Available online at: http://publikasi.mercubuana.ac.id/index.php/ijiem

IJIEM (Indonesian Journal of Industrial Engineering & Management)

ISSN (Print) : 2614-7327 ISSN (Online) : 2745-9063

Analysis of Cocoa Bean Inventory Control with Continuous (Q) and Periodic (P) Review System Methods at Majapahit Chocolate Factory

Shaffa Arindra Tuffahati*, Farida Pulansari

Department of Industrial Engineering, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Jl. Rungkut Madya No.1, Gunung Anyar, Surabaya 60294 Indonesia

ARTICLE INFORMATION

Article history:

Received: 6 June 2023
Revised: 14 June 2023
Accepted: 7 July 2023

Category: Research paper

Keywords:
Inventory control
Continuous review
Periodic review
Forecasting

DOI: 10.22441/ijiem.v4i3.20812

A B S T R A C T

Majapahit Chocolate Factory is one of the manufacturing industries that processes cocoa beans into various chocolate products called Majapahit Chocolate. In the production process, Majapahit Chocolate Factory has not controlled raw material inventory efficiently using any method so there is still a frequent mismatch between the amount of inventory and production needs. The higher the amount of inventory, the higher the inventory costs incurred. Based on these problems, this study aims to determine the control of cocoa bean inventory to minimize the total cost of inventory at the Majapahit Chocolate Factory. The results showed that the most minimal total inventory cost was the Continuous Review System method of IDR303,863,596.70 with a savings of 1% from the Periodic Review System method and 4% from the company method. After forecasting the need for raw materials for January-December 2023 using the Weighted Moving Average method, the total demand for cocoa beans during the 2023 period is 61752 kg. Meanwhile, the size of the order quantity is 5739 kg and the reorder point is 8234 kg, so the total inventory cost required in January-December 2023 is IDR1,278,081,375.44.

***Corresponding Author**

Shaffa Arindra Tuffahati
E-mail: shaffaarindra@gmail.com

This is an open access article under the **CC–BY-NC** license.

1. INTRODUCTION

In the current era of globalization, competition in the business world is becoming increasingly fierce, making business entities with good performance or performance that will survive. In running its business, a business entity cannot be separated from the operating costs that need to be incurred. To maintain profits, every business entity must have a strategy can control its inventory. Inventory is an active element in the production process of a business entity that is continuously acquired, modified, and sold to consumers. With good inventory management, a business entity can convert stored inventory into profit through sales as soon as possible (Vikaliana et al., 2020). Through the procurement of supplies, the ordering of raw materials can be adjusted to the production needs of the business entity, so that there are no excessive raw materials, and can minimize the costs incurred for the supply of raw materials (Setiawati and Hana, 2021).

Cocoa is one of the plantation commodities that has an important role in economic activities in Indonesia. According to data from the International Cocoa Organization (ICCO) as of November 30, 2022, global cocoa production is estimated to reach 4.82 million tons in 2021/2022. Of this amount, Indonesia ranks seventh out of the eight largest cocoa-producing countries in the world at 180,000 tons. Majapahit Chocolate Factory is one of the manufacturing industries that processes cocoa beans into various chocolate products called Majapahit Chocolate.

The control of raw material inventory at Majapahit Chocolate Factory has not been running efficiently, as evidenced by the amount of inventory that is higher than the raw material requirements. This condition indicates an excess of raw materials or overstock, as at the end of the 2022 period, there was an excess of 24,124.29 tons of cocoa beans. The condition of excess raw materials can be detrimental to the company because the higher the inventory, the higher the storage costs so the company can experience losses (Pratiwi et al., 2020).

The purpose of this study is to control the inventory of cocoa beans and to minimize the total cost of inventory at the Majapahit Chocolate Factory using the Continuous Review and Periodic Review methods. Both the Continuous (Q) Review method and the Periodic (P) Review method can be used to control inventory to avoid excess inventory and can be used to forecast and manage independent demand. In a continuous review system, inventory levels are continuously monitored, and orders are placed whenever inventory levels reach a predetermined reorder point.

In a periodic review system, inventory levels are reviewed periodically, and orders are placed with varying order quantities with fixed ordering periods (Alim and Suseno, 2022). There are several previous studies on inventory control of chocolate raw materials using the EOQ method where the data taken is inventory data for 3 months. In this study, the method used is Continuous (Q) and Periodic (P) Review System with inventory data for 1 year. Based on research conducted by Alim and Suseno (2022) found that using the continuous review system method can save inventory costs by 2.77%. In contrast to Alim, in a study conducted by Pratiwi et al., (2020) it was concluded that inventory costs using the periodic review system method could save costs by 150%.

2. LITERATURE REVIEW

Inventories are assets that include goods owned by the company that are intended to be sold within the normal business period, or an inventory of goods still in the production process, or inventory of raw materials intended for use in the production process (Vikaliana et al., 2020). Inventory control is the activity of collecting or storing commodities that will be used from time to time to meet demand. Inventory according to Siagian (2005) cited in the journal Ardiansah et al., (2019) has the following functions: Economic Function, Independence Function, Anticipation Function, and Flexibility Function.

According to Alam (2019) cited in Pulansari and Ikhsan, (2021), the costs arising from inventory include (a) Purchase Costs: the cost of acquiring a product, (b) Procurement Costs (Ordering Costs): costs incurred to place an order with a vendor or supplier. Ordering costs do not depend on the number of items ordered. Regardless of the items ordered, the ordering costs incurred are the same, (c) Inventory-Carrying Cost: this cost includes all expenses incurred by the company due to the volume of inventory stored. If inventory increases, costs will also increase, (d) Shortage Cost (Stock-out Cost): costs that must be incurred by the company due to running out of stock of goods in the warehouse.

Continuous Review System (CRS) often called Q-Model, is a method that takes into account that the resources or inventory of goods available in the warehouse are considered to have the same amount as the inventory in the deterministic system by increasing the safety stock. In Q-model inventory, the reorder rule is executed if the inventory point is already in the same position as the reorder point. Although the total order quantity is the same for each order in this model, the consecutive lead times will be different in length (Purba et al., 2022).

Periodic Review Method is a method in which

the time between two orders in inventory control is fixed. The order quantity of item ordered with the periodic review method is highly dependent on the remaining inventory at the end of the ordering period. Therefore, the size of the items ordered is always different for each order (Hendrayanti et al., 2023). According to Stevenson and Choung (2014) cited in the journal Ngantung et al., (2019), forecasting is a fundamental input in the operations management decision-making process to meet future needs with the aim of determining how much capacity or inventory is needed, making personnel decisions, making budgets, ordering goods from suppliers and partners according to the expected supply chain. The quantitative forecasting method is a forecasting method based on planning existing historical data without the subjective judgment of the person doing the forecasting. This method is based on previous data, which is then processed using various statistical methods to make it more objective (Sulistyowati et al., 2020). Extrinsic quantitative methods consider external factors that may affect future demand

3. RESEARCH METHOD

The research location was conducted at the Majapahit Chocolate Factory located in Claket Hamlet, Mojokerto Regency, East Java in April 2023 until the data was fulfilled. The object of this research is cocoa beans as the main raw material for making Majapahit Chocolate products.

The first step is to process inventory data with the company's actual method, Continuous (Q) and Periodic (P) Review System to obtain the minimum total inventory cost of the three methods. The second step is a forecasting analysis to determine the results of cocoa bean requirements in the coming period based on historical demand patterns. There are many factors in inventory management in the company, one of the main ones is random customer demand. Companies anticipate random customer demand through data recording into a set of historical demand data for a product. The company's historical data will form a data pattern that is useful for the company in forecasting the next product demand (Eunike et al., 2021). The next step is to calculate the total cost of inventory using a predetermined method based on the forecasting that has been done.

4. RESULT AND DISCUSSION

At this step, the data is processed using the company's method to determine the total cost of company expenses during the January-December 2022 period shown in Table 1.

Table 1. Cocoa beans usage and demand data for 2022

No	Month	Initial Inventory	Purchase	Demand	Excess
1	Jan	73,570.84	369.63	3,296,10	70,644.37
2	Feb	70,644.37	892.29	2,901.15	68,635.51
3	Mar	68,635.51	289.96	5,630.0	63,295.40
4	Apr	63,295.40	479.62	5,012.60	58,762.42
5	Mei	58,762.42	303.18	5,344.70	53,720.90
6	Jun	53,720.90	444.55	4,938.85	49,226.60
7	Jul	49,226.60	1,198.15	5,294.10	45,130.65
8	Agu	45,130.65	87.45	4,979.00	40,239.10
9	Sep	40,239.10	178.23	5,192.00	35,225.33
10	Okt	35,225.33	83.35	5,052.00	30,256.68
11	Nov	30,256.68	3,831.82	5,183.00	28,905.50
12	Des	28,905.50	421.79	5,203.00	24,124.29
Total			**8,580.02**	**58,026.57**	**568,166.75**

Company Method

Inventory cost data includes three main variables, namely the procurement cost of each order, the inventory-carrying cost in the form of a percentage of the price of goods per unit order per month, and the cost of shortages

a. Purchase Cost
   Ob = b x p = 8.580.02 x IDR 30.000
   = IDR 257.400.600
b. Procurement Cost
   Op = f x A = 12 x IDR 2.000.00
   = IDR 24.000.000
c. Inventory - Carrying Cost
   Os = h x m = IDR 500 x 4.835.55
   = IDR 36.366.606,25
d. Shortage Cost
   Ok = Nr x Cu = IDR 15.000 x 0
   = IDR 0
e. Total cost
   Or = Ob + Op +Os + Ok
   = IDR 317.667.206,25

So the total cost of inventory with the current conditions for cocoa bean raw materials from January to December 2022 is IDR317,667,206.25. After knowing the total cost of inventory in the current condition the

next step is to calculate using the Continuous Review method.

Continuous (Q) Review System

The calculation of the Q lost sales model using the Hadley-Within solution for cocoa bean raw materials will go through several iteration steps to get the optimal solution. The calculation results are shown in Table 2.

Table 2. Continuous review method calculation result

Iteration	Indicator	Result	Unit
1	Total needs (D)	58026.57	kg
	Standard deviation (S)	801.29	kg
	Order quantity (q_{01}^*)	5563	
	Possible shortage ($\boldsymbol{\alpha}$)	0.04574	
	Standard normal deviation ($\boldsymbol{Z\alpha}$)	1.685	
	Ordinal f($\boldsymbol{Z\alpha}$)	0.0965	
	Partial expectation $\boldsymbol{\psi(Z\alpha)}$	0.019	
	Reorder point (r_1^*)	7917	kg
	Shortage (N)	6.89	kg
	Order quantity (q_{02}^*)	5705	kg
	Possible shortage ($\boldsymbol{\alpha}$)	0.0469	
	Standard normal deviation ($\boldsymbol{Z\alpha}$)	1.675	
	Reorder point (r_2^*)	8227	kg
2	Ordinal f($\boldsymbol{Z\alpha}$)	0.09815	
	Partial expectation $\boldsymbol{\psi(Z\alpha)}$	0.01945	
	Shortage (N)	7	Kg
	Order quantity (q_{03}^*)	5707	kg
	Possible shortage ($\boldsymbol{\alpha}$)	0.0469	
	Standard normal deviation ($\boldsymbol{Z\alpha}$)	1.675	
	Reorder point (r_3^*)	8227	kg

In the second iteration, the value of r_2^* = 8227 with r_3^* = 8227 has the same value, so the iteration is not continued or completed. Total cost of inventory using the Continuous (Q) Review method is obtained as follows:

a. Safety Stock

$$SS = Z_{\propto} S\sqrt{L} \quad (1)$$

$$SS = (1{,}675)(801{,}29)\sqrt{4/30} = 490 \text{ kg}$$

b. Level of Service

$$\eta = 1 - \frac{N}{D_L} \quad (2)$$

$$\eta = 1 - \frac{6{,}89}{(58026{,}57)\left(\frac{4}{30}\right)} x\ 100\% = 99\%$$

c. Total Cost

$$O_T = Dp + \frac{AD}{q_0} + h\left(\frac{q_0}{2} + \mathrm{r} - D_l + N\right) + \frac{C_u D}{q_0} N \quad (3)$$

= IDR 303,863,596,7

The total cost of inventory for cocoa bean raw materials from January to December 2022 using the Continuous (Q) Review method is IDR303,863,596,7. Furthermore, the total inventory cost is calculated using the Periodic (P) Review System Lost Sales method

Periodic (P) Review System

The calculation of the P lost sales model using the Hadley-Within solution for cocoa bean raw materials will go through several iteration steps to get the optimal solution. The calculation results are shown in Table 3.

Table 3. Periodic review method calculation result

Iteration	Indicator	Result	Unit
1	Total needs (D)	58026.57	Kg
	Standard deviation (S)	801.29	Kg
	Order interval (T_{01}^*)	0.09587	Year
	Possible shortage ($\boldsymbol{\alpha}$)	24.74	
	Standard normal deviation ($\boldsymbol{Z\alpha}$)	1.685	
	Maximum inventory (R_1)	13946.32	Kg
	Ordinal f($\boldsymbol{Z\alpha}$)	0.0965	
	Partial expectation $\boldsymbol{\psi(Z\alpha)}$	0.019	
	Shortage (N)	24,74	Kg
	Total Cost (OT_0^*)	IDR1,832,961,706.53	IDR
	Ordinal f($\boldsymbol{Z\alpha}$)	0.0671	
	Partial expectation $\boldsymbol{\psi(Z\alpha)}$	1.495	
	Maximum inventory (R_1)	13873.43	Kg
	Ordinal f($\boldsymbol{Z\alpha}$)	0.09815	
	Partial expectation $\boldsymbol{\psi(Z\alpha)}$	0.01945	
	Shortage (N)	7	Kg
2	Ordinal f($\boldsymbol{Z\alpha}$)	5707	Kg
	Partial expectation $\boldsymbol{\psi(Z\alpha)}$	0.0469	
	Shortage (N)	33	Kg
	Total Cost (OT_0^*)	IDR1,835,468,821.63	IDR

The results of the second iteration show that the total cost value of the second iteration is higher than the first iteration. So the iteration is not continued and the first iteration is the optimal one. The total cost of inventory using the Periodic Review method is obtained as follows:

a. Safety Stock

$$SS = (1{,}685)(801{,}29)\sqrt{(0{,}09587 + 4/30)} = 646.6 \text{ kg}$$

b. Level of Service

$$\eta = 1 - \frac{N}{D_L} = 1 - \frac{24{,}74}{58026{,}57\ x\ \frac{4}{30}}\ x\ 100 = 99.68\%$$

c. Total Cost

$$O_T = Dp + \frac{AD}{q_0} + h\left(\frac{q_0}{2} + \mathrm{r} - D_l + N\right) + \frac{C_u D}{q_0} N$$

= IDR307,842,345.89

The total cost of inventory for cocoa bean raw materials from January to December 2022 using the Periodic (P) Review method is IDR307,842,345.89.

Based on the calculations that have been done, the Continuous (Q) Review method has a minimum total inventory cost compared to the Periodic (P) Review method with a difference in total inventory costs of IDR3,978,749.19 or a percentage of 1%. Meanwhile, when compared to the company's method, the total inventory cost of the Continuous Review (Q) method has a cost savings of IDR13,803,609.55 with a percentage of 4%.

Forecasting

The results of the data pattern of chocolate raw materials, that is, cocoa beans, are horizontal or stationary shown in Fig. 1.

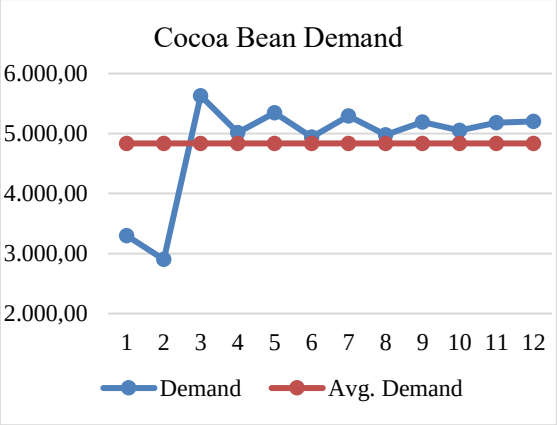

Fig. 1. Data pattern
Source: data processing

Forecasting accuracy measurement is a useful way to determine the error rate of forecasting results. There are several methods used such as Mean Absolute Deviation (MAD), Mean Square Error (MSE), and Mean Absolute Percentage Error (MAPE) (Israwan, 2022). The forecasting error will be compared shown in Table 4.

Table 4. Forecasting error results in Cocoa Bean Raw Material for January-December 2023

Type	SES 0.3	SES 0.5	WMA	MA
MAD	619.29	468.28	269.1	343.7
MSE	841,124.9	689,336.7	115,328.9	234,727
MAPE	12%	9.23%	5.25%	6.7%

Based on Table 4, the forecasting error measurement tool that has the smallest result for making planning production in January-December 2023 is the Weighted Moving Average (WMA) method. After obtaining the smallest MSE value, forecasting verification is carried out using the Moving Range Chart (MRC). The Moving Range Chart is designed to compare the actual demand value with the forecasting value in the same period. The map is developed for the next period to compare the forecast data with the actual demand (Kusmindari et al., 2019). Based on the forecasting results, the Moving Range Chart (MRC) results are obtained as shown in Fig. 2.

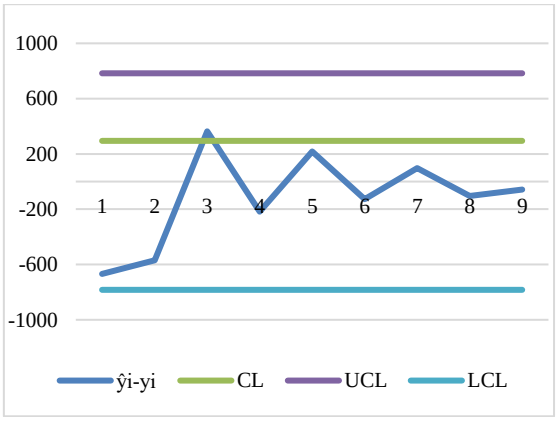

Fig. 2 Moving range chart
Source: data processing

$$\mathrm{CL} = \mathrm{MR} = \frac{\sum_{t=1}^{n} MR}{n-1} = 294.4257$$

UCL = +2.66 MR = 783.1723

LCL = -2.66 MR = -783.1723

Based on Fig. 2, it can be seen that the forecasting data for January 2023-December 2023 is within the control limits, so the Weighted Moving Average (WMA) method can be used to forecast cocoa bean raw materials in January 2023-December 2023. The results of forecasting the demand for cocoa beans for January 2023-December 2023 using the Weighted Moving Average (WMA) method are shown in Table 5.

Table 5. Forecasting demand period 2023

No.	Month	Forecast
1	January 2023	5146
2	February 2023	5146
3	Maret 2023	5146
4	April 2023	5146
5	May 2023	5146
6	June 2023	5146
7	July 2023	5146
8	August 2023	5146
9	September 2023	5146
10	October 2023	5146
11	November 2023	5146
12	December 2023	5146
Total	**61752**	

Based on the table above, the total demand for cocoa beans during the 2023 period is 61752 kg. After knowing the forecasting results, the next step is to calculate the inventory control of chocolate raw materials using the Continuous Review (Q) Lost Sales method.

a. Order Quantity **(**q_{01}^*)

$$q_{01}^* = \sqrt{\frac{2(2{,}000{,}000)(61752)}{7500}} = 5739 \text{ kg}$$

b. Possible Shortage (α)

$$\boldsymbol{\alpha} = \frac{(\mathbf{7500})(\mathbf{5739})}{(\mathbf{15.000})(\mathbf{61752})+(\mathbf{7500})(\mathbf{5739})} = \mathbf{0.0444} \text{ kg}$$

$$\boldsymbol{\alpha = 0,444 \rightarrow Z(\alpha) = 1.7}$$

$$\boldsymbol{Z(\alpha) = 1,7 \rightarrow f(Z\alpha) = 0.0940}$$

$$\boldsymbol{Z(\alpha) = 1,7 \rightarrow \psi(Z\alpha)} = 0.0183$$

c. Reorder Point (r_{01}^*)

$$r_1^* = (61752)(\tfrac{4}{30}) + (1{,}7)(801.29)\sqrt{4/30}$$

= 8234 kg

d. Shortage (N) and Order Quantity **(**q_{02}^*)

$$N=(0)\sqrt{4/30}\ [(0.094-(1.7)(0.0183)] = 0 \text{ kg}$$

$$q_{02}^* = \sqrt{\frac{2(61752)[2.000.000 + (15.000)(0)]}{7500}}$$

= 5739 kg

e. Possible Shortage (α) and Reorder Point (r_{02}^*)

$$\boldsymbol{\alpha} = \frac{(\mathbf{7500})(\mathbf{5739})}{(\mathbf{15.000})(\mathbf{61752})+(\mathbf{7500})(\mathbf{5739})} = \mathbf{0.0444} \text{ kg}$$

$$\boldsymbol{\alpha = 0,0444 \rightarrow Z(\alpha) = 1.7}$$

$$r_2^* = (61752)(\tfrac{4}{30}) + (1{,}7)(801.29)\sqrt{4/30}$$

= 8234 kg

In the first iteration, the value of $q^* = q_{02}^* = 5739$ and $r_1^* = r_2^* = 8234$, has the same value, so the iteration is not continued or completed. Thus, the following inventory policy can be obtained

a. Safety Stock

$SS = Z_{\alpha} S\sqrt{L} = (1{,}7)(80)\sqrt{4/30} = 0$ kg

b. Level of Service

$$\eta = 1 - \frac{N}{D_L} = 1 - \frac{60}{(61752)(\frac{4}{30})} x\ 100\% = 100\%$$

c. Total Cost

$$O_T = Dp + \frac{AD}{q_0} + h\left(\frac{q_0}{2} + \mathrm{r} - D_l + N\right) + \frac{C_u D}{q_0} N$$

= IDR1,235,040,000 + IDR21,520,687.72 + IDR21.520.687.72 + 0

=IDR1,278,081,375.44

Based on these calculations, the total inventory cost using the Continuous (Q) Review System Lost Sales method that must be incurred by the company for chocolate raw materials, which are cocoa beans, from January - December 2023 is IDR1,278,081,375.44 with a service level of 100% at an order quantity of 5739 kg and a reorder point of 8234 kg.

5. CONCLUSION

In the January-December 2022 period, the total cost of chocolate raw material inventory, namely cocoa beans using the Continuous (Q) Review Sytem Lost Sales method and the Periodic (P) Review Sytem Lost Sales method, respectively, was IDR303,863,596.70 and IDR307,842,345.89. The difference between the two methods is IDR3,978,749.19 or 1% with the total inventory cost of the Continuous (Q) Review Sytem Lost Sales method having the minimum value. Meanwhile, the total cost of inventory using the company's method or the company's actual conditions amounted to IDR317,667,206.25. Based on the comparison between the company's method and the Continuous (Q) Review Sytem Lost Sales method, savings of IDR 13,803,609.55 were obtained, which has a percentage of 4% of the total inventory cost of the company method.

Furthermore, for planning the need for raw materials for January-December 2023, forecasting with the Weighted Moving Average method obtained an order size of 5739 kg and a reorder point of 8234 kg. So the total inventory cost expenditure required in January 2023-December 2023 is IDR1,278,081,375.44. This research has limitations in the forecasting method used, that is the short-term forecasting method. Future research can use forecasting methods with medium to high periods such as ARIMA method.

REFERENCES

Alim, M. H., & Suseno. (2022). Analisa Persediaan Bahan Baku Menggunakan Metode Continuous Review System dan Periodic Review System di PT XYZ. *Jurnal Teknologi Dan Manajemen Industri Terapan*, *1*(3), 163–172. https://doi.org/10.55826/tmit.v1iiii.38

Ambarwati, R., & Supardi. (2020). *Manajemen Operasional dan Implementasi dalam Industri*. Pustaka Rumh Cinta.

Ardiansah, I., Pujianto, T., & Perdana, I. I. (2019). Penerapan Simulasi Monte Carlo dalam Memprediksi Persediaan Produk Jadi pada IKM Buluk Lupa. *Jurnal Industri Pertanian*, *01*(03), 61–69. http://jurnal.unpad.ac.id/justin/article/view/25748

Eunike, A., Setyanto, N. W., Yunianti, R., Hamdala, I., Lukodono, R. P., & Fanani, A. A. (2021). *Perencanaan Produksi dan Pengendalian Persediaan*. UB Press.

Hendrayanti, S., Fauziyanti, W., Estuti, E. P., Sari, C. T., & Indriastuti, A. (2023). (Ed.), *Manajemen Keuangan*. Nasya Expanding Management.

Herjanto, E. (2007). Metode Peramalan untuk Manajemen. *Manajemen Operasi*. Grasindo.

Ikhsan, B. N., & Pulansari, F. (2021). Analisa Pengendalian Persediaan Kayu Pinus Dengan Metode Continuous (Q) dan Periodic Review (P) di CV. XYZ. *Juminten : Jurnal Manajemen Industri dan Teknologi*, *2*, 157–168.

Indrawan, S., Suarlin, J., & Sirlyana, S. (2022). Penerapan Peramalan Produksi Produk Semen Di PT XYZ Guna Memenuhi Permintaan Konsumen. *Jurnal ARTI (Aplikasi Rancangan Teknik Industri)*, *17*(1), 91–97. https://doi.org/10.52072/arti.v17i1.367

Israwan, F. (2022). Mengukur Akurasi Peramalan. In *Teknik Peramalan pada Teknologi Informasi*. Get Press.

Kusmindari, C. D., Alfian, A., & Hardini, S. (2019). *Production Planning and Inventory Control*. Deepublish.

Ngantung, M., Jan, A. H., Peramalan, A., Obat, P., Ngantung, M., & Jan, A. H. (2019). Analisis Peramalan Permintaan Obat Antibiotik Pada Apotik Edelweis Tatelu. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, *7*(4), 4859–4867. https://doi.org/10.35794/emba.v7i4.25439

Pratiwi, A. I., Fariza, A. N., & Yusup, R. A. (2020). Evaluasi Persediaan Bahan Baku Dengan Menggunakan Pendekatan Metode Continuous Review System Dan Periodic Review System. *Opsi*, *13*(2), 120. https://doi.org/10.31315/opsi.v13i2.4137

Purba, B., Hasibuan, A., Sari, H. O., & Kurniawati, E. (2022). *Pengantar Manajemen Operasional*. Yayasan Kita Menulis.

Setiawati, S., & Hana, M. (2021). Pengaruh Persediaan Bahan Baku Terhadap Laba Bersih Perusahaan Pada Pt. Yokogawa Indonesia Jakarta. *Jurnal Lentera Akuntansi*, *6*(1), 77. https://doi.org/10.34127/jrakt.v6i1.435

Sulistyowati, C., Farihah, E., & Hartadinata, O. S. (2020). Peramalan Penjualan. In *Anggaran Perusahaan: Teori dan Praktika*. Scopindo Media Pustaka.

Vikaliana, R., Sofian, Y., Solihati, N., Adji, D. B., & Maulia, S. S. (2020). *Manajemen Persediaan.* Media Sains Indonesia.