find a job shortly after graduation, to those who have to wait a long time before getting a job. These differences are one of the factors that influence the assessment of

universities in producing graduates. Achieving a target waiting time of less than 6 (six) months is considered a positive indicator in the university accreditation process. Factors such as GPA, duration of study, points of activity during college, and English proficiency scores can collectively influence the waiting time of graduates. Research conducted by Anjani (2018) utilized study duration and student activity to see the influence to the waiting time. Another research by (Khoirudin et al., 2020) used Gender, GPA, and the English Proficiency to show whether students will have long or short waiting time.

Tracer studies are an important tool for understanding the outcomes of higher education on professional careers and for evaluating the conditions of graduates and the effectiveness of education. Data from tracer studies is used in this final project to analyze the waiting time of graduates. The tracer study data was gathered by Directorate of Career Development, Alumni, and Endowment (CAE) by giving out questionnaires to students. Based on the 2023 Tracer Study Book by the Directorate of Career Development, Alumni, and Endowment, the cohort response target specifically for Faculty of Industrial Engineering (FRI) students (population target) includes 413 students from the undergraduate Industrial Engineering study program, 364 students from the undergraduate of Information System study program and 21 students from the master degree of Industrial Engineering study program. Of these targeted cohort students, the 2023 tracer study achieved 76.44% from the overall targeted student cohort (Tracer Study Book of the Directorate of CAE 2023). Regarding the Waiting Time of Graduates from the Faculty of Industrial Engineering (FRI), the following depicts the waiting time for FRI graduates.

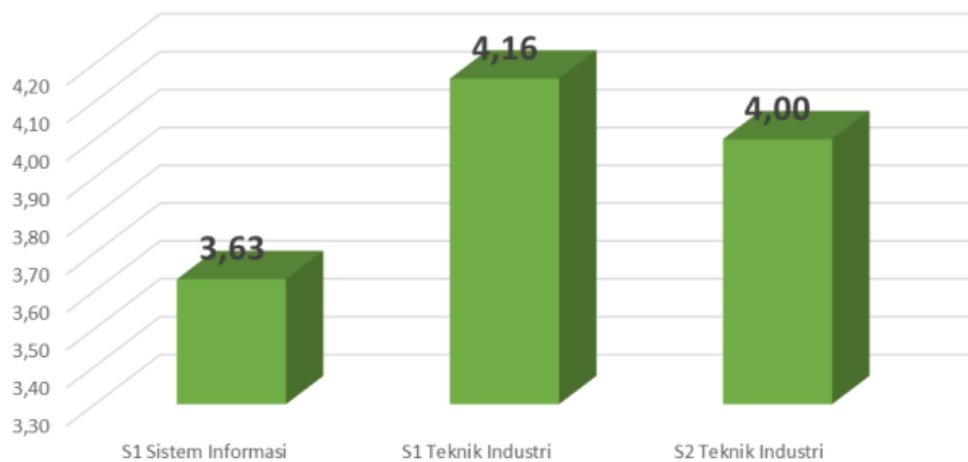


Figure I.1 The Waiting Time for FRI Graduates (In Months)  
 (Source: Tracer Study Book of the Directorate of CAE 2023)

Figure I.1 illustrates the Waiting Time for FRI Graduates where Industrial Engineering Bachelor's graduates have the longest waiting time of 4.16 months, compared to the waiting time of graduates from the other two study programs under FRI. Industrial Engineering Master's graduates have a waiting time of 4 months, and Information Systems Bachelor's graduates have the shortest waiting time of 3.63 months.



Figure I.2 The Average Waiting Time for FRI Graduates from 2021 to 2023 (In Months)

(Source: Tracer Study Book of the Directorate of CAE 2023)

Furthermore, based on Figure I.2, the waiting time for FRI graduates in 2023 increased (became longer), from 3.72 months in 2022 to 3.89 months. This indicates that the waiting time for FRI graduates has become longer. Referring back to Figure I.1, where the average waiting time for Industrial Engineering Bachelor's graduates is 4.16 months, it also shows that the average waiting time for Industrial Engineering Bachelor's graduates is longer compared to the overall average waiting time for all study programs under FRI, which is 3.89 months.

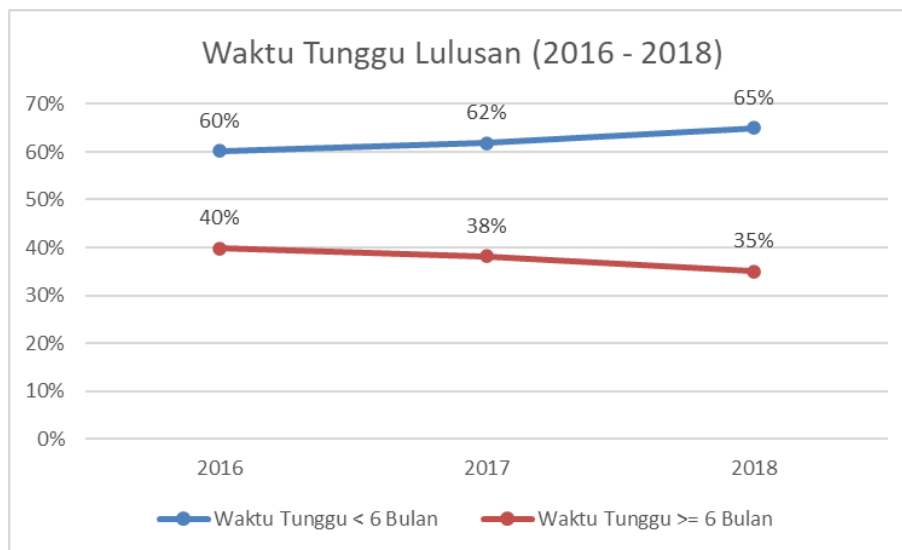


Figure I.3 The Waiting Time for Graduates of the 2016 - 2018 Cohort

(Source: Tracer Study Data 2016 – 2018)

In Figure I.3, it can be seen from the tracer study data obtained from the Directorate of CAE that the Waiting Time for Graduates of the 2016 – 2018 cohort in the category of less than 6 months increased, while in the category of waiting time greater than or equal to 6 months, it decreased. This is a positive trend. However, there are still graduates from the Industrial Engineering Bachelor's program who experience a waiting time greater than or equal to 6 months. This could become a problem for the accreditation of the Industrial Engineering Bachelor's program in the future.

According to the interview conducted with The Head of the Industrial Engineering Bachelor's Program, The Head of the Industrial Engineering Bachelor's Program considers the trend of longer average waiting times, up to 4.16 months, as a significant problem for the study program since it may potentially affect the

accreditation of Industrial Engineering. This issue, specifically the waiting period exceeding 6 months, needs to be addressed by the Industrial Engineering Bachelor's program. The Head of the Industrial Engineering Bachelor's Program also identified several factors that may affect the waiting time, including poor English proficiency, student activity, and study duration. However, the Head of the Industrial Engineering Bachelor's Program is still uncertain about which factor has the most influence on the waiting time. Additionally, there is no system in place to help the study program predict student waiting times. Therefore, it is necessary to identify the causes of this problem. One method to identify these causes is by using a Fishbone Diagram. The Fishbone Diagram is an analytical tool that provides a structured approach to evaluating the effects and causes contributing to the problem (Ilie & Ciocoiu, 2010). Below is the fishbone diagram used to identify the causes of the student waiting period issue.

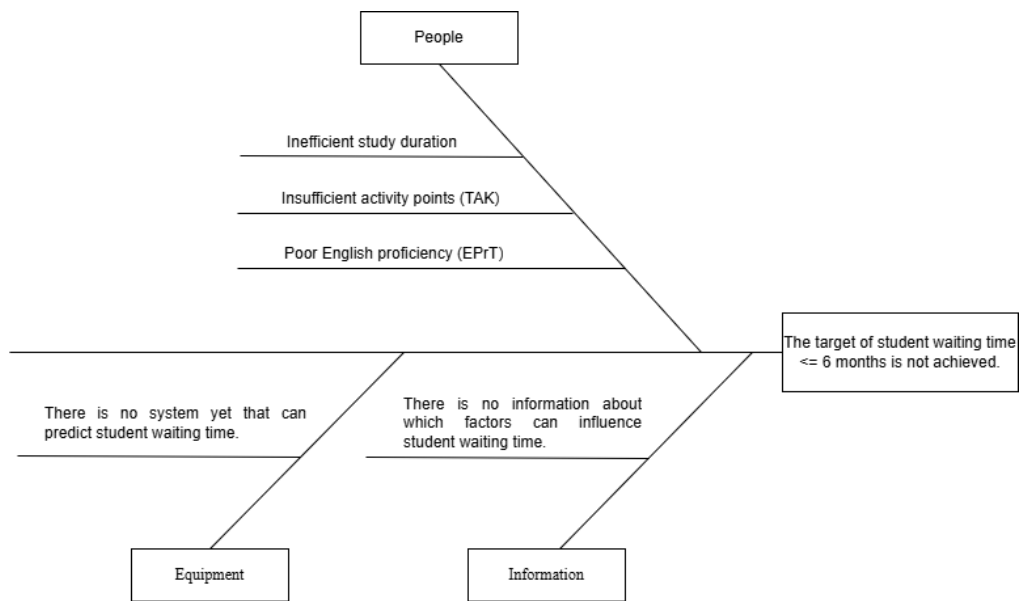


Figure I.4 Fishbone Diagram Student Waiting Time

The Fishbone Diagram in the figure I.4 shows that several factors, namely people, information, and equipment, influence the inability to achieve a graduate waiting time of 6 months or less. Under the "people" category inefficient study duration, insufficient transcript of student activities (TAK), and poor English proficiency (EPrT). Concerning “information”, there is a lack of data on what influences student waiting time, making it challenging for the study program to identify the most impactful factors on the speed of securing the first job for students. On the

“equipment” side, the study program lacks a system to predict whether a student will secure their first job in under or over 6 months. This absence of predictive capability hinders the program from identifying students at risk of taking more than 6 months to find employment, making it difficult to implement effective and preventive measures for reducing student waiting time.

The study program needs to take early measures to anticipate the long waiting time for students to get their first job. Referring to the mentioned earlier data, therefore, the Industrial Engineering Bachelor's Program can take preventive actions to avoid missing the target waiting time for active students by having a system that will help study program to predict student waiting time. Hence, this final project aims to propose a model for predicting the waiting time for students to get their first job using the Naive Bayes algorithm. By predicting the waiting time for students early on, the study program can take anticipatory steps to help students secure a job quickly.

## **I.2 Formulation of the Problem**

Based on the previously discussed problem, the problem formulation for this final project is as follows:

1. How can the waiting time for students in the Industrial Engineering Study Program at Telkom University be predicted using the identified factors?
2. What is the design of a dashboard to predict the waiting time for students in the Industrial Engineering study program at Telkom University?

## **I.3 Goal of the Final Project**

The objectives of this final project, based on the problem formulation, are as follows:

1. To produce prediction models for data mining techniques utilizing the algorithm of Naïve Bayes method.
2. To create a design of a dashboard for predicting waiting time in the Industrial Engineering Study Program at Telkom University.

## **I.4 Benefits of the Final Project**

This Final Project would advantage as follows:

1. To provide insights to study programs in making predictions regarding student waiting whether it be less than 6 months or not
2. To further help study programs to construct preventive measures based on student waiting time predictions
3. To provide assistance to students in making predictions about the possibility of them getting waiting time less than 6 months or not.

## **I.5 Outline of Chapters**

To ensure a more structured approach in writing this final project, it is divided into several sections. The structure of this final project is as follows:

### **Chapter I: Introduction**

This chapter provides a brief overview of the final project's background, the problem formulation based on issues identified by the problem owner, the project's objectives, its significance, its scope, and its organization.

### **Chapter II: Theoretical Foundation**

This chapter covers the literature relevant to the problem under study and reviews the findings of previous research. Additionally, it outlines the fundamental theories applied in this research.

### **Chapter III: Design Methodology**

This chapter provides a detailed explanation of the research steps, including the conceptual model and the systematic approach of the research. The conceptual model offers a representation of the problem and its solution in a model format. Systematic problem solving outlines the stages involved in addressing the problem.

### **Chapter IV: Integrated System Design**

This chapter outlines the data processing procedures, including the preprocessing stages and the tools utilized for data processing. This process aims to prepare the data for implementation with the Naive Bayes algorithm.

## **Chapter V: Validation and Evaluation of Design Results**

This chapter presents the results of the analysis using the Naïve Bayes method to predict student graduation. It provides a detailed explanation of the calculations performed by the Naïve Bayes algorithm applied to student graduation data. These calculations are conducted using software and are repeated multiple times according to the specified ratio comparisons.

## **Chapter VI: Conclusion and Recommendations**

This chapter includes conclusions and recommendations, serving as a reference for future researchers and providing answers to the objectives of this final project.