Implementation of Continuous Review System Method, Periodic Review System Method and Min-Max Method for Cheese Powder Inventory (Case Study: PT. Mayora Indah TBK)

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Abstract. PT. Sejahtera Mitra Lestari is a company engaged in manufacturing industrial chemicals specifically for the rubber industry. The irregular placement of finished products in the storage can cause errors in the delivery of goods due to proper management for delivering goods with a relatively fast time. The effort to overcome this problem is through designing of warehouse layout with the Class-Based Storage method-grouping based on popularity. Stages of research carried out by calculating the warehouse, the frequency of displacement, the number of storage places, the displacement distance. Improvements begin by sorting material based on frequency and variations of three classes, namely A, B, C. To design the layout, information is needed when making a new inventory layout. The results showed that the layout of the optimal results could reduce the displacement distance by 17.19% in 6 months and allow space to be 73.91%.

Keywords: continuous review system; periodic system; min-max

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1. Introduction

In the modern era, every company will be faced with global market competition, where companies must be able to face intense competition with other companies. An optimal product will be available in the production process is carried out smoothly. Therefore, smoothness in the production process is closely related to proper inventory control. In the manufacturing industry, planning and control of production and inventory are very important. One of the planning and control activities in a company is material control. Material is an essential factor in supporting the continuity of the production process. But sometimes there are obstacles and obstacles experienced by manufacturing companies in carrying out the supply of materials and auxiliary materials to support the continuity of production process activities.

PT. Mayora Indah, Tbk is a company engaged in manufacturing food and beverage production. This company is located on Jalan Daan Mogot Km. 18 Jakarta - Indonesia. Substantial demand made of PT. Mayora Indah TBK requires proper inventory control planning. The problem that often occurs in this company is the discrepancy between the level of purchase of Cheese Powder material and the level of use that was being carried out. This excess material will result in a sizeable total inventory cost to be incurred by the company. The excess material will lead to high inventory on hand, which will lead to suboptimal storage costs and high ordering costs. This research has been investigated the implementation of continuous review system method, periodic review system method, and min-max method for cheese powder inventory in PT. Mayora Indah Tbk.

2. Research Methodology

This type of research used in this study is quantitative and the research method used to obtain data to observation in the field and library. The type of data used in this study consists of 2 types, namely; 1) quantitative data in the form of data obtained from companies in the form of numbers such as material purchase data, material usage data, save cost & order data, material price data, quantity on

hand data, and lead time. 2) Qualitative data in the form of data obtained from companies in the form of information, both oral and written, namely information about the description of activities such as inventory and scheduling of materials for production. And this study uses 2 data sources, namely: 1) primary data in the form of material images and ordering cost from interviews with PPIC division employees. 2) secondary data includes material purchase data, material usage data, storage cost data, material price data, quantity data on hand, and lead time. In this method, the P, Q, and Min-Max methods are calculated and made a comparison.

The data was taken from stock, purchase, and usage from January up to December 2018, and as for the usage and purchase data was collected in 2018, as shown in Table 1. Ordering or purchasing cost are costs directly related to ordering activities which were carried out by the company, such as at PT. Mayora Indah Tbk and the order was made to the supplier. Table 2 shows the total estimated cost of the material order. For storage cost, based on information was obtained from the company regarding the details of the cost-saving, the saving cost is 10% multiplied by the price per material. Calculation of saving costs for a month can be done by multiplying the amount of inventory saved by the company with the cost of saving per sheet per month, namely, 10% × Rp. 100.800,- = Rp. 10.080,-/kg/year = Rp. 840,-/kg /month. Calculation inventory cost of Cheese Powder in the Company Period from January up to December 2018.

Table 1. Data total usage and purchase of cheese powder

Month	Total Usage (kg)	Total Purchase (kg)
January	35,620	58,200
February	36,38	107,620
March	31,595	117,200
April	27,362	108,725
May	22,875	28,800
Jun	14,566	-
July	28,903	-
August	24,789	13,000
September	37260	63,200
October	27,343	63,200
November	34,367	13,000
December	39,837	26,000

Table 2. Total calculation cost of material orders

No.	Explanation	Total Amount (Rp)
1	Clearance Cost	1,858,400
2	Transportation Rental Cost	3,800,400
Total Ordering cost		5,758,400

Table 3. Total calculation of cheese powder inventory costs in the company

Month	Purchase Amount	Total Usage	The Remaining Amount Stock	Storage Cost	Purchase Frequency	Ordering Cost	Inventory Cost
January	58,200	35,620	60,563	50,872,920	4	23,033,600	73,906,520
February	107,600	36,285	131,878	110,777,520	5	28,792,000	139,569,520
March	117,200	31,595	217,483	182,685,720	5	28,792,000	211,477,720
April	108,000	27,362	298,121	250,421,640	6	34,550,400	284,972,040
May	28,000	22,875	303,246	254,726,640	1	5,758,400	260,485,040
June	-	14,566	288,680	242,491,200	0	-	242,491,200
July	-	28,903	259,777	218,212,680	0	-	218,212,680
August	13,000	24,789	247,988	208,309,920	1	5,758,400	214,068,320
September	62,000	37,260	272,728	229,091,520	2	11,516,800	240,608,320s
October	62,000	27,343	307,385	258,203,400	2	11,516,800	269,720,200
November	13,000	34,367	286,018	240,255,120	1	5,758,400	246,013,520
December	26,000	39,837	272,181	228,632,040	1	5,758,400	234,390,440
Total	595,000	360,802	2,946,048	2,474,680,320	28	161,235,200	2,635,915,520

From Table 3, the policies used by PT. Mayora Indah Tbk in controlling material supplies, costs incurred in the period January - December 2018 amounted to Rp. 2,635,915,520, with a total frequency of purchases 28 times a year.

2.1 Calculation of continuous review system method (Q)

$$\text{Economic Order Quantity: EOQ} = \sqrt{\frac{2SD}{iC}} \quad (1)$$

$$= 2 \times 5{,}758{,}400 \times 360{,}802$$
$$= 0.1 \times 100{,}800$$
$$= 20{,}303 \text{ kg}$$

2.2 Safety Stock (SS)

The value of the service level is very necessary (service level) to be achieved by the company is 99%. This means that the inventory held must be able to meet 99.82% demand level and be willing to accept the risk of losing potential sales of 0.18%, then obtained *z* of 2.9.

$$SS = z \times s \times \sqrt{L} \quad (2)$$
$$= 2.9 \times 7{,}220.37 \times \sqrt{1}$$
$$= 20{,}939 \text{ kg}$$

2.3 Reorder Point

$$ROP = (AU \times L) + SS \quad (3)$$
$$= (30{,}066 \times 1) + 20{,}939$$
$$= 51{,}005 \text{ kg}$$

Table 4. The total inventory costs for the January - December 2018 period, along with a material inventory chart

Month	Purchase Amount	Total Usage	The remaining amount stock	Storage cost (Rp)	Purchase Frequency	Ordering Cost (Rp)	Inventory Cost
January	40,606	35,620	15,363	12,904,920	4	11,516,800	24,421,729
February	40,606	36,285	19,684	16,534,560	5	11,516,800	28,051,360
March	40,606	31,595	28,695	24,103,800	5	11,516,800	35,620,600
April	40,606	27,362	41,939	35,228,760	6	11,516,800	46,745,560
May	0	22,875	59,670	50,122,800	1	-	50,122,800
June	40,606	14,566	45,104	37,887,360	0	11,516,800	49,404,160
July	0	28,903	56,807	47,717,880	0	-	47,717,880
August	40,606	24,789	32,018	26,895,120	1	11,516,800	38,411,920
September	40,606	37,260	35,364	29,705,760	2	11,516,800	41,222,560
October	40,606	27,343	48,627	40,846,680	2	11,516,800	52,363,480
November	0	34,367	54,866	46,087,440	1	-	46,087,440
December	20,303	39,837	15,029	12,624,360	1	5,758,400	18,382,760
Total	345,151	360,802	453,166	380,659,440	28	97,892,800	478,552,240

From Table 4 show the total inventory cost incurred in the period on January up to on December 2018 based on the Q method was Rp 478,552,240.00.- with a total frequency of purchases 17 times a year.

2.4 Calculation of periodic review system method (P)

Order period at P

$$P = \sqrt{\frac{2S}{iCD}} \quad (4)$$

$$P = \sqrt{\frac{2 \times 5.{,}58{,}400}{0.1 \times 100{,}800 \times 360{,}802}}$$

$$= 0.72 = 17 \text{ days}$$

where: 1 year = 292 working days

2.5 Safety Stock (SS)

$$SS = z \times \sqrt{P + L \times s} \quad (5)$$
$$= 2.9 \times \sqrt{0.72 + 1 \times 7220.37}$$

= 27,430 kg

2.6 Target availability (T)

$$T = \{(P + L) \times AU\} + SS \quad (6)$$

= {(0.72 +1) × 30,066} + 27,430= 79,143 kg

The following material inventory chart

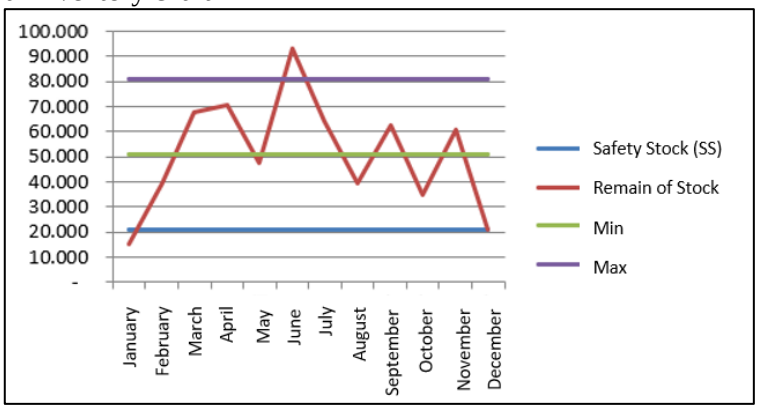

Figure 1. Cheese Powder Inventory Chart with the Min-Max Method

3. Results and Discussions

By using the min-max method, the minimum stock value is 51,005 kg, and the minimum stock is 81,071 kg. Then based on data processing, obtained order quantities for one order are 30,066 kg. From the calculation results, the total inventory cost using the min-max method is Rp 586,650,000 to hold 360,792 kg of material with a purchase frequency of 12 times a year. The details of the costs in the min-max method are the ordering cost of Rp 69,100,800 and the storage cost of Rp 517,549,200.

Table 5. Comparison of Method and Company Results for January - December 2018 Period

Comparison	Company	Q Method	P Method	Min-Max Method
Total Ordering (Kg)	595,000	345,151	394,824	390,858
Purchase Frequency	28	17	15	13
Ordering Cost (Rp)	161,235,200	97,892,800	86,376,000	74,859,200
Storage Cost	2,474,680,320	389,659,440	529,962,720	517,549,200
Total the remaining amount stock	2,635,915,520	478,552,240	616,338,720	592,408,400

Table 6. Comparison of Method and Company Results for January - December 2018 Period

Comparison	Company	Q Method	P Method	Min-Max Method
Total Ordering (Kg)	595,000	345,151	394,824	390,858
Purchase Frequency	28	17	15	13
Ordering Cost (Rp)	161,235,200	97,892,800	86,376,000	74,859,200
Storage Cost (Rp)	2,474,680,320	389,659,440	529,962,720	517,549,200
Total the remaining amount stock (Rp)	2,635,915,520	478,552,240	616338,720	592,408,400
Reduction in Inventory Cost (Rp)		2,157,363,280	2,019,576,800	2,043,507,120
Efficiency		82%	77%	78%

Controlling Cheese Powder material inventory at PT. Mayora Indah Tbk is advised to use the Q Method because this method can save booking and storage costs. Material inventory control research at PT. Mayora Indah Tbk. By using the Q method, can be continued for other materials to manage inventory with the total cost criteria.

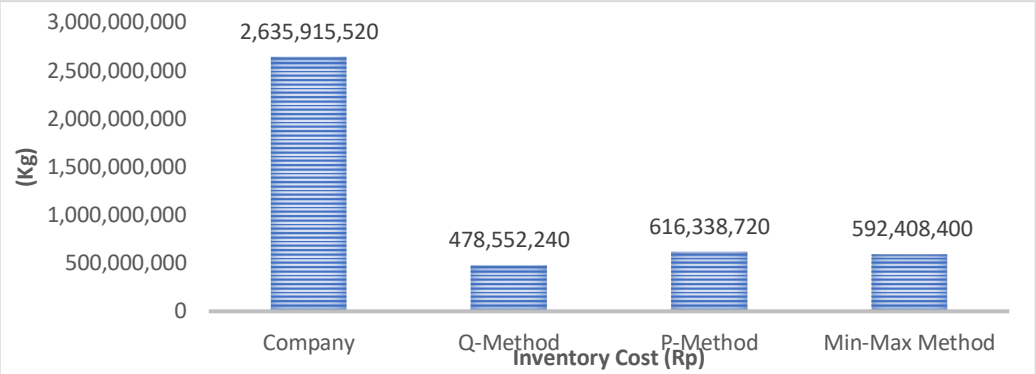

Figure 2. Comparison of Total Inventory Cost

Figure 2 shows the comparison graph of total inventory costs that the total inventory cost if using the company's primary method is the highest compared to the other three methods. Among the Methods Q, P and Min-max, it is obtained data that the Method Q produces the lowest total inventory cost; this is because in addition to the low safety stock for the number of purchases and the lowest final stock amount when compared with other methods.

4. Conclusions

Implementation of continuous review system method, periodic review system method, and min-max method for cheese powder inventory have been investigated at PT. Mayora Indah Tbk. Conclusions are obtained as follows:

- Based on the results of data processing that has been done, Method Q produces a total inventory cost of Rp. 478,552,240, - with an efficiency of 82%, Method P produces a total inventory cost of Rp. 616,338,720, - with an efficiency of 77%, and the Min-Max Method produces a total inventory cost of Rp. 592,408,400 with an efficiency of 78%.
- Based on the results of the comparison with the minimum total cost criteria, the Q Method is obtained as the method that produces the most optimal inventory level with the smallest total cost of Rp. 478,552,240 - with an efficiency of 82% of the total inventory costs incurred by the company.

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