CHAPTER I
INTRODUCTION

The introduction contains a description of the background of the problem, problem formulation, research objective, problem limitations, and outline of report.

1.1   Background

The pulp and paper industry is one of the most significant sectors, integral to various aspects of daily human life, including offices, education, households, and more. In Indonesia, paper consumption remains relatively low, averaging around 32.6 kilograms per person (Kemenprin, 2021). Despite this, global demand for products from Indonesia's pulp and paper industry is projected to rise, both domestically and in export markets. This trend suggests substantial growth potential for Indonesia's paper industry. The industry's expansion is driven by increasing domestic and international demand as well as the advancement of science and information flow, positioning the pulp and paper sector for continuous growth. In response to this development, efforts to enhance competitiveness have been ongoing to address the challenges of intense global competition.

PT XYZ is one of the leading companies in the pulp and paper industry in Indonesia and is currently operating in Riau. BAKP (Bleached Acacia Kraft Pulp) and UCWF (Uncoated Wood Free Paper) are products made by PT XYZ. Both products are commonly used in 55 gsm to 150 gsm paper for photocopying and printing. The company produces 2.8 million tons of pulp and 1.15 million tons of paper every year. PT XYZ markets about 85% of its pulp overseas, and the remaining 15% is marketed domestically.

However, the rise of digital technology has led to a decline in paper demand compared to previous years. Consequently, PT XYZ has shifted its focus more toward pulp production than paper manufacturing. This strategic shift is evident in the company's increased emphasis on pulp, driven by its higher demand

as a semi-finished product, as opposed to paper, which is a finished product. As a key supplier of pulp, PT XYZ bears the responsibility of ensuring smooth production processes to maintain a stable supply of pulp.

The pulp produced by PT XYZ, as illustrated in **Figure 1.1**, undergoes multiple processes, including de-barking, chipping, digesting, mixing, drying, cutting, and shipping. These processes are carried out by various departments, including the Woodyard, Fiberline, Pulp Dryer, and Chemical Plant. The production scheme for the pulp-making process at PT XYZ is shown in **Figure 1.2**.
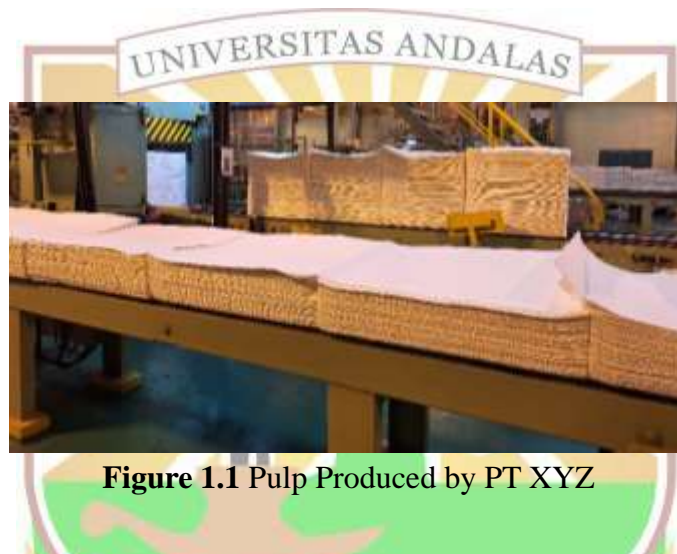

Figure 1.1 Pulp Produced by PT XYZ

Figure 1.2 Production Scheme of Pulp Paper Making Process in PT XYZ

The de-barking and chipping processes are handled by the Woodyard Department during the raw material preparation stage. The Fiberline Department

and the Chemical Plant work together to carry out the digesting and mixing processes. Within the Fiberline Department, the raw materials undergo pulping, bleaching, and cleaning, while the Chemical Plant provides the necessary chemical treatments and ingredients. The final stage involves the Pulp Dryer Department, where the pulp is dried, cut, and prepared for shipment.

Each department relies on specific machinery to support the pulp production process. However, frequent machine breakdowns often disrupt production. The machines in the Woodyard Department are particularly prone to breakdowns, mainly due to the silica content in the wood raw materials and the impact of hardwood on the cutting machinery.

During 2023, the Woodyard department experienced frequent breakdowns in nine key machines, including Roller Tables, Chip Conveyors, Infeed Chippers, Chippers, Chain Conveyors, Bark Conveyors, Gentle Feeds, Debarking Drums, and Log Belts. Some of these machines are depicted in **Figure 1.3**. The downtime experienced by the Woodyard Department in 2023 is summarized in **Figure 1.4**.

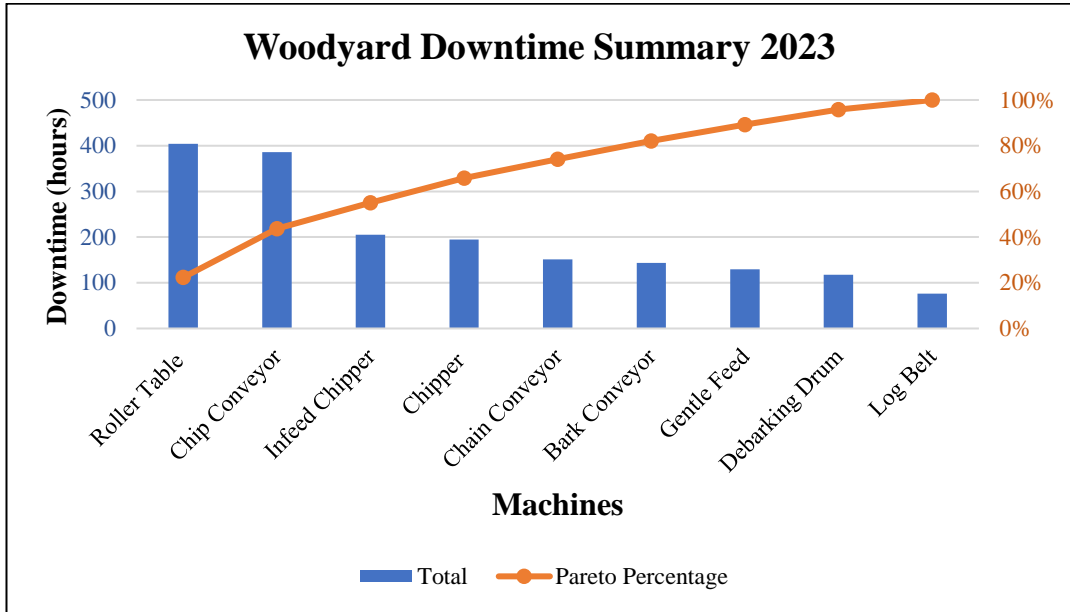
Figure 1.3 Machines in the Woodyard Department

Figure 1.4 Woodyard Downtime Summary in 2023

Figure 1.4 shows the downtime summary of critical machines in the Woodyard Department, highlighting how these interruptions can impact the company's production processes. The downtime in this department is closely linked to the availability of spare parts. A lack of spare parts can delay machine repairs, leading to prolonged downtime. For example, in April 2023, the Roller Table machine was out of operation for 41 hours due to delays in obtaining a Chain RS32B spare part. **Figure 1.5** illustrates the stock levels of the Chain RS32B (18214) item throughout 2023.
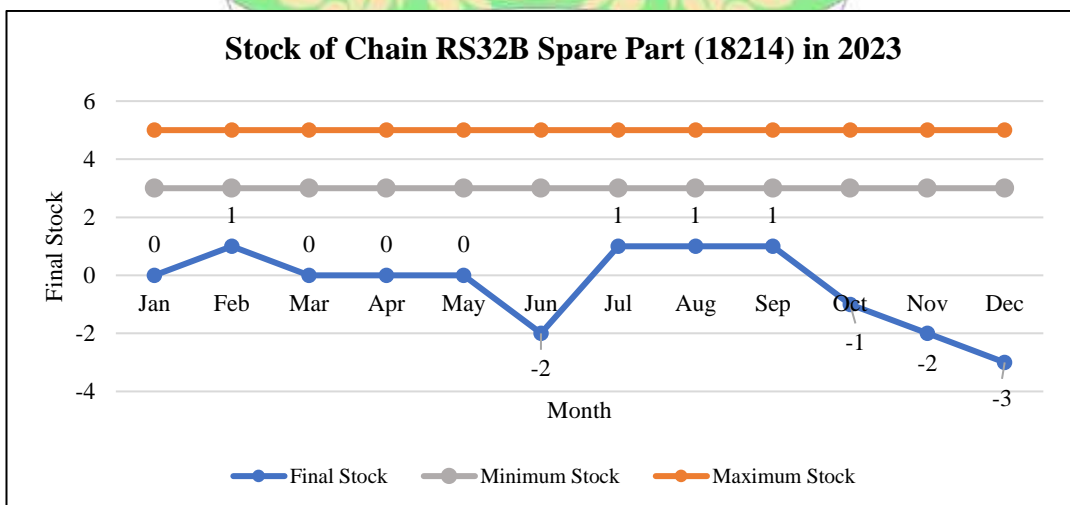

Figure 1.5 Stock of Chain RS32B (18214) in 2023

The data in **Figure 1.5** reveals a stockout of the chain spare part, which extended the downtime of the Roller Table beyond the expected duration. Such conditions can halt production processes. Additionally, following an inventory shortage, the procurement of the Chain RS32B item has not been timely, leading to further stockouts in the subsequent months.

The challenges in managing inventory stem from the unpredictable demand for spare parts, as shown in **Figure 1.6**. This unpredictability is primarily due to the irregular timing of machine breakdowns each month. Furthermore, PT XYZ's current inventory management system is limited to a minimum and maximum stock strategy based on the previous year's usage data. However, there are inefficiencies, such as stockouts and spare parts with final stock levels exceeding the maximum limit for several months, indicating an overstock problem, as seen in **Figure 1.7**.
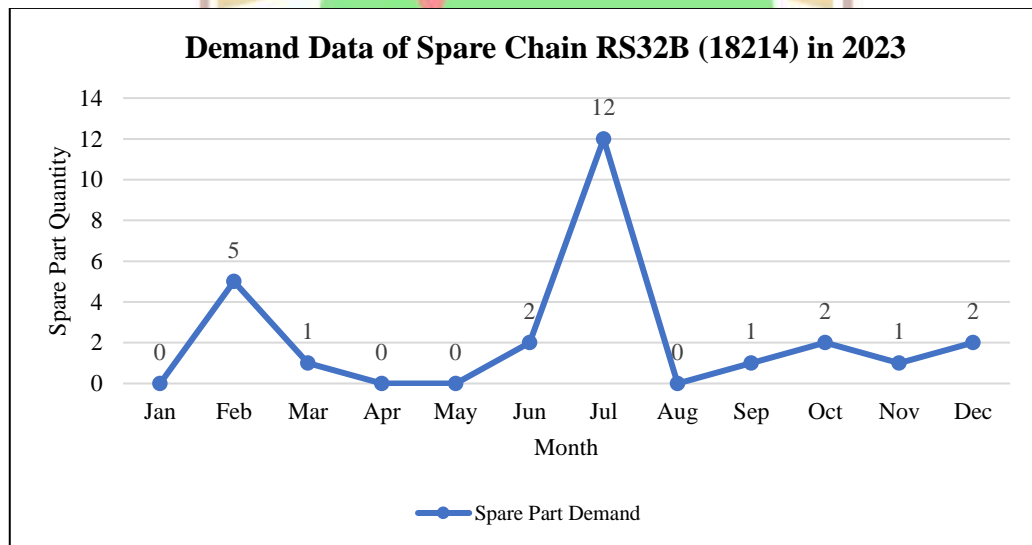

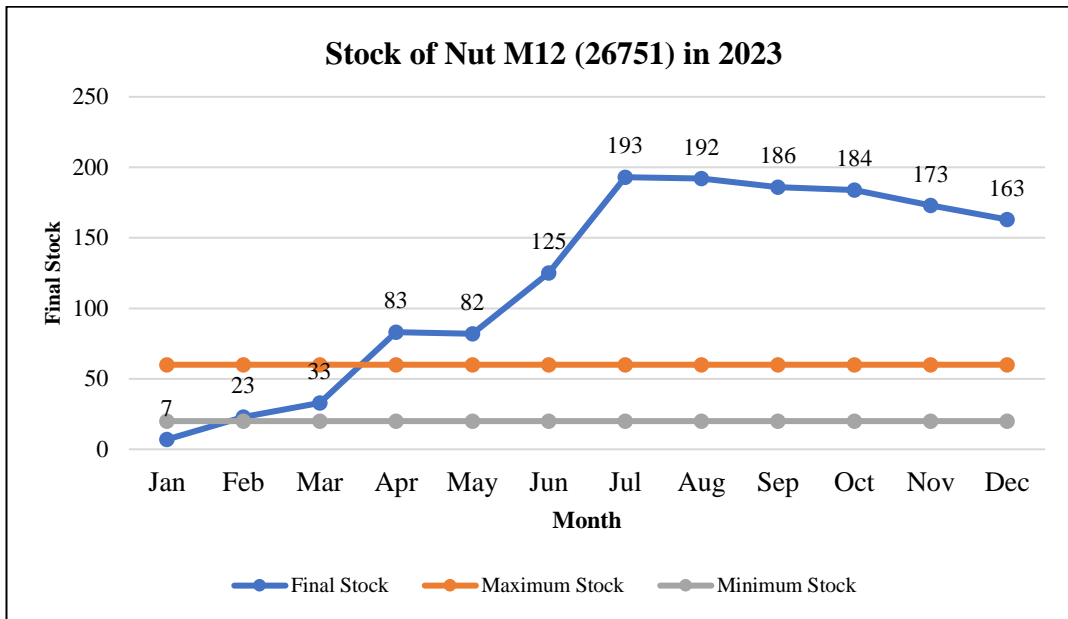**Figure 1.6** Demand Data of Spare Part Chain RS32B (18214) in 2023

Figure 1.7 Stock of Nut M12 (26751) in 2023

Figure 1.7 illustrates the overstocking of the Nut M12 (26751) item from April to December 2023, where the stock levels far exceed the maximum limit set by the company. This situation creates a significant gap between actual inventory levels and the company's established minimum and maximum stock limits. If left unaddressed, such conditions can lead to high inventory costs and negatively impact the company's operating expenses. Therefore, it is essential to evaluate the existing inventory planning in the Woodyard Department of PT XYZ to determine whether the current stock limits are appropriate for the current conditions.

The excessive inventory levels, resulting from large-scale orders, can lead to an accumulation of goods, as spare parts are not well-regulated. Consequently, it is crucial to reassess the existing inventory planning to determine the types of parts that should be ordered, along with the appropriate quantity and timing of orders.

Given this situation, it is clear that PT XYZ requires a more accurate inventory plan that considers the types of spare parts ordered, along with the appropriate quantity and timing of orders. The current spare parts inventory planning in the Woodyard Department needs to be evaluated to ensure that stock levels are neither insufficient nor excessive. Therefore, a comprehensive study

should be conducted to analyze the inventory policy previously implemented by the company. This study aims to propose an optimal inventory policy that minimizes inventory costs while maintaining sufficient stock levels.

1.2   Problem Formulation

Given the issues outlined in the background, the problem formulation in this study is what is the right inventory planning to be implemented in the Woodyard Department of PT XYZ to minimize the total inventory costs?

1.3   Research Objective

The objective of this research is to propose an effective spare parts inventory planning strategy for the Woodyard Department of PT XYZ to minimize total inventory costs.

1.4   Problem Limitations

The scopes and assumptions of this research are as follows:
1.   The price of spare parts is assumed to be equal to the price taken at the time of data collection.
2.   Ordered parts are assumed to arrived in good condition and at the same time.

1.5   Outline of Report

The outline of the report used in this research is as follows:

CHAPTER I INTRODUCTION

This section includes the background of the problem, problem formulation, research objectives, problem limitations, and an outline or systematics of research proposal.

CHAPTER II LITERATURE REVIEW

This section contains theoretical studies that form the basis for preparing research reports involving related topics, such as the definition of inventory, forms and types of inventory, inventory functions, inventory costs, product classification, distribution test, probabilistic inventory control, service level, and previous research.

CHAPTER III RESEARCH METHODOLOGY

This section summarizes the research method consisting of the steps to be taken in discussing the problem which includes preliminary studies, literature review, problem solving methodology, data collection and processing as well as conclusions and suggestions.

CHAPTER IV PROPOSED INVENTORY PLANNING

This section discusses data collection and data processing stages related to the Woodyard department spare parts inventory plan at PT XYZ to determine the proposed inventory planning.

CHAPTER V RESULTS AND DISCUSSIONS

This section presents a discussion of the results of proposed inventory planning that has been done previously.

CHAPTER VI CLOSING

This section highlights the conclusions of the research and provides suggestions for future research.