Volume 1 Number 3 October 2024
E-ISSN: 3047-4337

https://journal.antispublisher.com/index.php/IPTEKS/index

ANALYSIS OF SPARE PART INVENTORY CONTROL USING ECONOMIC ORDER QUANTITY (EOQ) AND CONTINUOUS REVIEW METHODS

Maharani Lutfiah Damayanti [1], Tedjo Sukmono[*,2]
[1,2] Industrial Engineering Study Program, Muhammadiyah Universitas of Sidoarjo, Indonesia

Article Info

Article history:
Received Sep 13, 2024
Revised Sep 28, 2024
Accepted Oct 11, 2024

Keywords:
Inventory Control;
Economic Order Quantity;
Continuous Review

ABSTRACT

General Background: In the concrete manufacturing industry, the reliance on machines for production activities necessitates a robust spare parts inventory management system to ensure operational continuity. **Specific Background:** However, fluctuating demand for spare parts often leads to overstock or stockout situations, significantly impacting inventory costs and cash flow. **Knowledge Gap:** Existing studies primarily focus on static inventory management approaches, neglecting the dynamic nature of spare parts demand in manufacturing environments. **Aims:** This research aims to optimize total inventory costs while determining efficient order and reorder point quantities by integrating the Economic Order Quantity (EOQ) method with continuous review techniques. **Results:** The findings reveal an optimal order quantity of 131 units and a reorder point of 18 units, resulting in a total inventory cost of IDR 2,414,609,989—an efficiency improvement of IDR 293,152,400, equivalent to an 11% cost saving compared to previous inventory management practices. **Novelty:** This study innovatively employs a probabilistic approach to account for demand variability, enhancing the accuracy of inventory control measures. **Implications:** The outcomes suggest that implementing the proposed inventory management strategy can mitigate the risks of overstocking and stockouts, ultimately fostering improved financial performance in the company. Furthermore, the research highlights the necessity for regular inventory reviews and suggests future studies to develop more dynamic inventory control models that incorporate price fluctuations for spare parts, thereby addressing potential risks associated with cost variability.

Corresponding Author:
Tedjo Sukmono
Industrial Engineering Study Program, Muhammadiyah Universitas of Sidoarjo
E-mail: thedjoss@umsida.ac.id
DOI : https://doi.org/10.61796/ipteks.v1i3.213

INTRODUCTION

The rapid development of the industry has made competition between companies even more intense, one of which is in the construction sector. With this competition,

companies are expected to be able to meet production demand by acting more effectively and efficiently in managing their businesses in order to achieve the company's goals. PT Varia Usaha Beton is one of the construction companies in Indonesia engaged in concrete manufacturing. PT Varia Usaha Beton produces several types of concrete products, including ready-to-use concrete, masonry concrete, precast concrete, and crushed stone or crushed stone. To meet its production needs, PT Varia Usaha Beton uses a variety of vehicles and equipment to support its production activities so that they run well. So that the treatment spare part which is the part that has a certain role in the vehicles and production equipment needs to be carried out so that production activities continue to run [1].

Supplies spare part is required by the company so that if there is damage to the engine or vehicle that requires replacement spare part, will not interfere with the sustainability of production activities [2]. In managing inventory spare part, there are often several obstacles such as fluctuations in demand in spare part, So that the supplies needed are erratic in each period. This results in the inventory stored in the warehouse piling up (overstock) or lack (stockout). With the existence of overstock Or stockout The company incurs inventory costs of IDR 2,707,762,389 annually. So that the existence of large inventory costs can have an impact on cashflow in the company.

This research is based on research on inventory control that experiences problems caused by demand uncertainty using the Economic Order Quantity (EOQ) and continuous review. This research focuses on inventory control spare part which aims to obtain an efficient total inventory cost as well as know the economical order quantity and reorder point so that an improvement can be made in inventory control spare part by using the Economic Order Quantity (EOQ) and continuous review. Method Economic Order Quantity (EOQ) can allow companies to determine the optimal order quantity by considering the number of requests [3]. Economic Order Quantity (EOQ) is a method used to determine the most economical number of bookings per booking [4]. Where the optimal quantity must be stored by the company can reduce inventory costs related to storage costs, ordering and shortages [5]. While the method continuous review It can enable companies to obtain efficient total inventory costs by taking into account the probabilities of volatile demand that is volatile in each period. Continuous review is a method of inventory control that is carried out on an ongoing basis and places an order if the inventory has reached the point of reordering (reorder point) with a large number of orders (Q) with different time intervals [6]. So that continuous review Able to overcome the problem of uncertainty from demand because it is always reviewed on an ongoing basis so that it is less likely to happen overstock Or stockout [7]. In addition, in order to avoid a shortage of inventory, it is necessary to determine the point of reordering (reorder point) and is always available in storage warehouses and does not interfere with the company's production activities [8]. This method was chosen because the data proposals generated can help in inventory control spare part production equipment, so that the inventory spare part no excess or less, so that production activities in the company are not disrupted [9]. With this, the application of the Economic Order Quantity (EOQ) and continous review This is for better inventory control by getting the minimum total inventory cost

METHODS

A. Place and Time

This research was carried out for 6 months from September 2022. The place of implementation of this research was carried out at PT Varia Usaha Beton which is located on Jl. H. Anwar Hamzah Blok F02 - F03, Kampung Baru, Tambakoso, Waru District, Sidoarjo Regency, East Java.

B. Research Methods

This study focuses on efforts to control *the inventory of spare parts* to obtain the minimum total inventory cost by using the integration of *the Economic Order Quantity* (EOQ) method and *continuous review*. In this study, *the* demand *for spare parts* is not always the same or varies from period to period, so that demand during *the lead time* cannot be predicted and *backorders* or out of stock can occur. The steps in the calculation put forward by Hadley-Within are as follows.

a. Calculating standard deviations

$$s = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}}$$

(1)
Source: [10], [7], [11]

b. Calculate the economic order quantity value (q01) using the EOQ equation

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

(2)
Source: [12], [5], [13]

c. Calculate the value of the supply shortage probability (α)

$$\alpha = \frac{hq_0}{C_u D}$$

(3)
Source: [14], [7], [15]

d. Once the value of is α known, it then looks for the Z value in the normal distribution table.α
e. After knowing the Z value, then calculate the α*reorder point* (r1)

$$r_1 = DL + Z_\alpha s\sqrt{L}$$

(4)
Source: [10], [7], [16]

f. Then calculate the value of the economic order quantity (q02) with the EOQ equation by considering the cost of the spare *part shortage* (and the number of spare C_u) *parts* shortage (N) in each cycle.

$$q_{02} = \sqrt{\frac{2D\left[A+C_u \int_{r1}^{\infty}(x-r_1)f(x)dx\right]}{h}}$$

(5)
Source: [10], [7], [16]

Where

$$\int_{r1}^{\infty}(x - r_1)f(x)dx = S_L[f(Z_\alpha) - Z_\alpha\, \psi(Z_\alpha)] = N$$

(6)
Source: [10], [7], [16]

With the values $f(Z_\alpha)$ and $\psi(Z_\alpha)$ searchable in the partial expectations table. Furthermore, the calculation continues from equations (3) to (4) based on the results of equation (5). The calculation will continue to be repeated for several iterations and get a reorder *point* (r) value from a comparison of relatively similar r1 and r2 values or quadrugens. If r1 ≠ r2, the calculation is repeated from equation (3) until the optimal result is obtained. Therefore, the optimal inventory value is obtained with r = r1 = r2 and q0 = q02.

Based on results *reorder point* (r) and booking lots (q0) of the optimal value of the *safety stock* to cover the possibility of out of stock at the time of ordering, which is likely to be out of stock due to delayed arrivals or increased demand and high demand exceeding previous calculations [8] with the following equation:

$$SS = Z\alpha\, S\sqrt{L} \quad (7)$$

Source: [17], [18], [19]

Furthermore, determine the costs involved in the inventory using the following equation:

a) Purchase Cost Expectations

$$O_b = D \times p$$

(8)
Source: [10], [7], [16]

b) Booking Fee Expectations

$$O_p = \frac{DA}{q_0} \quad (9)$$

Source: [10], [7], [16]

c) Storage Cost Expectations

$$O_s = \left(\frac{q_0}{2} + r - DL\right) \times h$$

(10)
Source: [10], [7], [16]

d) Expected Cost Shortage

$$O_k = \frac{C_u D}{q_0} \int_r^{\infty} (x - r) f(x) dx$$

(11)
Source: [10], [7], [16]

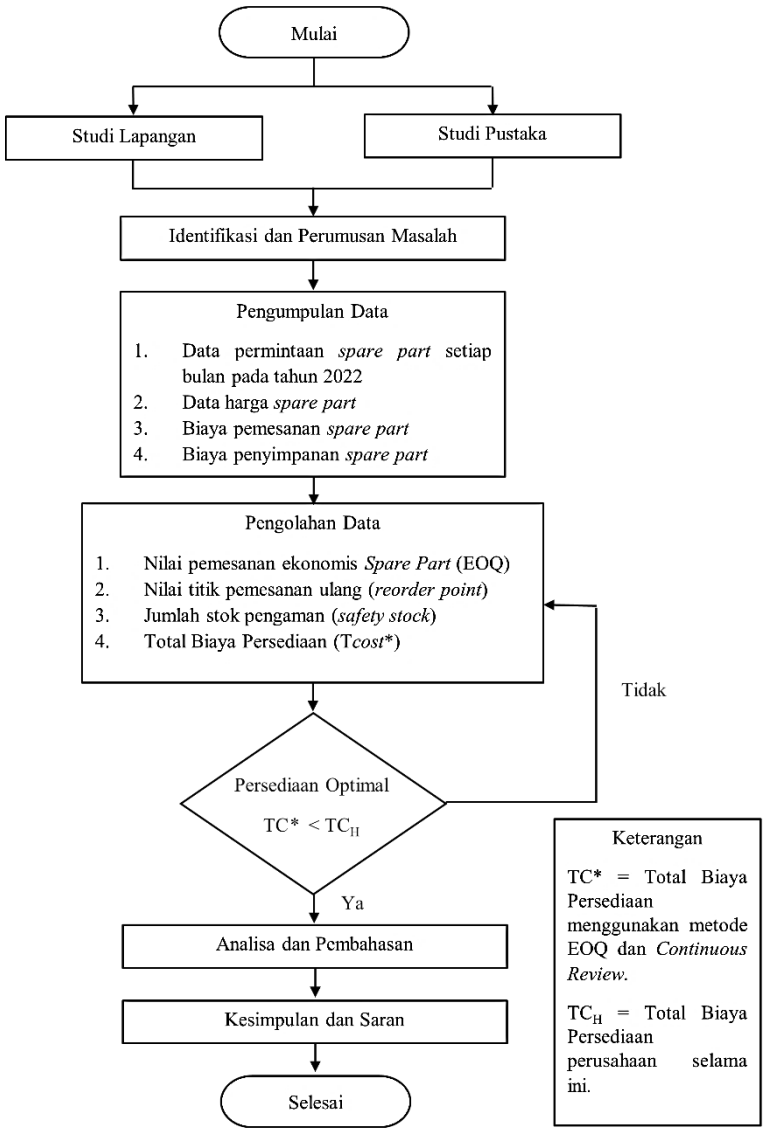
e) Total Inventory Costs

$$TC^* = Ob + Op + Os + Ok \quad (12)$$

Source: [10], [7], [16]

Research Flow

The following is the flow of activities during the research which can be seen in the following process flow diagram:



Picture 1. Research Process Flow Diagram

RESULT AND DISSCUSION

A. Spare Part *Request Data*

This research is on *spare parts oil* cooler, I WG 9725190102 air filter, diesel filter and *radiator cooler*. The data is contained in table 1. is the data on the demand for *spare parts* for one year.

Table 1. Spare part *request data* .

Period	*Oil Cooler* (*unit*)	Air Filter I WG 9725190102 (*unit*)	Filter Solar (*unit*)	*Radiator Cooler* (*unit*)
January	21	16	17	25
February	23	18	12	28
March	27	12	15	21
April	24	15	11	17
May	30	19	18	17
June	23	20	14	14
July	20	23	16	17
August	28	13	19	30
September	19	24	25	22
October	25	15	18	30
November	28	27	26	16
December	30	17	20	14
Total	**298**	**219**	**211**	**251**
Average	**24,83**	**18,25**	**17,58**	**20,92**

Source : Company Data

B. Inventory Costs

Inventory costs at the company consist of purchase costs, ordering costs and storage costs. The purchase cost made by the company is obtained based on the number of purchases for one year and the price per *unit* with orders for *spare parts* made once a month or as many as 12 times per year. So that the purchase cost was obtained of IDR 2,705,274,494. b) The cost of ordering in one year consists of the cost for office stationery of Rp 6,990, the cost for electricity in operating the computer of Rp 38,559, and the cost for communication of Rp 120,000. So that the total cost of ordering in one year is Rp 165,549. c) The cost of storing *spare parts* in the company consists of capital costs, insurance, taxes, transfers, storage, depreciation, obsolescence, and depreciation. In companies, storage costs have a value of 20% of the price per unit, so storage costs can be shown in table 2. next.

Table 2. Storage Fees

Item	Price Per *Unit*	Storage Fees
Oil Cooler	IDR 2,605,167	IDR 521,033
Air Filter I WG 9725190102	IDR 1,257,994	IDR 251,599
Filter Solar	IDR 415,336	IDR 83,067
Radiator Cooler	IDR 4,850,000	IDR 970,000

C. Results of EOQ Calculation and *Continuous Review*

Calculations using EOQ and *continuous review* are carried out as follows:

Iteration 1

Calculating standard deviation using equations (1)

$$s = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}}$$

$$s = \sqrt{\frac{\sum(21-24{,}83)^2+(23-24{,}83)^2+\cdots+(30-24{,}83)^2}{12-1}}$$

$s = 3{,}79$

Calculate the value of q01 using equation (2)

$$EOQ = q01 = \sqrt{\frac{2SD}{H}}$$

$$q01 = \sqrt{\frac{2\times298\times165.549}{521.033}}$$

Q01 = 14 *units*

Based on the value of q01, the value can be obtained using equation (3) with the cost of the shortage of α*spare parts* worth Cu = Rp 781,550 which is assumed to be 30% of the price per *unit* as follows:

$$\alpha = \frac{hq_0}{C_u D}$$

$$\alpha = \frac{521033\times14}{781550\times298}$$

$$\alpha = 0{,}03$$

Based on this value, the Z value in the normal distribution table can be determined at 1.87. So that the value αr_1 using equation (4) is.

$$r_1 = DL + Z_\alpha s\sqrt{L}$$

$$r_1 = 298 \times (4/260) + 1{,}87 \times 3{,}79\sqrt{4/260}$$

$r_1 = 5$ *Unit*

Next, calculate the value of N using an equation based on equation (6) of the table of partial expectations with the value , then the value and value are obtained.$Z_\alpha = 1{,}87 f(Z_\alpha) = 0{,}5656 \psi(Z_\alpha) = 0{,}0111$

$$N = S_L[f(Z_\alpha) - Z_\alpha\, \psi(Z_\alpha)]$$

$$N = 3{,}79 \times [0{,}5656 - 1{,}87 \times 0{,}0111]$$

N = 0.02 or 1 *unit*

Calculate the value of q02 using equation (5).

$$q_{02} = \sqrt{\frac{2D\left[A+C_u \int_{r1}^{\infty}(x-r_1)f(x)dx\right]}{h}}$$

$$q_{02} = \sqrt{\frac{2\times298\times[165549+(781550\times1)]}{521033}}$$

$q_{02} = 33$ *unit*

Calculate the value using equation (3) based on $q\alpha_{02}$.

$$\alpha = \frac{hq_{02}}{C_u D}$$
$$\alpha = \frac{521033 \times 33}{781550 \times 298}$$
$$\alpha = 0{,}074$$

Based on this value, the Z value in the normal distribution table can be determined at 1.45. So that the value αr_2 using equation (4) is.

$$r_2 = DL + Z_\alpha s\sqrt{L}$$
$$r_2 = 298 \times (4/260) + 1{,}45 \times 3{,}79\sqrt{4/260}$$
$$r_2 = 5 \textit{ unit}$$

In the first iteration is obtained $r_1 = 5$ and the one that has the same value and the iteration has been considered completed. So that an optimal inventory is obtained with $r_2 = 5$ *a reorder point* value (r) of r = r1 = r2 = 5 *units* and an economical order quantity (q0) of q0 = q02 = 33 *units*. Based on these results, the reserve stock or *safety stock* (SS) can be determined using equation (7) as follows.

$$SS = Z\, S\sqrt{L}$$
$$SS = 1{,}45 \times 3{,}79\sqrt{4/260}$$
SS = 1 *unit*

The results of the calculation from EOQ and *continuous review* were carried out in several iterations to obtain optimal results as shown in table 3.

Table 3. Results of Calculation of Order Quantity, *Safety Stock* and *Reorder Point*.

Item	Order Quantity (q0) (*unit*)	*Safety Stock* (SS) (*unit*)	*Reorder Point* (r) (*unit*)
Oil Cooler	33	1	5
Air Filter I WG 9725190102	31	1	4
Filter Solar	38	1	4
Radiator Cooler	29	2	5
Total	**131**	**5**	**18**

Table 3. shows the results of the optimal calculation using the *Economic Order Quantity* (EOQ) method and *continuous review* and obtained the quantity of orders made each time an order of 131 *units* is made when the inventory reaches the *reorder point*, which is 18 *units* with reserve inventory in the storage warehouse of 5 *units*.

Based on the results of the calculation in table 3., it can be determined that the expectations of the costs involved in inventory for one year so as not to interfere *with the company's cash flow* using equations (8) to (12) are as follows.

Purchase fee

$$O_b = D \times p$$

$O_b = 298 \times \text{IDR } 2{,}605{,}167$
$O_b = \text{Rp } 776.339.667$

Booking fee
$O_p = \frac{DA}{q_0}$
$O_p = \frac{298 \times \text{Rp } 165.549}{33}$
$O_p = \text{IDR } 1{,}498{,}841$
Storage costs
$O_s = \left(\frac{q_0}{2} + r - DL\right) \times h$
$O_s = \left(\frac{33}{2} + 5 - (298 \times (4/260)\right) \times \text{Rp } 521.033$
$O_s = \text{IDR } 8{,}929{,}566$
Shortage cost
$O_k = \frac{C_u D}{q_0} \int_r^{\infty} (x - r) f(x) dx$
$O_k = \frac{\text{Rp } 781.550 \times 298}{33} \times 1$
$O_k = \text{IDR } 7{,}075{,}952$
Total inventory costs
TC* = Ob + Op + Os + Ok
TC* = Rp 776.339.667 + Rp 1.498.841 + Rp 8.929.566 + Rp 7.075.952
TC* = Rp 793.844.026

Based on these calculations, the results of the calculation of the expected costs involved in the inventory are obtained as contained in table 4. next.

Table 4. Results of Inventory Cost Calculation Continuous *Review*.

Item	Purchase Fee (If)	Booking Fee (Op)	Storage Fee (Os)	Cons Fees (Ok)	Total Inventory Costs (TC*)
Oil Cooler	IDR 776,339,667	IDR 1,498,841	IDR 8,929,566	IDR 7,075,952	IDR 793,844,026
I Wg 9725190102 Air Filter	IDR 275,500,725	IDR 1,179,261	IDR 4,060,337	IDR 2,688,328	IDR 283,428,651
Filter Solar	IDR 87,635,999	IDR 909,824	IDR 1,651,252	IDR 684,780	IDR 90,881,855
Radiator Cooler	IDR 1,217,350,000	IDR 1,434,842	IDR 15,059,903	IDR 12,610,712	IDR 1,246,455,457
Total	**Rp 2.356.826.391**	**IDR 5,022,767**	**Rp 29.701.722**	**Rp 23.059.772**	**Rp 2.414.609.989**

In table 4, the results of the calculation of *spare parts* inventory of Rp 2,414,609,989 in one inventory cycle or one year using monthly demand are obtained.

D. Comparison of the Company's Total Cost of Inventory with *Continuous Review*

The following is the result of the recapitulation of inventory costs incurred using the company's policy based on the number of requests and use *of spare parts* in one year contained in table 5. below.

Table 5. Recapitulation of inventory costs by the company.

Item	Purchase Fee	Booking Fee	Storage Fees	Total Inventory Costs
Oil Cooler	Rp 896.177.333	IDR 165,549	IDR 521,033	Rp 896.863.916
I Wg 9725190102 Air Filter	Rp 323.304.504	IDR 165,549	IDR 251,599	Rp 323.721.652
Filter Solar	Rp 108.402.824	IDR 165,549	IDR 83,067	IDR 108,651,441
Radiator Cooler	IDR 1,377,389,833	IDR 165,549	IDR 970,000	IDR 1,378,525,382
Total	**IDR 2,705,274,494**	**IDR 662,197**	**IDR 1,825,699**	**IDR 2,707,762,389**

The results of the calculation of inventory costs using the policies implemented by the company are based on table 5. a value of IDR 2,707,762,389 was obtained.

Table 6. Comparison of Total Cost of *Spare Parts* Inventory.

Company Policy	*Continuous Review*	Savings	
		Total Cost	%
IDR 2,707,762,389	Rp 2.414.609.989	Rp 293.152.400	11%

Table 6 shows the comparison of the total inventory costs generated using the EOQ method and *continuous review* with the total inventory costs using the company's policies, resulting in a total cost savings of Rp 293,152,400 and a percentage savings of 11%.

CONCLUSION

In conclusion, fundamental findings from this study indicate that the implementation of the Economic Order Quantity (EOQ) model combined with continuous review significantly optimizes inventory management for spare parts, resulting in a total cost reduction of Rp 293,152,400, equating to an 11% savings compared to the company's current policies. **Implications** of these findings suggest that adopting such inventory

management techniques can enhance financial efficiency and operational effectiveness within the organization, thereby improving overall cash flow and resource allocation. However, **limitations** of this research include the reliance on historical demand data which may not fully capture future demand variability and the potential for external factors influencing supply chain dynamics that were not addressed in the analysis. **Further research** should explore the integration of predictive analytics and machine learning models to better forecast demand fluctuations and assess their impact on inventory strategies, along with a comprehensive examination of the effects of external market conditions on spare parts procurement and management**.**

REFERENCES

[1] A. O. B. Ginting, "Penerapan Data Mining Korelasi Penjualan Spare Part Mobil Menggunakan Metode Algoritma Apriori (Studi Kasus : CV . Citra Kencana Mobil)," *J. Inf. Technol. UNIMOR*, vol. 1, no. 2, pp. 70–77, 2021, doi: https://doi.org/10.32938/jitu.v1i2.1472.

[2] A. Y. Siahaan, L. Andrawina, and F. Yulianti, "Perancangan Kebijakan Persediaan Untuk Meminimasi Biaya Persediaan Suku Cadang Dengan Menggunakan Metode Continuous Review dan Periodic Review di PT FGH," *e-Proceeding Eng.*, vol. 8, no. 5, pp. 7572–7579, 2021.

[3] A. W. Pratiwi, I. Maflahah, and Asfan, "Controlling Vaname Shrimp (Litopenaeus Vannamei) Raw Material Inventories (Case Study at PT. Grahamakmur Ciptapratama Sidoarjo)," *PROZIMA (Productivity, Optim. Manuf. Syst. Eng.*, vol. 4, no. 1, pp. 37–46, 2020, doi: 10.21070/prozima.v4i1.1273.

[4] E. R. E. Wiriyani, "Analisis pengendalian persedian bahan baku crumb rubber dengan metode EOQ (economic order quantity) pada PT. golden energi mandiangin," *J. Inov.*, vol. 3, no. 1, pp. 31–36, 2020.

[5] W. Emar, Z. A. Al-Omari, and S. Alharbi, "Analysis of inventory management of slow-moving spare parts by using ABC techniques and EOQ model-a case study," *Indones. J. Electr. Eng. Comput. Sci.*, vol. 23, no. 2, pp. 1159–1169, Aug. 2021, doi: 10.11591/ijeecs.v23.i2.pp1159-1169.

[6] V. Jainuri and T. Sukmono, "Optimization of Inventory Cost Using the Continuous Review System (CRS) Method in Controlling the Need for Raw Materials for the Crimean Industry," *Acad. Open*, vol. 5, pp. 6–14, 2021, doi: 10.21070/acopen.5.2021.2205.

[7] M. Saiful and F. Achmadi, "Penentuan Quantity Order, Reorder Point Dan Safety Stock Melalui Continuous Review System dalam Situasi Ketidakpastian Permintaan (Studi Kasus : Persediaan Bahan Baku Produksi PT. X)," *Semin. Nas. Inov. dan Apl. Teknol. di Ind.*, vol. 5, no. 3, pp. 236–242, 2019, doi: https://doi.org/10.36040/seniati.v5i3.1074.

[8] R. M. Ariyani, Heriyono, and D. Ekawati, "Mekanisme Pengelolaan Persediaan

Sparepart Sepeda Motor Honda Pada PT . Bintang Motor Jaya , Tbk Cabang Cirebon," *J. EXCHALL*, vol. 2, no. 1, pp. 71–105, 2020.

[9] An. D. Priyanto, Y. C. Winursito, I. Nugraha, F. Sholeha, and H. S. Fanani, "Minimizing Cost of Milk Raw Material Inventory Using the Economic Order Quantity (EOQ) Method," *PROZIMA (Productivity, Optim. Manuf. Syst. Eng.*, vol. 7, no. 1, pp. 35–45, 2023, doi: 10.21070/prozima.v7i1.1611.

[10] E. Aryanny and Y. D. Kurniawan, "Analisis Pengendalian Persediaan Suku Cadang Housing Gowl Gravel Pump Warman Dengan Metode Periodic Review dan Continuous Review pada PT. XYZ," *Tekmapro J. Ind. Eng. Manag. Vol.15*, vol. 15, no. 01, pp. 13–24, 2020, [Online]. Available: http://tekmapro.upnjatim.ac.id/index.php/tekmapro%0AANALISIS

[11] H. Kartika and C. S. Bakti, "Usulan Perbaikan Persediaan Bearing 6004-2RSL Dengan Metode Economis Order Quantity Pada Divisi Sparepart di PT SI," *J. Ind. Eng. Manag. Res.*, vol. 1, no. 1, pp. 17–22, 2020.

[12] H. I. Unsulangi, A. H. Jan, and F. Tumewu, "Analisis Economic Order Quantity (EOQ) Pengendalian Persediaan Bahan Baku Kopi Pada PT. Fortuna Inti Alam," *J. EMBA*, vol. 7, no. 1, pp. 51–60, 2019.

[13] L. J. Krajewski, M. K. Malhotra, and L. P. Ritzman, *Operation Management: Processes and Suply Chains*, 11th ed. Pearson, 2016.

[14] S. N. Bahagia, *Sistem Inventori*. Bandung: Penerbit ITB, 2006.

[15] U. Trisnawati, P. A. W, and D. Pujotomo, "Rancangan Pengendalian Persediaan Spare Part Studi Kasus PT. Indonesia Power Unit Pembangkitan Semarang," *Ind. Eng. Online J.*, vol. 7, no. 1, 2018.

[16] M. H. Alim, "Analisa Persediaan Bahan Baku Menggunakan Metode Continuous Review System dan Periodic Review System di PT XYZ," *J. Teknol. dan Manaj. Ind. Terap.*, vol. 1, no. 3, pp. 163–172, 2022.

[17] A. W. Romariardi, M. Mustafid, and S. Suryono, "Penerapan Konsep Continuous Review (Q,r) Pada Model Economic Order Quantity (EOQ) Uutuk Mengoptimalkan Persediaan Bahan Baku Minuman," *J. Sist. Inf. BISNIS*, vol. 12, no. 1, pp. 66–72, Sep. 2022, doi: 10.21456/vol12iss1pp66-72.

[18] A. A. Istiningrum, L. M. Munandar, and Sono, "Reducing Spare Part Inventory Cost with Shortage Elimination through Probabilistic Economic Order Quantity," *KINERJA*, vol. 25, no. 2, pp. 179–191, Sep. 2021, doi: 10.24002/kinerja.v25i2.4371.

[19] M. H. Baihaqi and Z. F. Rosyada, "Analisis Pengendalian Persediaan Material Suku Cadang Standar Pada Pesawat NC 2121 Dengan Metode EOQ Studi Kasus: PT Dirgantara Indonesia," *Ind. Eng. Online J.*, vol. 11, no. 4, 2019.