CHAPTER I
INTRODUCTION

This chapter contains the background, the problem formulation, the research objective, the research scope, and the systematics of writing the report.

1.1 Background

The automotive industry is rapidly expanding nowadays. It is distinguished by the emergence of crowded automotive product among the general public. According to the Republic of Indonesia's Ministry of Industry, there are currently 22 or more four-wheeled motor vehicle companies in Indonesia (Ministry of Industry RI, 2021). In such cases, consumers must exercise caution and critical thinking when deciding on the type of vehicle to purchase. This condition also raises competition among automotive companies, which must provide the best service possible to satisfy customers. Indeed, automotive companies recognize the importance of providing vehicles with advanced technology at reasonable prices, involving all interconnected aspects of the company. In addition to technological advancements that make vehicles more sophisticated, the increased use of vehicles is due to population growth and the consumptive nature of the population. **Figure 1.1** displays the number of vehicles in Indonesia from 2018 to 2020.

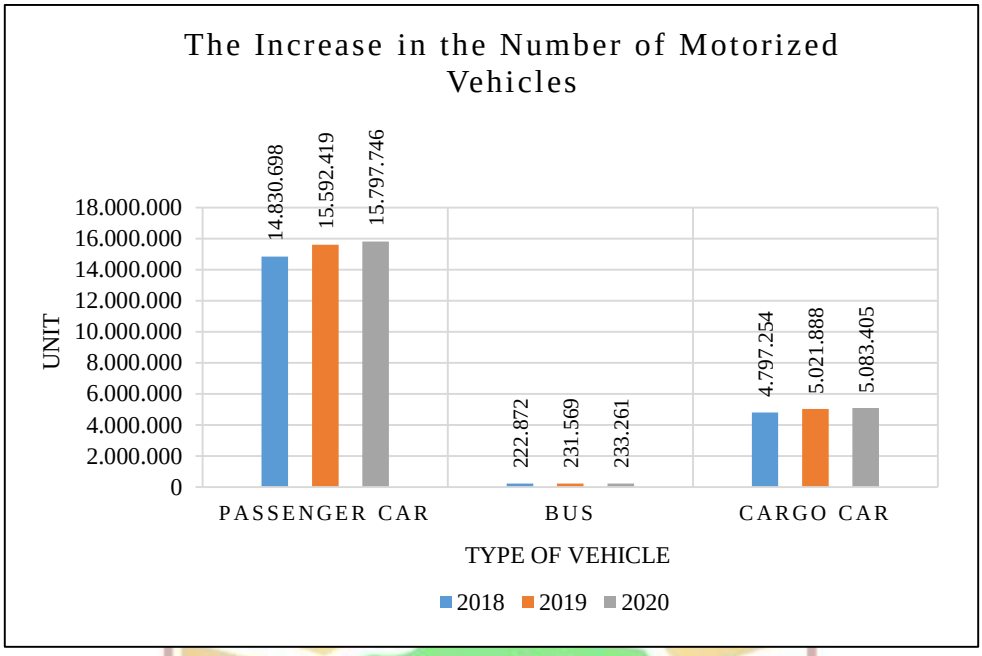

Figure 1.1 The Increase in the Number of Motorized Vehicles
(Source: www.bps.go.id)

Figure 1.1 shows that Indonesia's vehicle users increased from 2018 to 2020. The number of passenger car users increased by 761,721 units between 2018 and 2019 and 205,327 units between 2019 and 2020. The use of buses and freight cars is also increasing. Because of the growing number of motor vehicle users in Indonesia, every automotive company has the opportunity to improve customer services in vehicle procurement capabilities, inventory control planning of spare parts, and qualified vehicle maintenance capabilities. Similarly, proper spare part inventory control must be calculated so that the company has a reference in determining the optimal lot size, which affects spare part sales and the vehicle maintenance process.

Inventory is a resource or material that is waiting to be processed. The waiting process can occur in production activities in the manufacturing system, marketing activities in the distribution system, and consumption activities. The primary function of inventory is to ensure the smooth operation of the demand fulfilment mechanism in response to consumer needs and desires so that the managed system can improve the company's performance (Bahagia,2006).

Companies' poor inventory control policies frequently result in overstock and stockouts. The issues that arise as a result impact the costs incurred. Inventory costs are operational costs incurred to procure and operate inventory following policies established and calculated over the planning horizon. Inventory costs are associated with not only accountable expenses (tangible costs) but also lost opportunity costs (opportunity costs) as a result of inventory shortages (Bahagia, 2006). As a result, companies must control inventory and develop appropriate policies to reduce total inventory costs. Inventory issues in the company must be addressed appropriately for production activities to keep going and for consumer needs to be met.

PT XYZ is a company engaged in the service and trade business. PT XYZ's business activities include selling and purchasing car units through the sales/marketing department, selling spare parts through the spare parts administration section, and repairing or servicing customers' cars. PT XYZ is located at By Pass street, Kuranji District, Padang City, West Sumatra. PT XYZ only sells one vehicle brand and accepts vehicle services from the same brand. Vehicle sales and spare parts distribution are constricted to West Sumatra. PT XYZ obtains its spare parts from a single supplier, PT IAMI. PT XYZ is the holding company for the procurement of spare parts for the “ISZ” brand in West Sumatra. Thus, it can be said that PT XYZ has no competitors for the procurement of the same type of spare parts because the retail located in West Sumatra obtains the spare parts from this company; indirectly, the retail demand at the retail level also influences the demand for spare parts at PT XYZ. The number of PT XYZ vehicles in West Sumatra is directly proportional to spare parts procurement. **Figure 1.2** shows PT XYZ's vehicle sales.

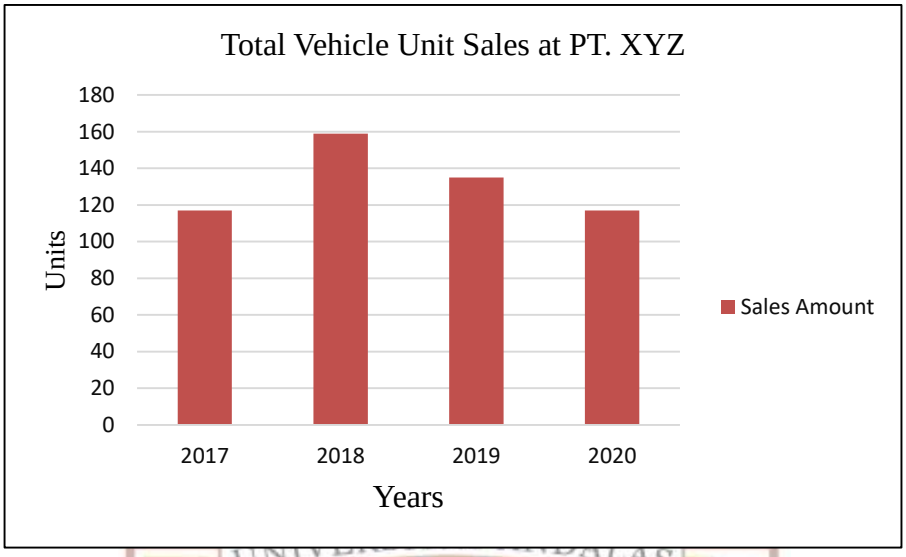

Figure 1.2 PT XYZ Vehicle Sales from 2017-2020

(Source: PT XYZ)

Figure 1.2 shows that 528 vehicles were sold between 2017 and 2020. Certain types of vehicles are sold, including pickup trucks, buses, and others. This is in proportion to the increasing demand for spare parts as PT XYZ's vehicle sales increase. Spare parts sales at PT XYZ are classified into three types: sales through vehicle service, sales directly by the administration of the spare part, and sales to stores/retail.

The sale of spare parts by PT XYZ fluctuates or is not consistent for each type of spare part. The number of vehicles performing services, such as routine maintenance and vehicle repair, influences this condition. Furthermore, fluctuations in spare part sales are influenced by retailers' speculative purchases. This situation impacts the inventory available in the warehouse at any given time. In 2021, PT XYZ's total spare parts sales amounted to Rp 3,617,857,500.

Uncertain demand for spare parts, both from maintenance and sales to stores, makes it difficult for businesses to determine the amount of spare parts inventory that must be ordered and kept in warehouses. According to interviews with inventory employees at PT XYZ, the problem was the difficulty in determining the quantity of orders on regular orders, resulting in a frequent inventory shortage

when needed. The order process at the company is divided into two parts: regular and emergency orders. Regular orders are carried out regularly following the quantity of orders the company sets. PT XYZ, consumers can accept tolerance by reordering the term emergency order to fulfil demand shortages. On the other hand, an emergency order is the number of items ordered by the customer but unavailable in the warehouse, requiring management to order the item as soon as possible. Because of the shorter delivery wait time, the emergency order will incur higher shipping costs than regular orders.

According to the interview, several factors contribute to emergency orders, including fluctuations in demand, a shortage of safety stock spare parts, undefined order quantities, parts on the way from suppliers, and back ordering to fulfil demand from stores/retail. The inventory system implemented by PT XYZ uses a minimum inventory policy that must be available in the warehouse. The company will place an order for spare parts if the stock of spare parts available in the warehouse is less than the minimum stock level set by the company. However, inventory employees can place orders for units exceeding the minimum stock set by the company. This system will lead to minimal safety stock, and there is no standard policy for placing orders. **Table 1.1** shows an example of a stock-level policy at PT XYZ.

Table 1.1 Spare Parts Inventory Recapitulation of I8-97172 549-A

No. Material	Material Description	Stock Availability	Stock Level (unit)	Quantity (unit)											
				Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
I8-97172 549-A	FUEL FILTER	**Initial Inventory**	15	27	21	47	39	29	35	39	29	16	24	7	25
		Buying Stock		0	29	0	0	24	20	0	20	20	0	31	20
		Selling Stock		6	3	8	10	18	16	10	33	12	17	13	32
		Ending Inventory		21	47	39	29	35	39	29	16	24	7	25	13

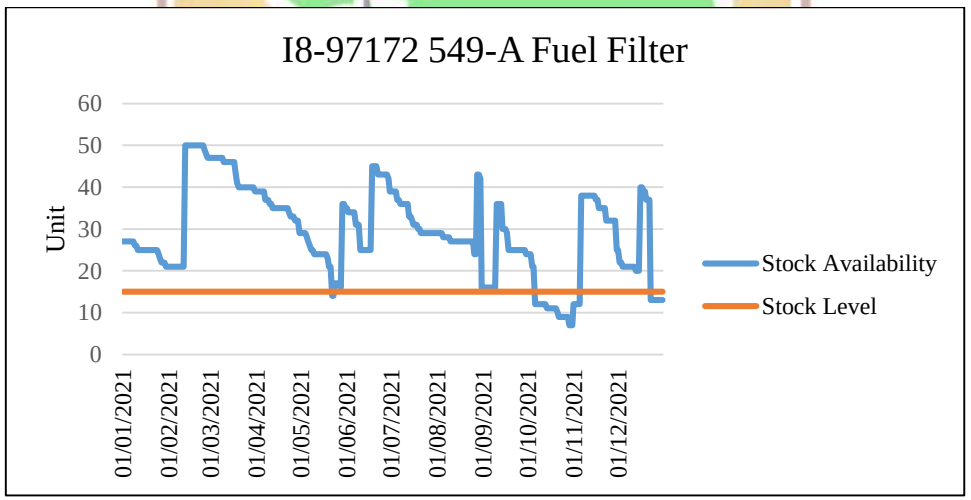

Figure 1.3 Spare Parts Inventory Cycle of I8-97172 549-A

Table 1.1 and **Figure 1.3** show the value of the minimum inventory level, which is the buffer stock in the inventory system. Based on this inventory level value, the company does not have a definite system for determining the number of orders. The company does not have guidelines for placing an order (reorder point). This system can result in a shortage of inventory from applying a minimum stock level policy that remains available when demand is high and the potential for overstock from the lot order that does not have a standard order. Throughout 2021, there were 55 units of spare part orders emergency made due to the stock being unavailable in the warehouse or urgent customer requests. As a result, PT XYZ must have a spare parts inventory system to ensure that the vehicle maintenance process runs well while meeting customer demands and maximizing profits. The frequency of emergency orders for spare parts demands for September – December 2021 can be seen in **Table 1.2**.

Table 1.2 Frequency of Emergency Order for Spare Parts September – December 2021

No	Month	Emergency Order Frequency	Total Order Frequency
1	September	77	253
2	October	104	223
3	November	98	272
4	December	57	230
Total		336	978

(Source: PT XYZ)

Table 1.2 shows the frequency of emergency orders made between September - December 2021. The frequency of orders made for emergency orders was 336 times or 34.35% of the total orders. The emergency order is due to the inability of the inventory system in the warehouse to meet demand, delays can be tolerated, or stock is not available in the warehouse. This inability can be in the form of customer requests through maintenance activities or purchasing spare parts. The recapitulation of emergency order spare parts throughout 2021 can be seen in **Appendix A**.

Thus, the issue that arises from PT XYZ's spare parts inventory system is the frequent stockout of spare parts demand. Because emergency orders address the demand stockout problem, the profit obtained from emergency orders is lower than that obtained from regular orders. The profit obtained from emergency orders is lower than from regular orders because emergency orders are delivered by air transportation, whereas regular orders are sent by land transportation. The difference in profit from selling spare parts with regular and emergency orders is around 5% of the selling price/unit. As a result of the emergency order, PT XYZ is expected to lose Rp 21,325,400 between September and December 2021.

Meanwhile, the company is expected to lose Rp 426,508,000 in sales if the emergency request is not met. As a result, maintaining the proper spare parts inventory system is critical to maximizing the company's profits. This research is expected to assist PT XYZ in developing a spare parts inventory system proposal to increase the company's profits.

1.2 Problem Formulation

According to a preliminary study in the background above, there is a problem in the spare parts inventory system in 2021, as evidenced by the high stockout value in the number of spare parts. Although customers still tolerate fulfilment time delays, the company imposed a back ordering policy with the addition of ordering costs borne by the company. PT XYZ referred to it as an emergency order. Emergency orders reduce the company's margin compared to regular spare parts orders.

1.3 Research Objectives

Based on the formulation of the problem, the objective is to evaluate a spare part inventory control for PT XYZ to minimize the number of spare parts that are stocked out and potential overstock and proposed parameter of inventory control.

1.4 Research Scopes

The scope of this research is that the spare parts that will be conducted in this study are spare parts with a fast-moving classification in 2021 and do not consider adding new spare parts and discount prices.

1.5 Outline of Report

Systematically, the writing of this research report is described with the systematics of writing as follows.

CHAPTER I INTRODUCTION

This chapter contains the background of the problem, the formulation of the problem, the purpose of the study, the research scope, and the systematics of writing the report.

CHAPTER II LITERATURE REVIEW

This chapter contains relevant theories and supports problem-solving in the research and writing of this final report. The theories used in this study are inventory, form, type of inventory, inventory function, inventory cost, spare parts, FNS classification, inventory control model, and previous research.

CHAPTER III RESEARCH METHODOLOGY

This chapter contains an explanation of the stages carried out in the study. These stages include field studies, literature studies, method selection, data collecting & calculating, result & discussion, and conclusion.

CHAPTER IV DATA & CALCULATION OF INVENTORY CONTROL PARAMETER

This chapter contains data collecting and the stages carried out in data calculating to control spare parts inventory at PT XYZ.

CHAPTER V RESULTS AND DISCUSSION

This chapter describes the analysis of the data processing that has been carried out. The analysis included an analysis of the FNS classification, an analysis of the probabilistic Q model inventory system, and a comparative analysis of actual and proposed inventory policies.

CHAPTER VI CONCLUSION AND SUGGESTION

This chapter contains the conclusions from the study's results and suggestions for further research.