

CHAPTER I

INTRODUCTION

This chapter contains the background, problem formulation, research objectives, research scopes and assumptions, and outline of report.

1.1 Background

Nowadays, Indonesia is facing the era of the industrial revolution 4.0. This era is marked by the development of science by paying attention to the needs of the community which triggers increased competition in various sectors (Hairuni, 2022). One way to overcome the challenges of intense competition is to improve and maintain customer satisfaction. According to Tjiptono (2015) in Bangun (2020), customer satisfaction is the main element that becomes the thinking and practice of modern markets in winning competition and responding to the extent to which products and services are produced according to customer needs. Several main factors can affect customer satisfaction, one of which is service quality (Tjiptono and Candra, 2012 in Arianty, 2015). Service quality is a factor that needs to be considered by the community service industry, one of which is hospitals (Supartiningsih, 2017).

The hospital is a community health service center. According to the World Health Organization (1957), hospitals are an integral part of social and health organizations that aim to prevent disease, cure disease, and provide comprehensive services to the community. One of the requirements for health services is the availability of medicines (Timpua et al., 2021).

The availability of medicines is important in achieving optimal health services in a hospital. Medicine availability means the number of medicines available according to patient needs. Efforts that can be made to maintain the availability of medicines are to hold a medicine inventory. Inventory is

collection of goods (assets) that will be sold during a certain period or raw material inventories waiting to be used in the production process or semi-finished goods inventories that are still in the production process (Alexandri, 2009 in Ternando et al., 2018)

Organizations usually want to always meet customer demand as quickly as possible by maintaining sufficient inventory. This is not effective and efficient because the goods stored have a holding cost and the prices can decrease over time. In many developing countries, medicine purchases in hospitals can absorb around 40-50% of overall hospital investment costs (Indarti et al., 2019). Such large medicine expenditures must be managed effectively and efficiently, because if not, it can be the main cause of inefficiency in hospitals. Appropriate procedures for determining the inventory are necessary to be carried out to be able to meet customer demand with the lowest possible inventory cost (Wijayanti and Sunrowiyati, 2019).

Inventory control is a series of procedures to maintain inventory at an optimal level, namely to fulfill customer demands with the lowest possible inventory costs. The procedure consists of determining the time to place an order, the number of orders, and the level of inventory that must be maintained. Inventory control can ensure the availability of inventory in the right amount. Inventory control is not an easy thing to do. This is because there is an element of uncertainty that is sometimes involved in inventory control procedures. If inventory control is not carried out properly, it will cause stockouts and overstocks (Vikaliana et al., 2020).

According to Syamil et al. (2018), overstock is a condition where the number of demands is lower than the amount of inventory, while stockout is a condition where the number of demands is higher than the amount of inventory. Excess inventory will lead to the retention of a lot of capital and increase holding costs. The retained capital should be used for other sectors that can provide other benefits. Conversely, a shortage of inventory will result in more expensive

emergency procurement costs and empty items will displease customers and switch to other sellers (Vikaliana et al., 2020).

Universitas Andalas Hospital is a university hospital managed by Universitas Andalas. Universitas Andalas Hospital is located in the Universitas Andalas campus area, Limau Manis Street, Pauh District, Padang City. Universitas Andalas Hospital was built because of the Medical Education Law No. 20 of 2013 which states that higher education is mandated to have an education hospitals. According to Government Regulation No. 93 of 2015, an education hospital is a hospital in which research, education, and health services are organized in an integrated manner that can improve capabilities according to their respective fields. Universitas Andalas Hospital was built in 2014. This hospital is equipped with quite complete facilities and infrastructure. Various service facilities available at this hospital are inpatient services, outpatient services, surgery services, referral patient services, supporting services, emergency room services, radiotherapy, ambulances, ICU services, and pharmaceutical installation.

A pharmaceutical installation is a unit in a hospital that is tasked with providing comprehensive pharmaceutical services to patients (Setiani et al., 2021). The pharmaceutical installation of Universitas Andalas Hospital is a source of medicine supplies in the Universitas Andalas Hospital. Universitas Andalas Hospital consists of four pharmacies, namely outpatient pharmaceutical, inpatient pharmaceutical, surgery pharmaceutical, and emergency room pharmaceutical. An outpatient pharmaceutical is a pharmaceutical that has the highest medicines requirements. **Figure 1.1** shows the number of patients at Universitas Andalas Hospital from January – March 2022 and **Table 1.1** shows the amount of demand of several medicines in each pharmaceutical from October 2021 – September 2022.

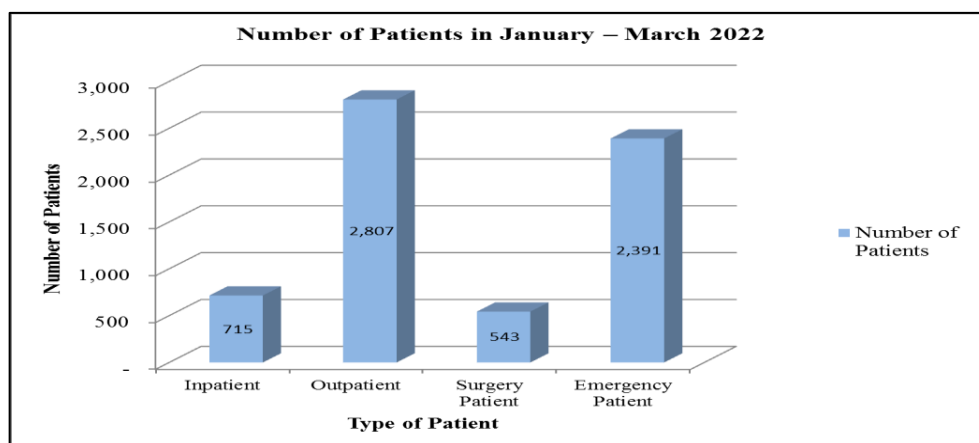


Figure 1.1 Number of Patients in January – March 2022 at Universitas Andalas Hospital

(Source: Universitas Andalas Hospital, 2022)

Table 1.1 Total Medicine Demand in Each Pharmaceutical in October 2021 – September 2022

Medicine Name	Unit	Total Medicine Demand in Each Pharmaceutical			
		Inpatient	Outpatient	Surgery	Emergency
Lansoprazol 30 mg	Tablet	3,438	149,758	105	7,158
Paracetamol 500 mg	Tablet	21,074	76,510	6	33,379
Metformin 500 mg	Tablet	1,167	128,311	-	477
Aptor 100 mg	Tablet	930	79,199	60	387
Amlodipin 10 mg	Tablet	1,326	75,451	60	855
Candesartan 16 mg	Tablet	898	72,427	120	225
Bisoprolol 5 mg	Tablet	241	69,956	97	135
Nitrocaf Retard	Tablet	1,302	60,143	-	182
Candesartan 8 mg	Tablet	821	58,400	30	791
Amlodipine 5 mg	Tablet	956	46,966	60	1,176
Vitamin B COMP	Tablet	1,608	41,611	-	5,507
Bisoprolol 2.5 mg	Tablet	997	46,431	-	316
Natrium Bicarbonat	Tablet	3,273	40,805	3	231
Atorvastatin 20 mg	Tablet	1,438	41,412	44	223
Asam Folat 1 mg	Tablet	3,586	39,164	2	327
Calcium Lactate	Tablet	622	41,951	1	392
Natrium Diklofenak 50 mg	Tablet	995	36,218	15	1,766
Glimepiride 2 mg	Tablet	538	37,760	30	156
Carvedilol 6.25 mg Tablet	Tablet	533	36,888	-	58
Acetylcystein 200 mg KAP	Tablet	7,160	17,538	2	11,504

(Source: Universitas Andalas Hospital, 2021 and 2022)

Based on the results of interviews with the head of the pharmaceutical installation warehouse, there are inventory problems in the form of excess and shortage of medicine inventory. This happens because there is a difference between the amount of inventory and demand. The medicines that most often experience inventory problems are medicines in the outpatient pharmaceutical. **Figure 1.1** shows that at Universitas Andalas Hospital the largest number of patients are outpatients. The greater number of outpatients affects the greater requirement for outpatient pharmaceutical compared to other pharmacies which can be seen in **Table 1.1**. Large outpatient medicine requirements must be managed properly so that inventory problems that often occur can be minimized.

The head of the warehouse stated that the time to place an order was only based on estimates without specific calculations. The number of medicines orders is generally only based on the number of medicine used in the previous three months with an additional safety stock of 30% of the amount used. Determination of the number of orders and safety stock has not used a specific calculation that considers the number of future requirements and the lead time for ordering medicines properly. The amount of safety stock for each medicine is made the same even though there are medicines with different requirement rates. This situation causes some inventory problems. **Figure 1.2** and **Figure 1.3** show the examples of overstock problem of outpatient medicine, namely blood supplement tablet and prednison tablet.

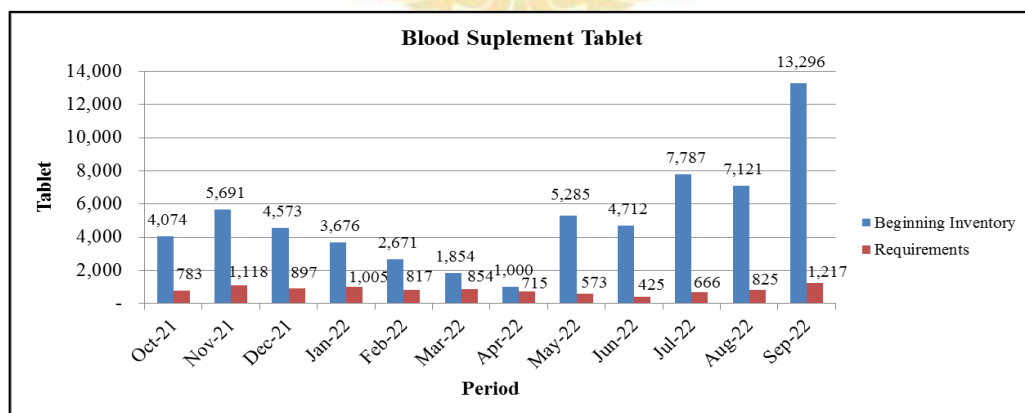


Figure 1.2 Overstock Conditions of Blood Supplement Tablet
(Source: Universitas Andalas Hospital, 2021 and 2022)

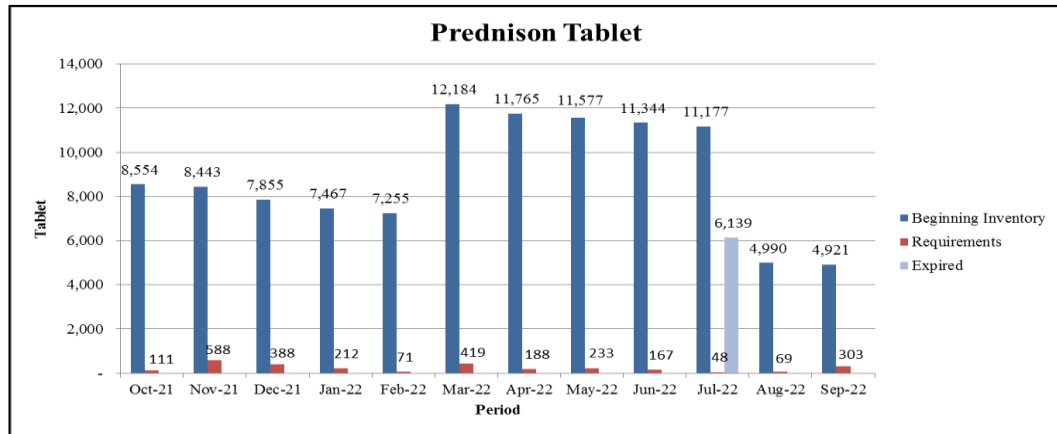


Figure 1.3 Overstock Conditions of Prednison Tablet
(Source: Universitas Andalas Hospital, 2021 and 2022)

Based on **Figure 1.2** and **Figure 1.3**, it can be seen that blood supplement tablet and prednison tablet are overstocked. It is said to be overstocked if the inventory value at the end of the period (every 3 months) exceeds the safety stock value set by Universitas Andalas Hospital. In November 2021, 2,400 tablets of blood supplement were received, bringing the total inventory to 5,071 tablets, and if according to the hospital's plan, in February 2022 there will be 1,170 tablets left. However, in reality, the remaining blood supplement tablet in February 2022 amounted to 1,854 tablets, which far greater than the safety stock value of the medicine. Then, **Figure 1.3** shows that a total of 6,139 prednison tablet that expired in July 2022. This is because the inventory of these medicines is very large and does not match the usage rate. The expired medicines are the remaining inventory of the previous period. The main factor causing expired medicines is not due to the short shelf life of the medicine, but due to the storage period that is too long. The smallest medicine shelf life at Universitas Andalas Hospital is 2 years. Excess stock can increase the risk of expired goods and accumulation of goods in warehouses which makes embedded capital unproductive and should be used for other things that can provide benefits (Bahagia, 2006). In addition to the overstock problems, there are examples of stockout problems of outpatient medicines experienced by bisoprolol 5 mg which can be seen in **Table 1.2** to **Table 1.3**.

Table 1.2 Stockout Conditions in November 2021 of Bisoprolol 5 mg in Tablet

Date	Nov-21												
	4	5	6	7	8	9	10	11	12	13	14	15	16
Beginning of Original Inventory	684	324	-36	-36	-36	-36	-366	-793	-1,183	-1,423	-1,423	-1,423	16,577
Incoming Items	0	0	0	0	0	0	0	0	0	0	0	18,000	0
Requirements	360	360	0	0	0	330	427	390	240	0	0	0	300
Expired													
Ending of Original Inventory	324	-36	-36	-36	-36	-366	-793	-1,183	-1,423	-1,423	-1,423	16,577	16,277

(Source: Universitas Andalas Hospital, 2021 and 2022)

Table 1.3 Stockout Conditions in January 2022 of Bisoprolol 5 mg in Tablet

Date	January-22								
	24	25	26	27	28	29	30	31	
Beginning of Original Inventory	672	574	-373	-890	4,487	4,317	4,317	4,317	
Incoming Items	0	0	0	6,000	0	0	0	0	
Requirements	98	947	517	623	170	0	0	76	
Expired									
Ending of Original Inventory	574	-373	-890	4,487	4,317	4,317	4,317	4,241	

(Source: Universitas Andalas Hospital, 2021 and 2022)

Table 1.4 Stockout Conditions in February 2022 of Bisoprolol 5 mg in Tablet

Date	February-22										
	16	17	18	19	20	21	22	23	24	25	
Beginning of Original Inventory	595	385	-80	-440	-440	-440	-470	-1,130	-1,430	24,100	
Incoming Items	0	0	0	0	0	0	0	0	26,010	0	
Requirements	210	465	360	0	0	30	660	300	480	360	
Expired											
Ending of Original Inventory	385	-80	-440	-440	-440	-470	-1,130	-1,430	24,100	23,740	

(Source: Universitas Andalas Hospital, 2021 and 2022)

Tables 1.2 to Table 1.4 show that bisoprolol 5 mg experienced a stockout. The number of stockouts is indicated by the negative inventory value. When a medicine experiences a stockout, the warehouse staff will place an order back to the supplier. In addition, the warehouse will also borrow medicines to several

hospitals in Padang to meet patient needs. Medicines borrowed from other hospitals will be returned when the medicine order has arrived. The effect of a stockout causes additional costs such as document costs, telephone costs, and costs from other activities involved to meet patient needs as soon as possible with a total emergency procurement cost of Rp55,490.84 per outage which is an additional cost for procurement if it occurs stock out. Another effect of a stockout is the existence of delayed receipts which can reduce the level of customer satisfaction, thus giving rise to the possibility that customers will switch (Bahagia, 2006).

Based on the description of the problems above, the medicine inventory control policy at the Universitas Andalas Hospital Pharmaceutical Installation is not appropriate. The problems experienced must be resolved immediately because if not, the profit and service level of Universitas Andalas Hospital will decrease (Bahagia, 2006). In this study, inventory control was carried out using continuous review method which can minimize inventory costs, increase service levels, and reduce risks due to shortages and excess medicine inventories (Bahagia, 2006).

1.2 Problem Formulation

Based on the background, the problems faced by Universitas Andalas Hospital are the excess and shortage of medicine inventory. This happens because there is a difference between the number of medicine inventories available and the number of patient demands. The problem formulation in this study is how the policy in controlling medicine inventories at the Universitas Andalas Hospital Pharmaceutical Installation can minimize inventory costs, increase service levels, and reduce risks due to shortages and excess medicine inventories.

1.3 Research Objective

The objective of this study is to determine policy for controlling medicine inventories at the Universitas Andalas Hospital Pharmaceutical Installation.

1.4 Research Scopes and Assumptions

The scopes and assumptions of this research are as follows as:

1. The price of the medicines does not change where the price of medicines used is the price that apply during the data collecting period.
2. Medicine orders come all at once.
3. The data used is only outpatient medicine data.
4. Does not consider the shelf life of the medicines, because the medicines at Universitas Andalas Hospital has a minimum shelf life of 2 years which exceeds the planning period.
5. Do not consider discount prices.

1.5 Outline of Report

The outline of the final project are as follows:

CHAPTER I INTRODUCTION

This chapter contains the background, problem formulation, research objectives, research scopes and assumptions, and outline of report.

CHAPTER II LITERATURE REVIEW

This chapter contains several literature studies that are used as research guidelines consisting of inventory, factors affecting the existence of inventory, types of inventories, inventory problems

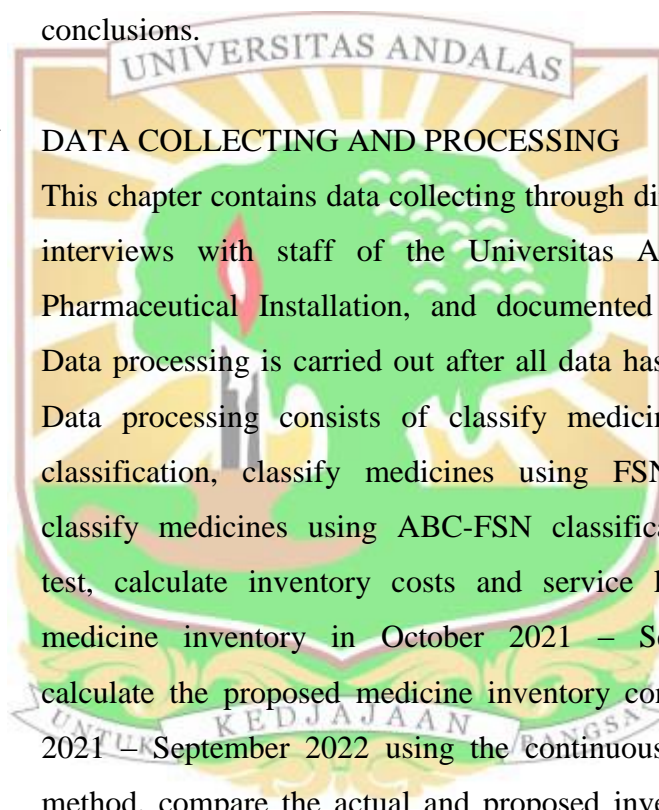
classification, inventory cost, inventory control, normality test, material classification, forecasting, forecasting accuracy, forecasting verification, inventory control model, continuous review method, sensitivity analysis, and previous research.

CHAPTER III RESEARCH METHODOLOGY

This chapter contains the stages of the research consisting of preliminary study, literature study, problem formulation, data collecting, method selection, data processing, discussions, and conclusions.

CHAPTER IV DATA COLLECTING AND PROCESSING

This chapter contains data collecting through direct observation, interviews with staff of the Universitas Andalas Hospital Pharmaceutical Installation, and documented historical data. Data processing is carried out after all data has been collected. Data processing consists of classify medicines using ABC classification, classify medicines using FSN classification, classify medicines using ABC-FSN classification, normality test, calculate inventory costs and service levels of actual medicine inventory in October 2021 – September 2022, calculate the proposed medicine inventory control in October 2021 – September 2022 using the continuous review system method, compare the actual and proposed inventory costs and service level in October 2021 – September 2022, forecasting medicines demand for the period October 2022 – September 2023, calculate the medicine inventory control planning for October 2022 – September 2023, sensitivity analysis, and evaluation of storage space limitations.



CHAPTER V RESULTS AND DISCUSSIONS

This chapter contains of an analysis of the ABC classification of medicine, analysis of the FSN classification of medicine, analysis of the ABC-FSN classification of medicine, analysis of actual and proposed inventory costs and service level in October 2021 – September 2022, analysis of medicine inventory control planning in October 2022 – September 2023, and sensitivity analysis of holding costs, ordering costs, and purchasing costs.

CHAPTER VI CONCLUSIONS

This chapter contains several conclusions and suggestions obtained based on the results of the research conducted.

