ECONOMIC ORDER QUANTITY (EOQ) METHOD ANALYSIS, ABC CLASSIFICATION AND VITAL, ESSENTIAL AND NON ESSENTIAL (VEN) ANALYSIS OF MEDICINES (Case Study at Pharmacy Clinic Dharma Tangerang)

Inayah; Dr. M. Benny Alexandri, SE. MBA; Dr. Ir. Meita Pragiwani, MM
Magister Manajemen
Sekolah Tinggi Ilmu Ekonomi Indonesia
Jakarta, Indonesia
malikiinayah@gmail.com; bennyalexandri@yahoo.co.id meita_pragiwani@stei.ac.id

Abstract - This study aims to analyze the economic order quantity (EOQ) method, ABC classification as well as vital, essential and non-essential (VEN) analysis of drug supplies, to determine trends in the supply of vital (V), essential (E) and non-essential (N), to determine the frequency of purchasing drug preparations and the optimal amount of drug needs and to determine the total cost of supplies at the Dharma Pharmacy Clinic, Tangerang.

This study used a quantitative descriptive method and interviews were analyzed using QM software for Windows V.

From the research and calculations, the results obtained, in the analysis of vital (V), essential (E) and non-essential (N) classifications of 160 drug units classified as 66 units of vital drug classes, 58 units of essential drugs and 36 units of non-essential groups. In the use of the ABC classification analysis based on the investment value, it can be seen that group A from the vital drug group is 69.83% with a volume of 17 units, the essential drug group is 70.23% with a volume of 13 units and the non-essential group is 70.69% with a volume of 6 units. Group B of the vital drug group was 20.16% by volume 18 units, the essential drug group was 19.24% with a volume of 14 units and the non-essential group was 17.88% with a volume of 7 units. Group C vital group 10.01% volume 31 units, essential 10.53% by volume 31 units and 9.48% non essential group with volume 23 units. With the EOQ method in the procurement of drug preparations, the cost of purchasing a drug unit for a class of vital drugs is Rp. 1,069,223,104 with the lowest EOQ value of 1 and the highest is 105, for the essential drug class of Rp. 280,472,456, the lowest EOQ value is 1 and the highest is 41, and the non-essential drug class is Rp. 148,042,836 with the lowest EOQ value of 1 and the highest of 58.

The results of this study indicate that the Dharma Pharmacy Clinic requires VEN classification analysis methods, ABC classification analysis and EOQ, ROP and SS analysis methods so that drug procurement at the Dharma Pharmacy Clinic is more effective and efficient.

I. INTRODUCTION

Drug supply is a factor that influences every service activity. The increasing number of drug orders will increase the need for an ordering system that is able to overcome difficulties in obtaining drug supply information quickly and accurately (Anief, M. 2014).

One of the pharmacy services in a pharmacy is procurement, which is an activity intended for planning needs. Effective procurement must ensure availability, quantity and time at an affordable price and according to quality standards. Procurement is an ongoing activity starting from selection, determining the amount needed as well as adjusting between needs and funds (Anief, M. 2014).

In general, there are several problems at the Dharma Pharmacy Clinic related to drug supply procurement management. The planning of procurement of pharmaceutical preparations at the Dharma Pharmacy Clinic has not used a detailed and structured analysis. but only based on estimated consumption. The frequency of unplanned orders makes the costs incurred for bookings unpredictable. As a result, there is often a shortage or vacuum of drugs (stock out) or excess stock which causes some drugs to become out of date and damaged.

Therefore we need an inventory control method that aims to achieve a balance between supply and demand needed at the Dharma Pharmacy Clinic. By implementing this drug supply formulation, it is hoped that it will be able to overcome the problems that often arise and can facilitate the procurement of drug supplies in order to be more effective and efficient at the Dharma Pharmacy Clinic.

Research purposes

The purpose of this research is

1. To determine the analysis of vital, essential and non-essential (VEN) of drug supplies at the Clinic of Pharmacy Dharma Tangerang.
2. To find out the ABC classification analysis of drug supplies at the Pharmacy Clinic Dharma Tangerang.
3. To find out the analysis of the economic order quantity (EOQ) method of drug supplies at the Dharma Pharmacy Clinic in Tangerang.
4. To find out the ABC classification analysis of drug supplies at the Pharmacy Clinic Dharma Tangerang.
5. To know the system for determining drug supply at Dharma Clinics in Tangerang.

II. LITERATURE REVIEW

1.1. Operational Management

Operational management is the basic input or input in the decision-making process of operations management because forecasting provides information in future requests. One of the

main objectives of operations management is to balance supply / demand and having an estimate of future demand is very important to determine how much capacity or supply is needed to balance demand (Stevenson, 2011: 72).

1.2. Inventory Management

The definition of inventory has a different meaning for each company. This definition depends on the business and activities of the company. Inventory is one of the most expensive assets of many companies, representing about 50% of the total invested capital. Operations managers around the world have long recognized that good inventory management is essential. On the one hand, a company can reduce costs by reducing inventory. On the other hand, production can stop and customers feel dissatisfied when an item is not available. The objective of inventory management is to determine the balance between inventory investment and customer service. The company will never achieve a low cost strategy without good inventory management (Heizer and Render, 2016: 553).

In analyzing the pattern of consumption of pharmaceutical supplies that is commonly used is the ABC or Pareto Classification Analysis. Meanwhile VEN analysis (Vital, Essential, Non-Essential) is a system for determining the selection, procurement and use of pharmaceutical supplies. To avoid stock out or vacancies and increase the benefits of available funds, it can be controlled by VEN analysis. Thus a combination of ABC and VEN classification analysis can be used to evaluate procurement patterns on the basis of priority (Bachrun, E.2017).

The ABC Critical Index analysis is an analysis used to increase the efficiency of the use of funds by classifying drugs or pharmaceutical supplies, especially drugs used based on their impact on health. ABC Critical Index analysis is a combination of analysis of use value, investment value and critical value of drugs (Febriawati, H. 2013: 92).

III. METHODOLOGY

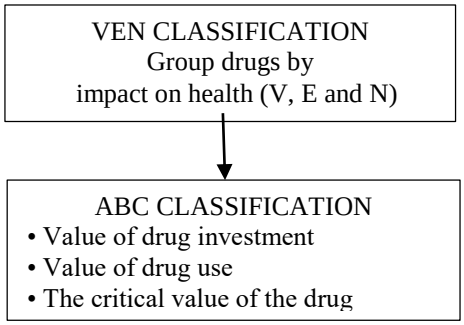
This type of research is quantitative descriptive to determine the existence of either one or more independent variables without making comparisons or looking for the relationship between variables by describing how drug supply control is applied in the Pharmacy Clinic Dharma Tangerang. The data obtained will be analyzed using the economic order quantity (EOQ) method, the ABC classification analysis method and vital, essential and non-essential (VEN) analysis.

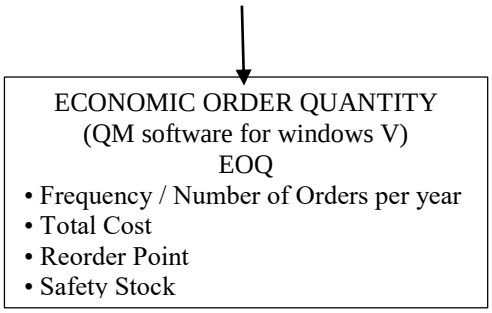
This study uses a unit of analysis. The unit of analysis in this study is in the form of drug supply data and data on the costs of drug supplies, as well as decision making by Pharmacists who manage pharmacies and pharmacy facility owners from January 2019 to December 2019.

Data processing in this study is data related to the procurement of drug preparations, namely quantitative data and processed using Microsoft Excel software, QM For Windows and ABC-VEN Critical Index Analysis table which aims to simplify the calculation of the collected data.

Data Analysis Stages

The stages of data analysis used in this study are as follows:





3.1 Presentation of Data

Presentation of data in this study using QM software. V and excel tables to facilitate understanding

3.2. Data Statistical Analysis Tool

1. VEN analysis

Vital, Essential and Non-essential (VEN) Method Data Analysis. The first step in the analysis of the VEN method is carried out by seeking information and documentation from the Pharmacists who manage the Pharmacy and the Facility Owners who are authorized to issue documents at the Dharma Pharmacy Clinic with the intention of determining which drugs are included in the vital category, essential drugs and non-essential drugs, providing pattern data. disease and standard of treatment during 2019 (Febrawati, 2013: 92).

Vital, essential and non-essential classifications are as follows (Ministry of Health of the Republic of Indonesia, 2019):

Group V (vital) is a group of medicines that are life saving or very important to provide.

Group E (essential) is a group of drugs that are effective and significantly act on disease.

Group N (non-essential) is a group of drugs to treat a small number of diseases or diseases that can be overcome alone.

2. ABC analysis

a. Determine the investment value of drugs.

Calculating the investment value of drugs by multiplying the drug price by the number of uses in the period January - December 2019.

Sort the results from large to smallest investment amounts

Classifying the total drug investment in the ABC group based on the following criteria:

- Group A with a drug investment value of 70% -80% of the total drug investment.
- Group B with a drug investment value of 15% -20% of the total drug investment.
- / Group C with a drug investment value of 5% -10% of the total drug investment.

b. Calculating the value in use

Calculating the amount of drug use during the January - December 2019 period.

Classifying the total drug use in the ABC group based on the following criteria:

- Group A with drug use values of 70% -80% of the total drug use.
- Group B with a drug use value of 15% -20% of the total drug use.
- Group C with drug use values of 5% -10% of the total drug use.

c. Determine the critical value of the drug

• Compile a drug list

Fill in a list of drugs to determine the critical value of a drug with criteria determined by the pharmacist who is influential in providing the drug.

• Classifying total drug users into ABC groups based on criteria

✓ Group A with a critical index value of 9 - 12
✓ Group B with a critical index value of 6 - 8
✓ Group C with a critical index value of 4 – 6

3. Data Analysis with Economic Order Quantity (EOQ) Method

a. Economic Order Quantity (EOQ)

The equation in the EOQ model is as follows (Heizer & Render, 2016)

$$\textbf{EOQ (Q*)} = \sqrt{\frac{2 \times D \times S}{H}}$$

Where :
D = Request
Q * = optimal quantity (optimal quantity)
S = Cost of ordering
H = cost of holding

b. Frequency or number of orders per year (N)

The value of the frequency or number of orders per year can be obtained by the following formula (Heizer & Render, 2016: 564)

$$N = \frac{Demand\ (D)}{Order\ Quantity (Q)}$$

c. Total Cost (TC)

In general, Total Cost is the total amount of costs associated with inventory, but in the context of economic order quantity TC is the total amount between the ordering cost and the total storage cost. The TC value can be obtained by the following equation (Heizer & Render, 2016: 565).

$$TC = \frac{D}{Q}S + \frac{Q}{2}H$$

Where
Q = number of units per order
D = Annual demand in units of supply
S = Order fee for each order
H = Cost of storing or carrying inventory per unit per year
P = price of goods per unit

d. Reorder Point (ROP) and Safety Stock (Safety Stock).
ROP Formulas (Heizer & Render, 2016: 567)
Reorder point (ROP)

$$ROP = d \times L$$

Where :
d: number of requests per day
L: Lead time or waiting time is the time between placing an order and its receipt.

If the company adopts a safety stock policy, the ROP will be:
If the company adopts a safety stock policy, the ROP will be:

$$ROP = d \times L + \textit{safety stock}$$

e.Safety Stock (SS)
Safety stock can be calculated by the formula:

$$\mathbf{SS = \sigma \times z}$$

Information :
SS = safety stock
Σ = Standard deviation
z = The security factor is formed on the basis of the company's capabilities.

III. RESULTS AND DISCUSSION

1. VEN analysis
Of the approximately 160 drugs used in pharmaceutical services at the Dharma Pharmacy Clinic based on a decision between the Pharmacists who manage the Pharmacy
as the person in charge of the Pharmacy and the owner of the Dharma Pharmacy Clinic Facility who is also a doctor who plays a role in the procurement of drug preparations, 66 types of drugs can be classified including in the vital (V) group, namely 41.25%, where these drugs must be available within less than 48 hours, 58 types of drugs are included in the essential group (E), namely 36.25% where those included in this class of drugs work at the source of the disease and the vacuum can be tolerated within up to 48 hours and 36 types of drugs are included in the Non-Essential (N) group, namely 22.5% of which included in this group are supporting drugs whose vacancies can be tolerated for more than 48 hours. Following are the results of the classification analysis of vital (V), essential (E) and non essential (N).

2. ABC analysis
2.1. ABC analysis based on investment value
According to the Ministry of Health of the Republic of Indonesia in 2014, group A supplies were those with a high amount of money value per year (60-90%) but usually in low volume. Group B is a supply with a moderate amount of money value per year (20-30%) and group C is a stock with a low annual money value (10-20%) but usually has a large volume.

In this ABC analysis research, an analysis was carried out of 160 drug units available at the Dharma Pharmacy Clinic where the drug units were classified according to the analysis of vital (V), essential (E) and non-essential (N).
Group A had 57 units (36%) of vital (V) and essential drugs with high critical index values, namely 9-12. The drugs in group A should not be underdeveloped considering the effect of the therapy on the patient. Orders can be made in small amounts but the frequency is more frequent and because the investment value is quite large, it has the potential to provide huge profits for the Dharma Pharmacy Clinic as
well. Therefore group A requires strict supervision and monitoring, accurate and complete recording and regular monitoring by the Pharmacists who manage the Pharmacy and the Facility Owners directly.
Group B there were 79 units (49%) of vital, essential and non-essential drugs with moderate Critical Index Value, namely 6-8. Vacancies of group B drugs can be tolerated no more than 24 hours with a less frequent ordering, for example once every two weeks, but the number of orders may be relatively larger. Supervision and monitoring of this group is less stringent than group A, for example, it is done every three or six weeks.
Group C, there were 24 units (15%) of the drugs for essential (E) and non-essential (N) classes with a low Critical Index Value of 4-6. The vacancies for group C drugs can be longer than 24 hours, with less frequent ordering, adjusted to the needs and available funds, for example once a month. Supervision and monitoring of this group can be more lax, for example, done once a month or more.

Table 1.

Results of ABC Classification Analysis Based on the Investment Value of the Dharma Pharmacy Clinic in 2019

GOLONGAN	ABC	JUMLAH OBAT	% jumlah obat	Nilai investasi	% nilai investasi
VITAL	A	17	25,76%	Rp 746.645.124	69,83%
	B	18	27,27%	Rp 215.520.200	20,16%
	C	31	46,97%	Rp 107.057.780	10,01%
TOTAL		66	100,00%	Rp 1.069.223.104	100,00%
ESENSIAL	A	13	22,42%	Rp 196.987.500	70,23%
	B	14	24,14%	Rp 53.952.676	19,24%
	C	31	53,44%	Rp 29.532.280	10,53%
TOTAL		58	100,00%	Rp 280.472.456	100,00%
NON ESENSIAL	A	6	16,67%	Rp 136.295.616	72,65%
	B	7	19,44%	Rp 33.544.120	17,88%
	C	23	63,89%	Rp 17.777.900	9,48%
TOTAL		36	100,00%	Rp 187.617.636	100,00%

2.2. ABC analysis based on value in use

According to the Director General of Pharmaceuticals and Medical Devices (2010), the need for drugs in hospitals, health centers, clinics and pharmacies refers to the National List of Essential Medicines (DOEN) according to each health service. So far, the procurement of drug preparations

at the Dharma Pharmacy Clinic has only been determined based on a doctor's request because the Dharma Pharmacy Clinic does not have its own formulary as the basis for drug needs.
In its implementation, to determine fast moving, moderate or slow moving drugs, ABC analysis has not been used. So far, only based on doctor's request and experience. Drug classification based on ABC Value of Use at Dharma Pharmacy Clinic

Table 2
ABC Classification Analysis based on the Use Value of the Dharma Pharmacy Clinic 2019 year

GOLONGAN	ABC	JUMLAH OBAT	% JUMLAH OBAT	JUMLAH PEMAKAIAN	% NILAI PAKAI
VITAL	A	17	25,76%	5235	69,79%
	B	19	28,79%	1559	20,78%
	C	30	45,45%	707	9,43%
TOTAL		66	100,00%	7501	100,00%
ESENSIAL	A	15	25,86%	1706	69,12%
	B	18	31,03%	529	21,43%
	C	25	43,10%	233	9,44%
TOTAL		58	100,00%	2468	100,00%
NON ESENSIAL	A	7	19,44%	936	70,86%
	B	10	27,78%	258	19,53%
	C	19	52,78%	127	9,61%
TOTAL		36	100,00%	1321	100,00%

2.3 Critical Index ABC Analysis

The ABC Critical Index analysis is used to increase the efficiency of using funds by classifying drugs or pharmaceutical supplies, especially drugs or pharmaceutical supplies used based on their impact on health (Febriawati, 2013). In the procurement of pharmaceutical preparations, the Dharma Pharmacy Clinic has also not used analysis, but only based on requests from experience or requests from doctors. In determining fast moving, moderate or slow moving, calculations have never been carried out based on real drug data either from the value of use, investment value or based on the impact of each type of drug on health. Researchers tried to apply the combination of these analyzes to pharmaceutical preparations at the Dharma Pharmacy Clinic with the following results:

Table 3
Classification analysis of vital, essential and non-essential drugs based on the ABC Critical Index of the Dharma Pharmacy Clinic in 2019

KLASIFIKASI	GOLONGAN			TOTAL		NILAI INDEKS
	V	E	N			KRITIS
A	42	15	0	57	36%	9-12
B	24	43	12	79	49%	6-8
C	0	0	24	24	15%	4-5
TOTAL	66	58	36	160	100%	

3. Economic Order Quantity (EOQ) Analysis

3.1. Economic Order Quantity

According to Schoreder (2010) the Economiq Order Quantity (EOQ) method can help companies to keep the production process running smoothly so that the company can maintain its business continuity. If the company is sustainable, of course, production effectiveness can be achieved, considering that one of the production objectives is to maintain the continuity of the company's business. For product quality, companies must choose suppliers who provide good raw materials and can provide these raw materials on time because in addition to hampering the production process, delays in raw materials also affect product quality.

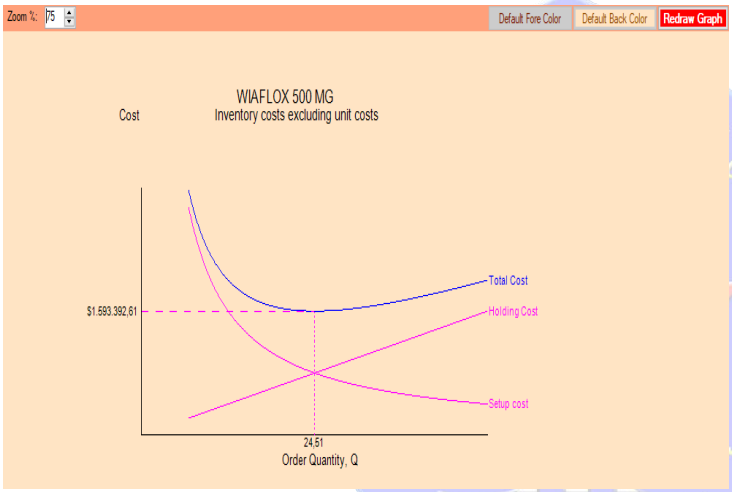
From the results of EOQ calculations, Order Frequency and Total Cost for drug units at the Dharma Pharmacy Clinic vary. The highest EOQ value for the class of vital drugs is 105 with an order frequency of 11 times with a total cost of IDR 481,602,326 and the lowest EOQ value is 1 with a frequency of ordering 1 time with a total cost of IDR 54,399,632. The highest EOQ value for essential class drugs was 41 with an order frequency of 9 times with a total cost of IDR 9291.76 and the lowest EOQ value was 1 with an order frequency of 4 times with a total cost of IDR 175,571. The highest EOQ value for non-essential drugs is 42 with a 4 times ordering frequency with a total cost of IDR 179543.42 and the lowest EOQ value is 1 with an order frequency of 2 with a total cost of IDR 104,715.97. Therefore, drug units in the Pharmacy Clinic Dharma with high EOQ values should be more concerned about the procurement, especially for vital drug groups compared to drug units with low EOQ values.

3.2. Reorder Point and Safety Stock

To find the right time, it can be done by calculating the Reorder Point (ROP). If there is a lead time (grace period), we must determine the minimum inventory level so that when this minimum inventory level has been reached, we must submit a new order to prevent a void in stock (Anif, 2014). Reorder times can be set so that supplies can cover inventory requirements during the grace period / waiting for orders to arrive. According to the Director General of Pharmaceutical and Medical Devices, the Ministry of Health of the Republic of Indonesia (2010), one of which is the waiting time required from ordering until the drug is received.

Table 4
EOQ, ROP and SS Calculation Results for Wiaflox 500 mg with QM Software for Window V

Demand rate(D)	930		Optimal order quantity (Q*)	24.51
Setup/ordering cost (S)	21000		Maximum Inventory Level (Imax)	24,51
Holding/carrying cost(H)	65000		Average inventory	12,26
Unit cost	250000		Orders per period(year)	37,94
Days per year (D/d)	312		Annual Setup cost	796696,3
Daily demand rate	2,98		Annual Holding cost	796696,3
Lead time (in days)	1		Total Inventory (Holding + Setup) Cost	325000
Safety stock	5		Unit costs (PD)	232500000
			Total Cost (including units)	234418400
			Reorder point	7,98 units



Economic Order Quantity graph from Wiaflox 500 mg in 2019

III. CONCLUSIONS AND SUGGESTIONS

4.1. Conclusion

1. Based on the VEN analysis of 160 drug units used in the Dharma Pharmacy Clinic, 66 drug units (41.25%) can be classified as Vital (V), 58 drug units (36.25%) including essential (E) and 36 drug units (22.5%) are non-essential. Group V drugs should be available in less than 48 hours, group E vacancies can be tolerated in up to 48 hours and group N is an auxiliary drug whose vacancies can be tolerated for more than 48 hours.
2. ABC Classification Analysis ABC classification based on the investment value for group A from the vital (V), essential (E) and non-essential (N) groups is an inventory with a high investment value (70-90%) of the total investment value. From group V, namely 69.83% with a volume of 17 units (25.76%), group E is 70.23% with a volume of 13 units (22.42%) and group N is 72.65% with a volume of 6 units (16.67%).

Group B of the Vital (V), essential (E) and non-essential (N) group is an inventory with a moderate investment value (15-20%) of the total investment value. From group V, that is 20.16% with a volume of 18 units (27.27%), group E is 19.24% with a volume of 14 units (24.14%) and group N is 19.44% with a volume of 7 units (17.88%).
Group C from the vital (V), essential (E) and non-essential (N) groups are inventories with low investment value (10-20%) of the total investment value. From group V which is 10.01% with a volume of 31 units (46.97%), group E is 10.53% with a volume of 31 units (53.44%) and group N is 9.48% with a volume of 23 units (63.89%).

ABC classification is based on the use value of the total usage per year for each drug class. Group A of the group V drug there were 17 units (25.76%) with a total usage of 5235 units (67.79%), group E 15 units (25.86%) with a total usage of 1706 units (69.12%), group N there are 7 units (19.44%) with a total usage of 936 units (70.86%). Drugs included are drugs with high usage (fast moving) and also high volume.

Group B of group V drugs there were 19 units 28, 79%) with a total use of 1559 units (20.78%), essential drugs (E) there were 18 units (31.03%) with a total use of 529 units (21.43 %), there were 10 units of non-essential drugs (27.78%) with 259 units (19.53%). This group B drug was moderate with moderate volume and value of use.

Group C of group V drugs there were 30 units (45.45%) with a total use of 707 units (9.43%) per year, there were 25 units of class E drugs (43.10%) with 233 (94.44%) usage.) and N medicine there were 19 units (52.78%) per year with a total usage of 127 units (9.61%). This group C drug includes drugs slow moving group with a large number but low level of usage.

ABC classification based on the Critical Index group A, there are 57 units (36%) of the vital (V) and essential class drugs with a high Critical Index Value, namely 9-12. The drugs in group A should not be underdeveloped considering the effect of the therapy on the patient. Group B there were 79 units (49%) of vital, essential and non-essential drugs with moderate Critical Index Value, namely 6-8. Vacancies of group B drugs can be tolerated no more than 24 hours with less frequent ordering. Group C, there were 24 units (15%) of the drugs for essential (E) and non-essential (N) classes with a low Critical Index Value of 4-6. The vacancies for group C drugs can be longer than 24 hours, with less frequent ordering, adjusted to the needs and available funds.

3. Based on the Economic Order Quantity (EOQ) method, the optimum order quantity for the class of vital drugs (V) 66 units varies with the lowest EOQ 1 (2 units) and the highest is 105 (1 unit), the essential drugs (E) vary with the lowest EOQ 1 (3 units) and the highest was 41 (1 unit), non-essential drugs (N) also varied with the lowest EOQ 1 (3 units) and the highest was 58 (I units). Based on the calculation of the Reorder Point (ROP) by considering the safety stock, the reorder point or time of ordering the 160 units of medicine varies. For vital drug classes, 0-10 units, for essential drugs, 0-4 units, non-essential drugs for 0-3 units. Drugs with a high EOQ value should be paid more attention to procurement, especially for vital drugs.

4. Drug procurement at the Dharma Pharmacy Clinic which is carried out in the pharmaceutical procurement and warehouse department, namely by taking stock-taking, stock cards and defecta books. The procurement of pharmaceutical supplies has not used special methods such as VEN classification analysis for grouping based on their impact on health, ABC

analysis for inventory priority, Economic Order Quantity (EOQ) to determine the optimum order quantity, Reorder Point (ROP) and Safety Stock (SS) to determine time ideal booking

4.2. Suggestion

1. There is a need for an information system to be able to produce an information system regarding the amount of use of each drug, either monthly, quarterly or annually in order to facilitate the preparation of drug supply requirements. Such as the use of a Pharmacy management information system that is integrated into each service so that it makes it easier for the supervision, procurement and control of medicines.
2. It is necessary to apply VEN analysis to provide accurate information in controlling drugs based on their impact on health so that in drug procurement at Pharmacy Clinics, a formulary or standard of therapy is required which is evaluated annually.
3. It is necessary to apply the ABC analysis method of drugs based on the amount of investment value, so that drugs that use a large investment budget can be more attention.
4. It is necessary to apply the ABC analysis method based on the value of use, so that the drugs with a higher use value are more concerned with the procurement.
5. It is necessary to apply the ABC Critical Index Analysis method which is a combination method of the ABC analysis method of investment value, ABC of use value and vital (V), essential (E) and non-essential (N) analysis to give different priorities to each drug class because drugs with high investment value, high use value and high impact on health require a strict control system rather than drugs that have low investment value and low use value.
6. It is necessary to apply the EOQ method to avoid drug vacancies or excess (expired) drugs because all this time the Dharma Pharmacy Clinic has often experienced drug vacancies, excess drugs which result in the drug becoming damaged (expired).
7. It is necessary to apply the Reorder Point (ROP) and Safety Stock (SS) method so that the reorder point and safety stock of the drug unit can be controlled.

REFERENCE LIST

Anief, M. (2014). *Manajemen Farmasi,* Universitas Gajah Mada Press. Cetakan VI, 2014, 10-22.

Bachrun E.,(2017), Efektifitas Metode ABC (*Activity Based Costing*) Dalam Analisis Perencanaan Obat JKN di Puskesmas Dagangan Kabupaten Madiun. *Jurnal Kesehatan*, Vol. No. 2, 250, E-ISSN 2548 5695, P-ISSN 2086 7751. Akreditasi Sinta 3.

Balai Besar Pengawas Obat dan Makanan. *Laporan Tahunan Balai Besar Pengawas Obat dan Makanan* tahun 2019. Serang, Banten.

Citraningtyas, *et. al*. (2019). Analisis Perencanaan Pengadaan Obat Antibiotika Berdasarkan Analisis ABC Indeks Kritis Di Instalasi Farmasi Rumah Sakit Umum Daerah Luwuk. *Jurnal Farmasi–Unsrat*. Vol 8. No.1 Februari 2019, GARUDA, ISSN 2303-2493 EISSN 27214923 DOI 10.35799.

Daft, R. L. 2012. *Manajemen*, Salemba Empat, ediisi IX hal 24

Departemen Kesehatan RI, 2010. *Pedoman Teknis Pengadaan Obat Publik Dan Perbekalan Kesehatan Untuk Pelayanan Kesehatan Dasar.* Jakarta.

Ercis, *et al*. (2013). Analisis Pengendalian Obat Sitostatika Dengan Metode EOQ Dan ROP. *Jurnal Manajemen Dan Pelayanan Farmasi*, (*Journal of Management and Pharmacy Practice*), 3(3), 203–210. E-ISSN 2443-2946-P ISSN 24432946 DOI 10.22146. Akreditasi Sinta 2 Dikti No. 85/M/KPT/2020.

Febriawati, H., *Manajemen Logistik Rumah Sakit.* Gosyen Publishing. Cetakan I, 2013, hal 87-99.

Harith, *et a*l. 2013. Penerapan Metode *Economic Order Quantity* Dan *Reorder Point* Dalam Meningkatkan Efisiensi Persediaan Obat Reguler di Instalasi Farmasi Rumah Sakit. Volume 3 No 4. September

2013. Akreditasi Sinta 3 Dikti No 36a/E/KPT/2016.

Hartini. 2007. *Apotek : Ulasan Beserta Naskah Peraturan Perundang-Undangan Terkait Apotek Termasuk Naskah dan Ulasan Permenkes tentang* Apotek Rakyat. Cetakan Kedua, Yogyakarta, 61-62, 68.

Heizer, J. dan Render, B. 2016. *Prinsip – Prinsip Manajemen Operasi*,. Edisi IX Salemba Empat, Jakarta, 553-586.

Kementerian Kesehatan RI, 2010, Dirjen Binakefarmasian dan Alat Kesehatan, *Pedoman Pengelolaan Perbekalan Pelayanan Kefarmasian*, Jakarta.

Kementerian Kesehatan RI. 2014. Peraturan Kementerian Kesehatan Republik Indonesia Nomor 35 tentang *Standar Pelayanan Kefarmasian Apotek*, Jakarta.

Kementerian Kesehatan RI. 2016. Peraturan Menteri Kesehatan Repbublik Indonesia Nomor 73 tentang *Standar Pelayanan Kefarmasian di Apotek*, Jakarta.

Kementerian Kesehatan RI. 2019. *Pedoman Penyusunan Rencana Kebutuhan Obat Dan Pengendalian Persediaan Obat di Rumah Sakit*, Jakarta.

Keputusan Menteri Kesehatan Nomor 1197/Menkes/SK/X/2004 tentang *Standar Pelayanan Farmasi Di Rumah Sakit*. Jakarta.

Klinik Apotek Dharma, *Dokumentasi*, Tangerang Selatan, 2012

Mellen, R.C. dan Pujirahardjo, W.J. 2013. Faktor Penyebab dan Kerugian Akibat *Stok out* dan Stagnant Obat di Unit Logistik RSU Haji Surabaya. Vol 1 No 1, *Jurnal UNAIR*, 99-107. Akreditasi Sinta 2

Mousnad, *et al*. 2016. Medicine Expenditures in Sudan Natinal Health Insurance Fund an ABC-VEN of 5 Year Medicine Consumption. J*ournal of Pharmaceutical Health Services Research*. Published 01 May 2016, https://doiorg/10111/jphs12136 Citation : 1.

Octaviany, M. 2018. Analisis Pengendalian Persediaan Obat Antibiotik Di RS Meilia Pada Tahun 2014 Dengan Menggunakan Metode Analisis ABC Indeks Kriti*s*. *Jurnal Administrasi Rumah Sakit Indonesia*, Vol 4. No.2, 147–160. 2567, P-ISSN 2406-9108, E-ISSN 14460-08136. Akreditasi Sinta 2.

Quick, *et.al*. 2012. *Managing Drug Supply & Management Sciences for Health*. 7th printing. Boston, Massachussets

Satibi, *et al*. 2018. *Manajemen Apotek*. Gadjah Mada University Press. Cetakan II. 27-31, 4.

Saxena, *et al*. 2017. ABC-VED Analysis of Pharmacy of an Urban Health Centre (2017). Online ISSN: 2349-4182. Print ISSN:2349-5979 DOI doi.org/10.22271/ijmrd.

Schroeder, R. G. 1997. *Manajemen Operasi, Pengambilan Keputusan dala Suatu Operasi*, Edisi ketiga.

Sekaran, U dan Bougie R. 2017. *Motode Penelitian Untuk Bisnis*, edisi VI, Salemba, Jakarta. 119.