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Controlling Spare Parts Inventory of PT Hasura Mitra Gemilang's Production Machines Using the EOQ Method

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ABSTRACT

Controlling production machine spare parts inventory is crucial for a manufacturing company like PT Hasura Mitra Gemilang to ensure that production activities continue smoothly. The most frequently used spare part is the Nozzle Heater 40x40mm 220-volt. The objectives of this research are: (1) To determine the economic order quantity, (2) To determine the safety stock level that should be maintained, and (3) To determine the reorder point. The analysis uses the Economic Order Quantity (EOQ) method. The analysis results show that in 2024, the need for Nozzle Heater 40x40 mm 220-volt s is 353 units, the optimal order quantity is 62 units, the order frequency is 6 times, the safety stock is 7 units, the reorder point in inventory is 14 units, and the company can save inventory costs amounting to Rp. 102,330. In 2025, the demand for Nozzle Heater 40x40 mm 220-volt s is 410 units, the optimal order quantity is 67 units, the order frequency is 6 times, the safety stock is 7 units, the reorder point in inventory is 14 units, and the company can save inventory costs of Rp. 125,520.

Keywords: Inventory, Nozzle Heater 40,40mm 220-volt, Economic Order Quantity.

1. INTRODUCTION

Carter Sofyan dkk. (2019) explains that inventory control is a series of control policies that determine the level of inventory that must be maintained while also determining when to add inventory and how large orders should be placed.

A manufacturing company's production process will be maintained if the company is able to control inventory, one of which is spare parts included in the inventory category of operational, maintenance, and repair equipment. MRO (maintenance / repair / operating) is a special inventory of operational, maintenance, and repair equipment needed to ensure that machines and operations remain productive. MRO exists because certain equipment has unpredictable maintenance and repair needs and times. Although this MRO request is usually a maintenance plan, other unplanned MRO requests must also be considered (Heizer & Render, 2016). The inventory of spare parts for production machines serves as a spare in case of damage so that it does not become a hindrance in the production process. Spare parts control aims to ensure that the spare parts needed in the production process remain available so that the production process continues to run smoothly, there is no shortage of inventory and obtains minimum costs.

PT Hasura Mitra Gemilang is a manufacturing company that produces plastic injection molding components for various products, including automotive components, electronic components, and other plastic products. The machine used in PT Hasura Mitra Gemilang's production process is an injection molding machine, operated by at least one production employee. This machine molds plastic pellets into a product (product component) by heating the pellets.

The heater is one of the most important machine components in the operation of the injection machine because it plays a role in melting the plastic ore before molding it in the mold into a product and is the machine component that is most often replaced so that it is the spare part with the largest amount of inventory in the spare parts warehouse and attention is needed to maintain stock quantities.

Different heater sizes are used in injection molding machines with varying machine capacities. The most frequently used heater size, or the one with the highest usage, is the 40x40 mm heater with a voltage of 220 volts. In 2021, the lowest usage occurred in July with 5 units, and the highest usage occurred in April and November with 22 units. Then in 2022, the lowest usage occurred in May with 10 units, and the highest usage occurred in November with 36 units. Meanwhile, in 2023, the lowest usage occurred in April with 19 units, and the highest usage occurred in June and December with 28 units. Cumulatively, the usage of the 40x40 mm 220-volt Nozzle Heater in 2021 was 178 units, in 2022 with 244 units, and in 2023 with 293 units.

Table 1. 2023 40x40 mm 220-volt Nozzle Heater Inventory Data

Year 2023	**Beginning Inventory (Units)**	**Purchase (Unit)**	**Usage (Unit)**	**Ending Inventory (Units)**
January	13	20	22	11
February	11	20	25	6
March	6	20	24	2
April	2	24	19	7
May	7	20	22	5
June	5	42	28	19
July	19	30	23	26
August	26	20	27	19
September	19	20	23	16
October	16	20	26	10
November	10	20	26	4
December	4	34	28	10
Total		**290**	**293**	

Source: Company Data, 2024

The company sets a minimum stock standard for each spare part stored in the spare parts warehouse, where for the 40x40 mm 220-volt Nozzle Heater, the minimum inventory is set at 10 units. The data above represents the number of purchases and usage of the 40x40 mm 220-volt Nozzle Heater in 2023, where in February, March, April, May, and November the ending inventory is below the minimum amount set (understock), thus impacting the initial inventory in the following month to be below the minimum amount. This causes the company to experience a shortage of inventory, so the company purchases goods from different suppliers at much higher prices.

A shortage of 40x40 mm 220-volt Nozzle Heaters can disrupt production or even lead to machine downtime, resulting in a halt in production. This is because the Nozzle Heater is a critical component of an Injection Molding machine. If the Nozzle Heater is damaged and not promptly repaired, production on the machine can be halted, and production targets cannot be met. This can impact the company, as it incurs losses due to missed production targets. Therefore, maintaining the right amount of spare part inventory for production machines is crucial.

Furthermore, if spare part inventory falls below the minimum inventory level and is depleted when needed, it can result in increased spare part costs. This is because the company must immediately purchase spare parts directly from the store at a significantly higher price. Ordering from machine part suppliers cannot be done on the same day, as manufacturers produce spare parts

immediately after receiving orders and shipping them to the company. The company can receive ordered items at least one week after the order is placed.

Based on the above, a method is needed to control spare part inventory to maintain availability and avoid inventory shortages. A fairly efficient method for managing spare parts is the Economic Order Quantity (EOQ) method. By planning using the EOQ method, a company can reduce the likelihood of understocking, thereby preventing disruptions to production processes and saving on ordering and storage costs. Furthermore, planning using the EOQ method can save space, both in warehouses and workspaces, and can resolve problems caused by accumulated inventory. The Economic Order Quantity (EOQ) method determines the quantity of goods purchased for each order at the lowest possible cost (Sutrisno, 2007). The EOQ method generates economic ordering value by balancing ordering costs and holding costs. Large orders can reduce ordering costs but increase holding costs, and vice versa (Haming & Nurnajamuddin, 2007).

2. LITERATURE REVIEW

Inventory

According to Stevenson and Chuong in Apriliandra (2019), inventory is the stock or holding of goods. From small items like pens, paper, nuts, and bolts to large items like machinery, trucks, construction equipment, and airplanes, companies typically stock hundreds or even thousands of items.

Inventory Control

Carter in Sofyan et al. (2019) states that inventory control is a series of control policies that determine the level of inventory to be maintained, as well as determining when to replenish inventory and how large orders should be placed. Render and Heizer in Novriyandi & Nurkertamanda (2020) state that the purpose of inventory control for a company is to eliminate the risk of late delivery of goods, to meet demand or demand, to maintain production continuity or prevent the company from experiencing stockouts that could lead to production interruptions, and to provide the best service to consumers by offering requested products.

Economic Order Quantity (EOQ)

Economic Order Quantity (EOQ) is a method that can be used to determine the supply and demand for raw materials (Kumar, 2016). The ideal order quantity for a product can be determined using the EOQ model. This order quantity can reduce inventory costs and generate greater profits (Hertini et al., 2018).

Safety Stock

Inventory that must be maintained to offset differences in supply and demand is called safety stock (Lisan, 2018). It is crucial for companies to maintain safety stock to anticipate raw material shortages during the production process. Furthermore, safety stock is also useful for anticipating increased demand, decreased product quality, or delays in supplier deliveries, thus preventing impacts on the company's production operations. Lead time is the time a company needs from the time an order is placed until the goods arrive (Pradana). In the supply chain, lead time is crucial because it can reduce the risk of inventory shortages or buildup (Zharfan & Handayani, 2023).

Reorder Point

The reorder point is the point at which a company must reorder, determined by the quantity of demand for a given period and the time required to receive the ordered goods (lead time) (Umry & Singgih, 2019). Reorder Point is also indicated by the remaining quantity available in the warehouse.

3. RESEARCH METHOD

The research was conducted at PT Hasura Mitra Gemilang Plant Cikarang. The data used was quantitative data on production machine spare parts, including spare part purchasing data, spare part usage data, and other supporting data. The data sources for this study were secondary data obtained from information that could support the research, such as books, general company documents relevant to the research topic, journal references, previous research reports, and other research-related materials.

Data collection techniques were carried out through observation and interviews. Data collection with documentary studies was carried out by collecting documents and data related to the inventory of production machine spare parts from PT Hasura Mitra Gemilang Plant Cikarang. While data collection with literature studies was carried out by searching and studying literature and references related to inventory control. The population in this study was production machine spare parts at PT Hasura Mitra Gemilang. The sampling technique used was purposive sampling using the criteria of the most frequently replaced production machine components with the highest number of uses in this case the heater with the type of Nozzle Heater spare part that was most widely used in the production process in 2023, namely the 40x40 220-volt Nozzle Heater.

Data analysis was performed using the Economic Order Quantity (EOQ) inventory control method. Economic Order Quantity (EOQ) is a method that can be used to determine the supply and demand of raw materials (Kumar, 2016). The ideal order quantity for a product can be found using the EOQ model. This order quantity can reduce inventory costs and generate greater profits (Hertini dkk., 2018). Technically, the EOQ model is a model used by a company when purchasing or obtaining an item.

Inventory control analysis is done by forecasting in the following year based on historical data on spare part usage using *least square methods*. Ayu Ismarani Basir (2023), Defining forecasting is the art and science of predicting something that has not happened, with the aim of estimating events that will occur in the future by always requiring data from the past, so that with forecasting, the possibility of events that are not in accordance with the expected goals is followed by readiness to anticipate them. The least squares method was used in this study because it is a simple method based on historical data over a specific period of three years. Furthermore, this method minimizes forecasting errors, providing trend estimates that are closest to actual conditions. The assumptions used in forecasting using the least square method are that the relationship between time and demand variables is linear and there is no dominant external factor that causes extreme spikes in demand.

Next, calculate the economic order quantity to obtain the optimal order quantity. The next step is to calculate the order frequency in a year by dividing the forecasted demand by the economic order quantity.

Next, calculate safety stock, which is the amount of inventory that must be maintained to offset differences in supply and demand (Lisan, 2018). Safety stock is also useful for anticipating increased demand, decreased product quality, or delays in supplier deliveries so as not to affect the company's production operations. Lead time, the desired service level, and the standard deviation of demand influence the amount of safety stock. This is because demand is always changing. Lead time is the time required by a company from the time an order is placed until the goods arrive (Pradana). In the supply chain, lead time is very important because it can reduce the risk of shortages or inventory buildup (Zharfan & Handayani, 2023).

The next step is to calculate the reorder point, which is the point at which the company must reorder at a certain point, which is determined by the number of requests for a certain time and the time required to receive the ordered goods (lead time) (Umry & Singgih, 2019). Finally, calculate the costs in inventory control, namely ordering costs, storage costs, and inventory costs.

4. RESULTS AND ANALYSIS

Data analysis on the processing of production machine spare part inventory data, namely the 40 x 40 mm 220-volt Nozzle Heater, was carried out in accordance with the research objectives. For the purpose of conducting the analysis, data is needed to support the analysis, such as annual goods requirements, ordering costs per order, storage costs per unit per year, lead time, and safety stock. The 40x40 mm 220-volt Nozzle Heater provided by PT Hasura Mitra Gemilang Plant Cikarang is obtained from the main supplier, namely Nusa Abadi Electric and another supplier, namely Sinar Electric Cikarang.

Table 2. Purchase of 40x40 mm 220 volt Nozzle Heater in 2023

Receipt date	Supplier Name	Amount Goods	Unit Name	Unit Price of Goods	Total price	Total Tax (11%)
01-14-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
02-27-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
03-24-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
04-18-2023	Cikarang Electric Light	4	piece	Rp. 110,000	Rp. 440,000	Rp -
04-26-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
04-05-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
06-05-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
06-26-2023	Cikarang Electric Light	2	piece	Rp. 110,000	Rp. 220,000	Rp -
06-28-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
12-07-2023	Nusa Abadi Electric	30	piece	Rp. 52,800	Rp. 1,584,000	Rp. 174,240
08-18-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
09-08-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
10-09-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
11-14-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
11-12-2023	Cikarang Electric Light	4	piece	Rp. 110,000	Rp. 440,000	Rp -
12-19-2023	Nusa Abadi Electric	20	piece	Rp. 52,800	Rp. 1,056,000	Rp. 116,160
12-31-2023	Nusa Abadi Electric	10	piece	Rp. 52,800	Rp. 528,000	Rp. 58,080

Source: Company Data, 2024

Inventory costs consist of ordering costs and holding costs. Ordering costs per order, from placing the order to payment, include phone credit, invoicing, and admin fees for transfers. Holding costs are costs associated with inventory storage costs incurred by the company, including maintenance costs, electricity costs, warehouse keeper wages, and warehouse depreciation. Inventory costs are assumed to remain the same for the following year.

Ordering fee per order = Rp. 12,500 per order
Storage cost per unit per year = Rp 2,270 per unit per year

Lead time is the waiting time from the time an order is placed until the goods are received by the warehouse. PT Hasura Mitra Gemilang Plant Cikarang's lead time from the time the order is placed until the goods are received is 7 working days. In determining the forecast of the need for production machine spare parts such as the 40x40 mm 220 volt Nozzle Heater, the author uses the Least Squares method in determining the forecast of needs, where this method uses time units.

Equality :

$$Y = a + bx$$

Where :

$$a = \frac{\sum Y}{n} \qquad b = \frac{\sum XY}{\sum X^2}$$

Information :
Y = Periodic data (time series)
X = Time period (years)
n = amount of data
a = constant trend value in base year
b = average growth rate of the trend value each year

The data used to calculate the forecast is the usage data for the 40x40 mm 220 volt Nozzle Heater for the last 3 (three) years, namely 2021, 2022, and 2023. Forecasting is carried out to determine the estimated need for goods in the future or in the following year, namely the need in 2024 and 2025.

Table 3. Calculation of Demand Forecasting Using the Least Squares Method

Period	Usage (Y)	X	X^2	XY
January 2021	8	-35	1225	-280
February 2021	15	-33	1089	-495
March 2021	16	-31	961	-496
April 2021	22	-29	841	-638
May 2021	7	-27	729	-189
June 2021	16	-25	625	-400
July 2021	5	-23	529	-115
August 2021	13	-21	441	-273
September 2021	21	-19	361	-399
October 2021	19	-17	289	-323
November 2021	22	-15	225	-330
December 2021	14	-13	169	-182
January 2022	34	-11	121	-374
February 2022	14	-9	81	-126
March 2022	22	-7	49	-154
April 2022	13	-5	25	-65
May 2022	10	-3	9	-30

Period	Usage (Y)	X	X^2	XY
June 2022	11	-1	1	-11
July 2022	21	1	1	21
August 2022	35	3	9	105
September 2022	16	5	25	80
October 2022	13	7	49	91
November 2022	36	9	81	324
December 2022	19	11	121	209
January 2023	22	13	169	286
February 2023	25	15	225	375
March 2023	24	17	289	408
April 2023	19	19	361	361
May 2023	22	21	441	462
June 2023	28	23	529	644
July 2023	23	25	625	575
August 2023	27	27	729	729
September 2023	23	29	841	667
October 2023	26	31	961	806
November 2023	26	33	1.089	858
December 2023	28	35	1.225	980
Total	**715**		**15.540**	**3.101**

Source: Research Data, 2024

Table 4. Forecasting the Need for 40x40 mm 220-volt Nozzle Heaters in 2024

$$Y_n = 19,86 + 0,2x_n$$

Year 2024	x	bx	$a + bx$	Rounding
January	37	7.4	27.26	27
February	39	7.8	27.66	28
March	41	8.2	28.06	28
April	43	8.6	28.46	28
May	45	9	28.86	29
June	47	9.4	29.26	29
July	49	9.8	29.66	30
August	51	10.2	30.06	30
September	53	10.6	30.46	30
October	55	11	30.86	31
November	57	11.4	31.26	31
December	59	11.8	31.66	32
Total				**353**

Source: Research Data, 2024

Table 5. Forecasting the Need for 40x40 mm 220-volt Nozzle Heaters in 2025

$$Y_n = 19,86 + 0,2x_n$$

Year 2025	x	bx	$a + bx$	Rounding
January	61	12.2	32.06	32
February	63	12.6	32.46	32
March	65	13	32.86	33
April	67	13.4	33.26	33
May	69	13.8	33.66	34
June	71	14.2	34.06	34
July	73	14.6	34.46	34
August	75	15	34.86	35
September	77	15.4	35.26	35
October	79	15.8	35.66	36
November	81	16.2	36.06	36
December	83	16.6	36.46	36
Total				**410**

Source: Research Data, 2024

Safety stock is a safety stock to anticipate uncertainty in the arrival of orders and uncertainty in demand. If the company is unable to anticipate this, the company will experience inventory shortages. Previously, it was known that the use of 40x40 mm 220-volt Nozzle Heaters in 2024 was 353 units and in 2025 was 410 units. The working day at PT Hasura Mitra Gemilang Plant Cikarang is six days a week, so the total number of working days in one year is 312 days.

Average demand in 2024

$$d = \frac{D}{days}$$

$$d = \frac{353\ unit}{312\ days}$$

d = 1.13 units/day (rounded to 1 unit/day)

Average demand in 2025

$$d = \frac{D}{Jumlah\ hari\ kerja\ dalam\ 1\ tahun}$$

$$d = \frac{410\ unit}{312\ hari}$$

d = 1.13 units/day (rounded to 1 unit/day)

$$Safety\ Stock\ (SS) = d \times LT$$

$$Safety\ Stock\ (SS) = 1\ unit \times 7\ days$$

$$Safety\ Stock\ (SS) = 7\ unit$$

In determining the most economical order quantity using the EOQ method, this calculation aims to determine the order quantity and determine the most optimal costs incurred by the company in 2024 and 2025.

$$EOQ = \sqrt{\frac{2.D.S}{H}}$$

$$EOQ_{2024} = \sqrt{\frac{2.D_{2024}.S}{H}}$$

$$EOQ_{2024} = \sqrt{\frac{2\ .\ 353\ .\ Rp\ 12.500}{Rp\ 2.270}}$$
$$EOQ_{2024} = \sqrt{\frac{Rp\ 8.825.000}{Rp\ 2.270}}$$
$$EOQ_{2024} = \sqrt{3.887,67}$$
$$EOQ_{2024} = 62,35\ unit\ (62\ unit)$$

$$EOQ_{2025} = \sqrt{\frac{2.D_{2025}.S}{H}}$$
$$EOQ_{2025} = \sqrt{\frac{2\ .\ 410\ .\ Rp\ 12.500}{Rp\ 2.270}}$$
$$EOQ_{2025} = \sqrt{\frac{Rp\ 10.250.000}{Rp\ 2.270}}$$
$$EOQ_{2025} = \sqrt{4.515,42}$$
$$EOQ_{2025} = 67,2\ unit\ (67\ unit)$$

After obtaining the optimal purchase quantity, the next step is to calculate the purchase frequency in 2024 and 2025.

$$N = \frac{D}{EOQ}$$
$$N_{2024} = \frac{D_{2024}}{EOQ_{2024}}$$
$$N_{2024} = \frac{353}{62}$$
$$N_{2024} = 5,7\ times\ (6\ times)$$

$$N_{2025} = \frac{D_{2025}}{EOQ_{2025}}$$
$$N_{2025} = \frac{410}{67}$$
$$N_{2025} = 6,1\ times\ (6\ times)$$

Calculating the Reorder Point (ROP) is useful for determining when a company should reorder inventory to avoid stockouts or shortages. To avoid this, here's how to calculate the Reorder Point (ROP).

$$ROP = (d \times LT) + SS$$
$$ROP = (1\ unit \times 7\ days) + 7\ unit$$
$$ROP = 7\ unit + 7\ unit$$
$$ROP = 14\ unit$$

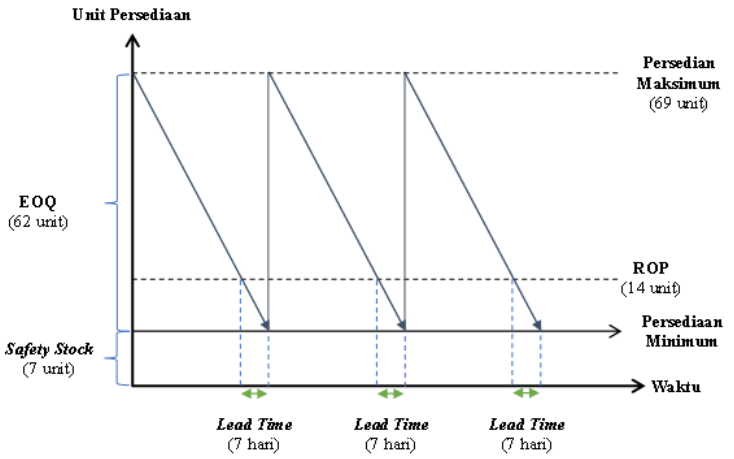

Figure 1. Graph of the relationship between EOQ, ROP, Safety Stock, and Lead Time for 40x40 mm 220 volt Nozzle Heater Inventory in 2024
Source: Research Data, 2024

In 2024, the optimal order quantity is 62 units per order. As time passes, Nozzle Heaters are taken from the warehouse for use, and inventory will continue to decrease until it reaches the reorder point (ROP) of 14 units. When inventory reaches 14 units, the company must reorder 62 units from the supplier to maintain optimal inventory costs. During a 7-day lead time, the company must have a safety stock of 7 units to maintain production operations until the ordered Nozzle Heaters arrive. When the ordered Nozzle Heaters arrive and enter the warehouse, inventory returns to its maximum.

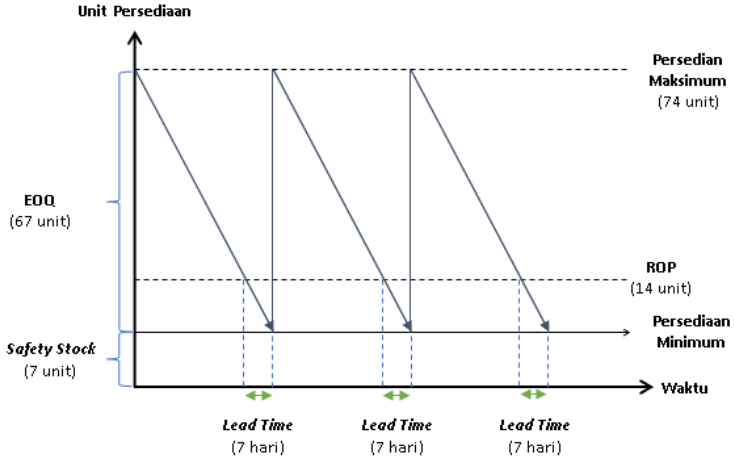

Figure 2. Graph of the relationship between EOQ, ROP, Safety Stock, and Lead Time for 40x40 mm 220 volt Nozzle Heater Inventory in 2025
Source: Research Data, 2024

In 2025, the optimal order quantity is 67 units per order. As time passes, Nozzle Heaters are taken from the warehouse for use, and inventory will continue to decrease until it reaches the reorder point (ROP) of 14 units. When inventory reaches 14 units, the company must reorder 67 units from the supplier per order to maintain optimal inventory costs. During a 7-day lead time, the company must have a reserve inventory or Safety Stock of 7 units to maintain the continuity of production operations until the ordered Nozzle Heaters arrive. When the ordered Nozzle Heater inventory has arrived and entered the warehouse, the inventory is again at its maximum.

Next, the total minimum cost of 40x40 mm 220-volt Nozzle Heater inventory that will be required by PT Hasura Mitra Gemilang in 2024 and 2025 is calculated using the EOQ method.

Total Inventory Cost (TIC) in 2024

$$TIC = TOC + TCC$$
$$TIC = \frac{D}{EOQ}(S) + \frac{EOQ}{2}(H)$$
$$TIC = \frac{353\ unit}{62\ unit}(Rp\ 12.500) + \frac{62\ unit}{2}(Rp\ 2.270)$$
$$TIC = 5,7\ (Rp\ 12.500) + 31\ unit\ (Rp\ 2.270)$$
$$TIC = Rp\ 71.250 + Rp\ 70.370$$
$$TIC = Rp\ 141.620$$

Total Inventory Cost (TIC) in 2025

$$TIC = TOC + TCC$$
$$TIC = \frac{D}{EOQ}(S) + \frac{EOQ}{2}(H)$$
$$TIC = \frac{410\ unit}{67\ unit}(Rp\ 12.500) + \frac{67\ unit}{2}(Rp\ 2.270)$$
$$TIC = 6,1\ (Rp\ 12.500) + 34\ unit\ (Rp\ 2.270)$$
$$TIC = Rp\ 76.250 + Rp\ 77.180$$
$$TIC = Rp\ 153.430$$

The total inventory cost using the EOQ method is Rp 141,620 in 2024 and Rp 153,430 in 2025. The following is a Total Inventory Cost (TIC) graph, which states that the EOQ method is the optimal purchasing level.

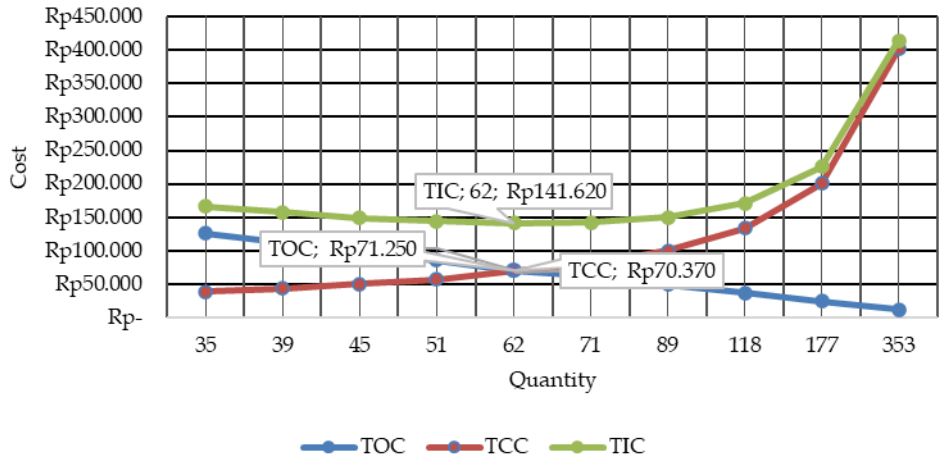

Figure 3. TOC, TCC, and TIC Graph for 2024
Source: Research Data, 2024

It is known that the quantity level can affect the inventory costs incurred by the company. If the order quantity increases, the ordering costs incurred will decrease, but the storage costs will increase, and vice versa. The minimum order quantity point for 40x40 mm 220-volt Nozzle Heater in 2024 is 62 units with a total ordering cost (TOC) of Rp 71,250 and a total storage cost (TCC) of Rp 70,370 with a total inventory cost (TIC) of Rp 141,620.

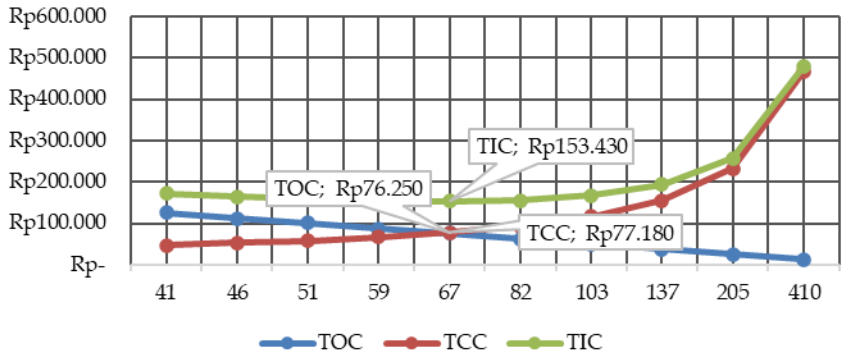

Figure 4. TOC, TCC, and TIC graphs for 2025
Source: Research Data, 2024

It is known that the quantity level can affect the inventory costs incurred by the company. If the order quantity increases, the ordering costs incurred will decrease, but the storage costs will increase, and vice versa. The minimum order quantity point for 40x40 mm 220-volt Nozzle Heater in 2025 is 67 units with a total ordering cost (TOC) of Rp 76,250 and a total storage cost (TCC) of Rp 77,180 with a total inventory cost (TIC) of Rp 153,430.

PT Hasura Mitra Gemilang Plant Cikarang orders 20 (twenty) units of 40x40 mm 220 volt Nozzle Heaters for each order. The order frequency for 2024 and 2025 is as follows:

Order Frequency in 2024

$$N = \frac{D}{Q}$$

$$N = \frac{353}{20}$$

$$N = 17,7\ times\ (18\ times)$$

Order Frequency in 2025

$$N = \frac{D}{Q}$$

$$N = \frac{410}{20}$$

$$N = 20,5\ times\ (21\ times)$$

The minimum total cost of 40x40 mm 220-volt Nozzle Heater inventory that will be required by PT Hasura Mitra Gemilang in 2024 and 2025, based on company policy. The following is the calculation of Total Inventory Cost (TIC).

Total Inventory Cost (TIC) in 2024

$$TIC = TOC + TCC$$

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

$$TIC = \frac{353\ unit}{20\ unit}(Rp\ 12.500) + \frac{20\ unit}{2}(Rp\ 2.270)$$

$$TIC = 17,7\ (Rp\ 12.500) + 10\ unit\ (Rp\ 2.270)$$

$$TIC = Rp\ 221.250 + Rp\ 22.700$$

$$TIC = Rp\ 243.950$$

Total Inventory Cost (TIC) in 2025

$$TIC = TOC + TCC$$

$$TIC = \frac{D}{Q}(S) + \frac{Q}{2}(H)$$
$$TIC = \frac{410\ unit}{20\ unit}(Rp\ 12.500) + \frac{20\ unit}{2}(Rp\ 2.270)$$
$$TIC = 20,5\ (Rp\ 12.500) + 10\ unit\ (Rp\ 2.270)$$
$$TIC = Rp\ 256.250 + Rp\ 22.700$$
$$TIC = Rp\ 278.950$$

Based on the results of the calculations that have been carried out, a comparison can be made between the total costs incurred by the company with the policies implemented by the company and the EOQ method.

Table 6. Comparison of 40x40 mm 220 volt Nozzle Heater Inventory Analysis Results Based on Company Policy with the EOQ Method in 2024

Information	Based on Company policy	Based on EOQ Method	Difference
Quantity Booking	20 units	62 units	42 units
Frequency Booking	18 times	6 times	12 times
Total Inventory Cost (TIC)	Rp. 243,950	Rp. 141,620	Rp. 102,330
Minimum Stock / Safety Stock	10 units	7 units	3 units
Reorder Point	-	14 units	-

Source: Research Data, 2024

Table 7. Comparison of Calculation Results for 40x40 mm 220 volt Nozzle Heater Inventory Based on Company Policy with the EOQ Method in 2025

Information	Based on Company policy	Based on EOQ Method	Difference
Quantity Booking	20 units	67 units	47 units
Frequency Booking	21 times	6 times	15 times
Total Inventory Cost (TIC)	Rp. 278,950	Rp. 153,430	Rp. 125,520
Minimum Stock / Safety Stock	10 units	7 units	3 units
Reorder Point	-	14 units	-

Source: Research Data, 2024

Table 7 shows that using the EOQ method is more cost-efficient than using the company policy, with larger orders and lower order frequency resulting in significantly reduced total inventory costs. The frequency of orders based on company policy requires more frequent orders, while the EOQ method reduces the frequency of orders, thereby reducing administrative burdens and other ordering-related costs. Higher safety stock based on company policy can increase storage costs, while using the EOQ method provides a more efficient amount of safety stock in stock management. The company does not set a specific reorder point, which can pose a risk of running out of stock or overstocking, while the EOQ method, which has a clear reorder point, can help the company manage stock better and avoid stockouts. Therefore, overall, using the EOQ method provides a more optimal solution in inventory management by reducing costs and increasing operational efficiency, while the company policy is simpler but less efficient.

The company has set the order quantity for Nozzle Heaters at 20 units per order, whereas using the EOQ method would require a single order quantity of 67 units. The order quantity based on company policy allows the company to more easily manage inventory and minimize the risk of

storing large quantities of goods. While the order quantity using the EOQ method represents a much larger quantity, allowing the company to reduce the frequency of orders and lower ordering costs.

The order frequency based on company policy is 21 units due to the small order quantity, requiring the company to place orders more frequently throughout the year. This high order frequency can increase ordering costs because it requires the company to place orders more frequently and organize purchasing administration more frequently. Meanwhile, the order frequency based on the EOQ method is much lower, at 6 units per year due to the higher order quantity per order. The company only needs to place orders a few times, thus reducing ordering costs and improving operational efficiency.

Based on company policy, the company sets a minimum inventory (safety stock) in the warehouse of 10 units. Compared to the safety stock calculated using the EOQ method, the company's set quantity is higher. This higher quantity can provide greater protection against stockouts, but it also increases storage costs. The reorder point is set when inventory reaches 14 units, ensuring inventory is maintained and doesn't run out before new orders arrive.

5. CONCLUSION

Based on the results of the data analysis and data processing research that have been described, it can be concluded that the calculation results using the EOQ method show that the economic order quantity in purchasing 40x40 mm 220-volt Nozzle Heater at PT Hasura Mitra Gemilang Plant Cikarang is 62 units in 2024 and 67 units in 2025. The results of the calculations that have been carried out in determining the amount of Safety Stock, PT Hasura Mitra Gemilang Plant Cikarang must maintain inventory in the warehouse of at least 7 units to maintain the availability of 40x40 mm 220-volt Nozzle Heater in the warehouse until the order arrives. The results of the calculations that have been carried out in determining the Reorder Point, PT Hasura Mitra Gemilang Plant Cikarang, can place another order if the inventory of 40x40 mm 220-volt Nozzle Heater in the warehouse is 14 units left.

There are several suggestions for consideration or input to the company. The company should improve the information system by completing notification or warning features regarding inventory, especially spare parts. The system will notify the relevant employee when the inventory has reached the reorder point so that the company can place orders or increase inventory levels in a timely manner. The company should increase attention to the amount of spare parts inventory for production machines, both 40x40 mm 220-volt Nozzle Heaters and other production machine spare parts. It is known that there is a significant price difference between one supplier and another for a type of spare part, so to avoid purchasing spare parts at a higher price, the company must monitor when to reorder from only one supplier, especially the supplier of 40x40 mm 220-volt Nozzle Heaters, namely Nusa Abadi Electric. Stock availability in the warehouse must always be considered so that when it is time to reorder, it is not too late and the availability of goods will always be there. The company can use EOQ calculations, Safety Stock, and Reorder Point in controlling inventory so that the company does not have to buy goods from other suppliers with higher prices, which would require the company to spend more on these spare parts.

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