CONTROL OF DRUG INVENTORY USING THE ECONOMIC ORDER QUANTITY METHOD AT DIFTA FARMA PHARMACY

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Abstract

The essential component of pharmaceutical operations is inventory. Patients and consumers will not receive adequate service if the inventory is insufficient. Therefore, inventory control is necessary. The aim of this study is to determine the ideal order quantity and reorder time at Difta Farma Pharmacy using Economic Order Quantity (EOQ) and Reorder Point (ROP) calculations. This research employs quantitative techniques for descriptive research, collecting data through interviews and documents. EOQ will be used to assess the collected data. The projected outcomes for effective drug ordering in 2024 are as follows: Rhinos Sr, 280 units ordered three times with a reorder point of 280 units, and Cataflam 50 mg, 211 units ordered twice with a reorder point of 211 units.

Keywords: Product Inventory, EOQ, Forecasting,Reorder Point

1. Introduction

Given the ever-increasing human demand, the pharmaceutical industry is rapidly growing. The pharmaceutical industry has witnessed new discoveries and advancements as a result of the development of science and technology, making competition among these businesses fiercer than ever before. Competitors push the business world to develop better products for the market and increase output to ensure the availability of goods. Determining planning and inventory management based on orders is crucial to meeting production according to client demand.

The phenomenon or problem occurring at Difta Farma Pharmacy is that there are sometimes shortages in supply, leading to unsatisfactory results from their current strategy. Stock shortages can cause the company's operations to become less efficient.

The purpose of this research is to understand the control of drug inventory at Difta Farma. A more suitable approach is needed to offer improvements to the current inventory issues. The EOQ (Economic Order Quantity) approach is an analysis used in product planning and management.

In this study, we use the Economic Order Quantity (EOQ) method to determine the amount of drugs that need to be ordered and the Reorder Point method to determine when the drugs need to be reordered.

It is important to note that the EOQ formula depends on several assumptions, including the assumption that demand remains constant over a certain period, and ordering costs. Therefore, EOQ is often used as a tool for planning and managing inventory, but it may require adjustments according to the unique characteristics of a particular business or industry.

2. Literature Review

Warehousing

A warehouse is a storage facility used to store goods before they are processed. When a company has a warehouse, it means its production output is high enough to require control over the inflow and outflow of goods as well as inventory storage. As a result, warehouses offer an effective and efficient way to manage and schedule the availability of a business's production output.

A warehouse is a place used for storing goods or products, whether they are raw materials, semi-finished goods, or finished goods. Warehousing encompasses all efforts related to warehouse management, including receiving, maintenance, storage, preservation, distribution, control, destruction, and reporting of materials and equipment to ensure quality and quantity are maintained.

Inventory

Inventory consists of goods that are readily accessible for purchase during routine business operations, as well as supplies or equipment necessary for those sales and the services provided. According to Assauri, inventory is defined as a component of an asset, which can include goods owned by a business with the intention of being sold during regular business hours, goods that are still in production, or raw materials waiting to be used for creation. Inventory may include raw materials, semi-finished products, maintenance, repair, and operating (MRO) supplies, and finished goods (Ahmad & Sholeh, 2019).

Inventory is a current asset that includes products or machinery intended to support government operations as well as products intended for sale or distribution in public service. Inventory consists of goods that are easily accessible for purchase during regular business operations, as well as supplies or equipment needed for these sales and the services provided. Inventory is a current asset that includes products intended for sale and commodities or equipment intended to support government operations.

Inventory Control

Inventory control is an approach or system used by companies to manage and monitor their stock of goods or raw materials. The goal is to maintain optimal inventory levels, avoid overstocking or understocking, and optimize inventory costs. In this context, inventory control involves various policies and procedures designed to ensure the smooth operation of the company and minimize inventory costs.

One of the main aspects of inventory control is monitoring inventory quantities, which can be done using various methods, such as Economic Order Quantity (EOQ) or the just-in-time method. This monitoring helps companies identify the right time to place new orders, ensuring that stock is always available when needed without burdening the company with high storage costs.

Additionally, inventory control also involves monitoring factors such as customer demand levels, order lead time, inventory cycles, and stock turnover rates. With a good understanding of these factors, companies can make informed decisions about how much to order, when to order, and how to optimize inventory cycles. Inventory control may also involve the use of technology such as inventory information systems or inventory management software to help monitor and analyze inventory data more efficiently. Overall, inventory control is a holistic approach involving effective planning, monitoring, and management of goods or raw material stock to achieve operational efficiency and customer satisfaction.

According to Amrillah, inventory control involves knowing how much product or raw material is stored so that the business can meet customer demand and make the right purchases at the right time (Sirait, 2019).

Inventory Control System

Before conducting inventory analysis, the inventory quantity must be determined. Inventory quantity can be determined by two commonly recognized systems over time:

1. Periodic System: Physical activities are conducted every fifth period so that the total inventory aging can be accurately determined.

2. Perpetual System: Often known as a book inventory, it refers to the practice of providing administrative support for each transaction.

Several methods can be used in inventory valuation, including:

- First In First Out (FIFO): This method is based on the assumption that the flow of material prices is the

same as the flow of material usage. Once a certain quantity of materials at a certain purchase price has been used up, the price for subsequent material usage is based on the next purchase price. Based on this method, the price or value of the ending inventory is in accordance with the price and quantity of the last purchase unit.

- Last In First Out (LIFO): With this method, the company assumes that the most recent purchase price is used for the first outgoing material, so the remaining stock is valued based on earlier purchase prices.

- Weighted Average Method: This method is based on the average price per unit of material, which is calculated by multiplying the unit price by the respective quantity and then dividing by the total number of units in the company.

- Standard Cost: The value of the ending inventory of a company is equal to the number of units in the ending inventory multiplied by the company's standard cost.

Inventory Functions

Efforts to improve the company's internal and external operations should prioritize the functions of procedures. These roles include:

- Pipeline Function: Also known as transit storage, this function acts as a channel for goods from the manufacturer to geographically separated suppliers or consumers with long delivery times. Demand for goods that cannot be immediately fulfilled due to time and distance constraints will always require additional stock to meet demand.

- Economic Order Quantity (EOQ): Describes the optimal order quantity of products to place with each order**.**

Reorder Point (ROP)

According to Riyanto, the reorder point is the point at which a new order must be placed so that the requested product arrives or is received as scheduled. The company must implement a reorder point, meaning that when the order arrives, the product inventory is still at or slightly above the safety stock level. This must be done before the stock of goods in the factory runs out (Sirait, 2019).

The reorder point is the moment when a company or organization needs to place an order for inventory or products to maintain a continuously regulated inventory level. The reorder point is the inventory level at which an order must be placed to ensure the product arrives on time. The following formula can be used to calculate the reorder point:

ROP = Q x L

Where:

ROP = Reorder point

Q = Quantity

Lt = Lead Time (days, weeks, months)

Forecasting

For data that has a trend pattern, the forecasting method used is exponential smoothing with a trend. The forecasting method known as Exponential Smoothing with Trend (ETS) is used to examine time series data, especially when there is seasonality and trend. It is an evolution of simple exponential smoothing, which is based on the idea of prioritizing newer data over older data. Along with the seasonal and level components, ETS now offers the ability to track trend behavior.

3. Research Methods

The time and place of the research were from August 2023 to March 2024 at Difta Farma Pharmacy. This research is a descriptive quantitative study, and the data collection is done retrospectively. The tools used in this research include writing instruments and a mobile phone for documentation. The materials used in this research are the drug data available at Difta Farma Pharmacy. The population and sample in this study consist of drug data from Difta Farma Pharmacy from January to December 2023. The sample for this research includes fast-moving items used to calculate EOQ. Data collection for this study was obtained from:

1. The drug documents at Difta Farma Pharmacy are used to record the list of drug names, the quantity of drug sales, and the drug prices. An interview was conducted with the pharmacy owner regarding inventory control at the pharmacy.
2. For data analysis, the data was calculated and forecasted using the exponential smoothing method, followed by the calculation of the EOQ.

The EOQ formula:

$$EOQ = \sqrt{\frac{2DS}{H}}$$

Where:

- (D) is the annual demand in units

- (S) is the cost per order (ordering cost)

- (H) is the holding cost per unit per year

4. Discussion and Results

In an effort to improve inventory management at Difta Farma Pharmacy, this analysis includes the calculation of Economic Order Quantity (EOQ) and demand forecasting for the year 2024. The data used is derived from the drug demand records throughout 2023, focusing on two main types of drugs: RHINOS and CATAFLAM. The primary goal of this analysis is to determine the optimal inventory levels and reduce costs associated with storage and ordering.

The data required to calculate EOQ includes the annual demand, ordering costs, and holding costs. Difta Farma Pharmacy needs order forms, writing instruments, and a phone to place drug orders. The data collected from the company regarding drug needs from January to December 2023 is presented in the following table. Historical data on drug supply for the year 2023 is also included.

BULAN	RHINOS Rp. 9.900/kapsul	CATAFLAM Rp. 9.500/kapsul
Januari	107	39
Februari	16	32
Maret	25	33
April	48	45
Mei	31	53
Juni	11	35
Juli	30	30
Agustus	39	26
September	95	27
Oktober	23	24
November	38	29
Desember	52	87
Total	515	460

Table 1 Drug demand data for Rhinos SR and Cataflam 2023

Based on the drug demand data for 2023 presented in Table 1, the monthly demand patterns for two types of drugs, RHINOS and CATAFLAM, can be observed:

- RHINOS: The total demand for the year 2023 is 515 capsules, with a price of Rp. 9,900 per capsule. The highest demand occurred in January (107 capsules) and the lowest in June (11 capsules).

- CATAFLAM: The total demand for the year 2023 is 460 capsules, with a price of Rp. 9,500 per capsule. The highest demand occurred in December (87 capsules) and the lowest in October (24 capsules).

Forecasting and error analysis

Next, based on the actual drug demand data for 2023, forecasting for the following year was performed using the exponential smoothing method. This method is important to assess the accuracy of the forecast.

The forecasting was conducted with consideration of errors measured by MAD, MAPE, and MSE. The data shows a trend pattern, and the forecasting method used is exponential smoothing with a trend. Forecast calculations were performed by adjusting the alpha value to minimize the error.

The results of the MAD, MSE, and MAPE analyses will influence the choice of forecasting method for the following year. The method with lower forecasting errors will be selected to improve the accuracy of inventory demand predictions. With more accurate forecasting, the calculation of Economic Order Quantity (EOQ) will also be more precise, helping to optimize order quantities and reduce costs.

Forecasting results and error analysis

no	BULAN	RHINOS y1	y' 1	MAD	MSE	MAPE	CATAFLAM y2	y' 1	MAD	MSE	MAPE
1	Januari	107	#N/A	*#N/A*	#N/A	#N/A	39	#N/A	#N/A	#N/A	#N/A
2	Februari	16	107	*91*	8281	5.6875	32	39	7	49	0.21875
3	Maret	25	89	*63.8*	4070.4	2.552	33	38	4.6	21.16	0.1393939
4	April	48	76	*28.04*	786.24	0.5842	45	37	8.32	69.2224	0.1848889
5	May	31	70	*39.432*	1554.9	1.272	53	38	14.656	214.79834	0.2765283
6	Juni	11	63	*51.5456*	2656.9	4.686	35	41	6.2752	39.378135	0.1792914
7	Juli	30	52	*22.23648*	494.46	0.7412	30	40	10.02016	100.40361	0.3340053
8	Agustus	39	48	*8.789184*	77.25	0.2254	26	38	12.016128	144.38733	0.4621588
9	September	95	46	*48.9686528*	2397.9	0.5155	27	36	8.6129024	74.182088	0.3189964
10	Oktober	23	56	*32.82507776*	1077.5	1.4272	24	34	9.89032192	97.818468	0.4120967
11	November	38	49	*11.26006221*	126.79	0.2963	29	32	2.91225754	8.481244	0.1004227
12	Desember	52	47	*4.991950234*	24.92	0.096	87	31	55.670194	3099.1705	0.6398873
total	**tahun 2024**	**515**	**703**				**460**	**404**			
				37	1959	1.64			12.7248331	356.1820096	0.29694725
						164.392					29.694725

Table 2 Forecasting results and drug errors for 2024

The forecasted demand for Rhinos in 2024 is 703 units. The MAD value of 37 indicates that the average absolute forecasting error is 37 units. The MSE value of 1959 shows that the mean squared error of the forecast is 1959 units. The MAPE value of 164.4% indicates that the average absolute percentage error of the forecast is 164.4%.

The forecasted demand for Cataflam in 2024 is 404 units. The MAD value of 12.7 indicates that the average absolute forecasting error is 12.7 units.

The average absolute forecasting error is 12.7 units. The MSE value of 356.2 indicates that the mean squared error of the forecast is 356.2 units. The MAPE value of 29.6% indicates that the average absolute percentage error of the forecast is 29.6%.

Using actual sales data from January to December 2023, the forecast for 2024 was calculated with an alpha value of 0.2 and 1-alpha of 0.8 using Excel. The calculations show that the forecast for Rhinos is 703 units with a MAD of 37, MSE of 1959, and MAPE of 164.4%. For the forecasting with the exponential smoothing with trend method, with alpha = 0.08 and 1-alpha = 0.8, the results are as follows:

1. Model Performance:

- The model has a MAD of 37, MSE of 1959, and MAPE of 164.4%. The low MAD indicates that the average error in the forecast is relatively small.

2. Forecast Accuracy:

- The forecasted value is 703. This indicates that with this model, the predicted value for the next period is 703.

For Cataflam, the forecast is 404 units with a MAD of 12.7, MSE of 356.2, and MAPE of 29.6.

Overall, with relatively low MAD and MSE values, this model demonstrates good forecasting capability. The forecasting results using the exponential smoothing with trend method, with alpha = 0.08 and 1-alpha = 0.8, show varying performance for the two types of drugs. For Rhinos, the forecasted demand is 703 units with errors including a MAD of 37, MSE of 1959, and MAPE of 164.4%.

164.4%. Although the low MAD indicates relatively small average errors, the high MAPE suggests that the percentage error of the predictions relative to the actual values is quite large. In contrast, for Cataflam, the forecast of 404 units is accompanied by a MAD of 12.7, MSE of 356.2, and MAPE of 29.6%. With relatively low MAD and MSE values, this model demonstrates good forecasting capability for Cataflam. Overall, while the model provides adequate results for both drugs, improvements may be needed to reduce percentage errors in the Rhinos forecast.

Analyzing MAD (Mean Absolute Deviation), MSE (Mean Squared Error), and MAPE (Mean Absolute Percentage Error) is important in the context of evaluation or prediction for the following reasons:

1. Measuring Error Levels: These metrics provide a way to measure how accurate our model or predictions are compared to actual data. Each metric shows different aspects of prediction errors.

2. Identifying Error Patterns: MAD and MSE provide information about the overall distribution of prediction errors. MAD offers an average of absolute errors between predictions and actual values, while MSE gives an average of squared errors between predictions and actual values. Through this analysis, we can identify potential error patterns in our model.

3. Model Adjustment and Improvement: By evaluating MAD and MSE, we can assess how well or poorly our model performs. This information is crucial for making adjustments or improvements to the prediction model, such as changing predictor variables, altering algorithms, or adjusting parameters.

4. Evaluating Relative Errors: MAPE provides a way to evaluate prediction errors relative to the actual values. This is important in assessing the performance of the model in a context where the size of errors relative to the scale of the actual values is a key concern.

In contexts such as forecasting or market prediction, where percentage errors can be more informative than absolute error magnitudes.

5. Model Performance Comparison: These three metrics also allow us to compare the performance of different prediction models. Models with lower MAD, MSE, and MAPE values are generally considered better in terms of prediction accuracy.

Calculation of economic order quantity

Jenis Produk	Satuan	*Rhinos*	*Cataflam*
Total Kebutuhan	kapsul	703	404
Biaya Order	Rp	99,000	95,000
Biaya Simpan	Rp	1,782	1,710

Table 3 EOQ formula data for 2024

The interview results provide a clear picture of the stock management and ordering practices at Apotek Difta Farma. The pharmacy does not use a specific method for stock management due to limited storage

space. They rely on fast lead times from local suppliers to ensure drug availability. Although they have experienced stockouts in the past, the quick ordering process helps address these issues. The absence of additional costs for ordering also assists the pharmacy in managing operational expenses more efficiently.

By implementing accurate EOQ calculations and forecasting, Apotek Difta Farma can enhance stock management efficiency and reduce the risk of stockouts in the future. The interview results indicate that there is room for improvement in management practices.

Stock through a more systematic and data-driven approach.

The economically optimal order quantity for medications, based on the data in Table 3 above using the EOQ method, is as follows:

Rhinos Sr

$$EOQ = \sqrt{\frac{2DS}{H}}$$

$$= \frac{\sqrt{(2\times703\times5000)}}{1782}$$

$$= 280 \text{ (unit)}$$

$$F = \frac{D}{Q} = \frac{703}{280} = 2{,}5 \text{ (3 kali)}$$

$$TIC = \left(\frac{D}{Q} \times S\right) + \left(\frac{Q}{2} \times H\right)$$

$$= \left(\frac{703}{280} \times 99.000\right) + \left(\frac{280}{2} \times 1782\right)$$

$$= \text{Rp.498,040}$$

Cataflam

$$EOQ = \frac{\sqrt{(2\times404\times95.000.}}{1710}$$

$$= 211 \text{ (unit)}$$

$$F = \frac{D}{Q} = \frac{404}{211} = 2{,}3 \text{ (2 kali)}$$

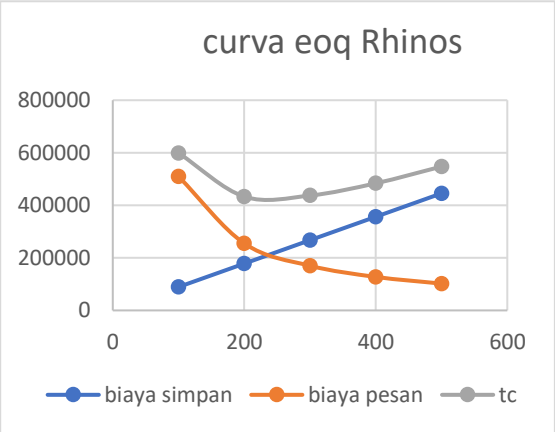
$$TIC = \left(\frac{D}{Q} \times S\right) + \left(\frac{Q}{2} \times H\right)$$

$$= \left(\frac{460}{211} \times 95.000\right) + \left(\frac{211}{2} \times 1710\right)$$

$$= \text{Rp.362,300.}$$

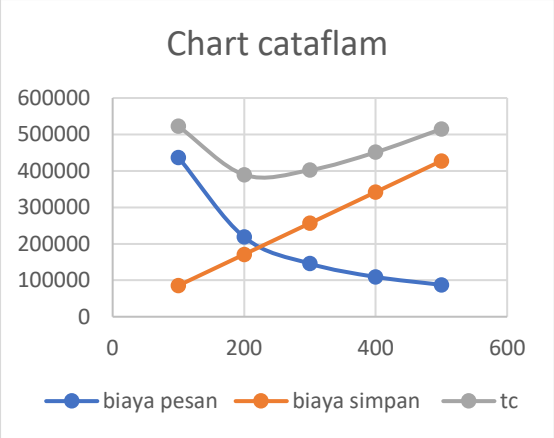
Based on the journal by Sirait G., (2019) titled "Inventory Control of Medicines Using the Economic Order Quantity Approach," the results indicate that the efficient order quantities for 2019 were as follows: for the medication Amlodipine 5 mg, the quantity was 10,153 units with a total inventory cost of Rp12,843,264, and for the medication Simvastatin 20 mg, the quantity was for the medication Simvastatin 20 mg, the quantity was 25,288 boxes with a total inventory cost of Rp30,447,245. This is in line with the research conducted, which indicates that the efficient order quantities for 2024 are as follows: for Rhinos Sr per capsule, the recommended inventory quantity is 280 units per capsule. For Cataflam 50 mg, the recommended inventory quantity is 211 units per capsule. The required inventory cost for Rhinos Sr per capsule is Rp498,040, while for Cataflam 50 mg, it is Rp362,300.

Curva EOQ



The Economic Order Quantity (EOQ) curve illustrates the relationship between order size and total inventory costs, which include ordering and holding costs. In the EOQ curve, the X-axis represents the order size (Q) in units, while the Y-axis represents the total inventory cost (TIC) in Rupiah. This curve generally takes a U-shape, reflecting that there is a specific order size that minimizes the total cost.

In the diagram above for Rhinos Sr, the optimal order size is 280 units, where the minimum total inventory cost is Rp498,040. At this order size, ordering and holding costs are balanced, resulting in the most efficient total cost. Smaller order sizes increase ordering costs due to more frequent orders, while larger order sizes increase holding costs due to storing more items.



Conversely, for Cataflam, the optimal order size is 211 units, with a minimum total inventory cost of Rp362,300. Like Rhinos Sr, the curve for Cataflam also forms a U-shape, indicating a point where ordering and holding costs are balanced in the most efficient way. Smaller order sizes for Cataflam result in higher ordering costs but lower holding costs, while larger order sizes lead to higher holding costs.

Overall, the EOQ curve helps in determining the ideal order size to minimize total costs, ensuring that inventory levels remain optimal without excess or shortage. By using the appropriate order size, companies can manage inventory more efficiently and reduce overall costs.

Safety Stock And Reoder Point

So far, the Safety Stock at Difta Farma Pharmacy has been based solely on estimates, without specific calculations to determine Safety Stock. The pharmacy owner stated that the lead time from ordering the medication until it arrives is 1 day. To establish Safety Stock, a service level target needs to be set. According to Assauri (2008), if Safety Stock with a service level of 95% (Z=1.65) and a constant standard lead time is known, the calculation is as follows:

SS = Z x d x L

Where:

SS = Safety Stock

Z = Service Level

d = Average Usage

L = Lead Time

Based on the available table, the amount of Safety Stock and Reorder Point (ROP) will be calculated for each type of medication.

no	nama obat	jumlah pemakaian	jumlah pemakaian per hari	lead time	service level	savety stock	ROP
1	rhinos sr	703	3	1	1,65	4 capsul	6 Capsul
2	cataflam	404	1	1	1,65	2 capsul	4 capsul

After determining the quantity of goods, here is the calculation for Safety Stock and Reorder Point (ROP) for the medication Rhinos Sr:

For Rhinos Sr:

- **Annual Usage (D):** 703 tablets

- **Lead Time:** 1 day

- **Service Level:** 95%

- **Z (95%):** 1.65

- **Number of days in a year:** 365 days

- **Average daily usage (d):** 703 tablets / 365 = 2 tablets

Safety Stock (SS):

\[SS = Z \times d \times L \]

\[SS = 1.65 \times 2 \times 1 = 3.3 \approx 4 \text{ tablets} \]

ROP Calculation:

- **d:** 2 tablets

- **L:** 1 day

- **SS:** 4 tablets

\[ROP = (d \times L) + SS \]

\[ROP = (2 \times 1) + 4 = 6 \text{ tablets} \]

Based on this calculation, an order for Rhinos Sr should be placed when the stock reaches 6 tablets, considering a lead time of 1 day and an average daily usage of 2 tablets.

For Cataflam:

- Annual Usage (D): 404 tablets

- Lead Time: 1 day

- Service Level: 95%

- Z (95%): 1.65

- Number of days in a year: 365 days

- Average daily usage (d): 404 tablets / 365 = 1.11 ≈

1 tablet

Safety Stock (SS):

d = 404 tablet/365 = 1 tablet Safety Stock (SS) = Z x d x l = 1,65 x 1 x 1 = 2 tablet

ROP Calculation:

d = 1 tablet
L = 1 day
SS = 2 tablets
ROP = (d x l) + SS = (2 x 1) + 2 = 4 tablets

Based on this calculation, an order for Cataflam should be placed when the stock reaches 4 tablets, considering a lead time of 1 day and an average daily usage of 1 tablet.

The results of this research align with the study described in Abbas et al. (2021), which states that the main objective is to determine the optimal order quantity and reorder point using Economic Order Quantity (EOQ) and Reorder Point (ROP) calculations. This study uses medication demand data from 2023 for RHINOS and CATAFLAM, consistent with the historical data mentioned in the abstract. The analytical methods applied, including EOQ and ROP calculations and demand forecasting for 2024, match the approach outlined in the abstract. The expected results, which are to determine the optimal EOQ and reduce storage and ordering costs, are also consistent with the anticipated benefits of the research. Thus, the abstract accurately reflects the focus and outcomes of this study.

Interview Results

The interview provided a clear picture of stock management and ordering practices at Difta Farma Pharmacy. The pharmacy does not use any specific method for stock management due to limited storage space. They rely on fast lead times from local suppliers to ensure medication availability. Although they have experienced stockouts in the past, the quick ordering process helps mitigate these issues. The absence of additional ordering costs also helps the pharmacy manage operational expenses more efficiently.

By applying accurate EOQ calculations and forecasting, Difta Farma Pharmacy can enhance stock management efficiency and reduce the risk of stockouts in the future. The interview results indicate that there is room for improvement in stock management through a more systematic and data-driven approach.

5. Conclusions

Based on the research conducted on inventory control for two types of products at Difta Farma Pharmacy, namely Rhinos Sr per Capsule and Cataflam 50 Mg, the recommended stock quantities are as follows: For Rhinos Sr per Capsule, the recommended stock is 280 units per capsule. For Cataflam 50 Mg, the recommended stock is 211 units per capsule. The inventory cost required for Rhinos Sr per Capsule is Rp. 498,040, while for Cataflam 50 Mg it is Rp. 362,300.

The reorder points for Rhinos Sr are set at 280 units and for Cataflam at 211 units to prevent future stockouts.

Thus, this research supports using the Economic Order Quantity (EOQ) method for inventory forecasting and exponential smoothing as a data analysis technique to determine order quantities that reduce overall ordering and storage costs. The Economic Order Quantity method aims to minimize costs related to product inventory, helping to estimate appropriate ordering schedules for Difta Farma Pharmacy. It is expected that the EOQ approach will become a key option for optimizing company operations.

Recommendations

Difta Farma Pharmacy is advised to carefully monitor medication records to facilitate easier inventory control, and consider EOQ and ROP methods to prevent stockouts. Future research should include testing or applying the EOQ and ROP methods, with a focus on the data to be analyzed. Researchers interested in studying inventory control using the EOQ method are encouraged to explore alternative analysis methods such as Just In Time or other correlation techniques. It is hoped that future research will provide different results and perspectives compared to previous studies. Additionally, it is recommended to test the EOQ and ROP methods with a more detailed focus on the data to be analyzed.

usage, which can make licensing faster, improve the system response, and allow website usage anywhere, thereby increasing the user's satisfaction.

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