International Journal of Scientific and Academic Research (IJSAR) ISSN: 2583-0279
Volume 2, Issue 4, April – 2022
www.ijsar.net
CrossRef DOI: 10.54756/IJSAR.2022.V2.i4.2

Inventory Control of Vegetable Oil Products Using Continuous Review System (Q) Approach and Periodic Review System (P) Methods in Retail Companies: A Case Study of Indonesia

Muhammad Kholil

Industrial Engineering

Mercu Buana University, DKI Jakarta, Indonesia

ABSTRACT

Retail companies are businesses that have a significant role in providing quality staples to improve public health. Every retail company wants the production inventory control system to run well to meet consumer demand. Suppose the amount of inventory in a retail company is too small. In that case, it will disrupt consumer demand for products that consumers want to buy and lose the opportunity to earn profits if an order is more significant than forecast. Meanwhile, if product inventory exceeds the need for a product, it will cause high costs, and if stock is stored for too long, it will result in damage and expiration. This retail company sells quality products and provides a wide range of excellent and complete products and makes it easier for customers to find their needs as one of the best. A company that needs to have a product control system to maintain sales and sell quality products and finally compete with other national and foreign retail companies. However, the current product inventory processing is not optimal because it is only based on previous inventory data. It can be seen from the varying amount of inventory and the high frequency of ordering. This study aims to obtain the most optimal comparison results by using the minimum total cost criteria and minimizing the cost of purchasing the product. This study compares two methods, namely the Continuous Review System (Q) method and the Periodic Review System (P) method. The most suitable method was the Q method with the total inventory cost of Vegetable Oil Products of Rp in this study. 13,371,600 with an efficiency of 42% of the entire inventory costs incurred by retail companies.

Key Words: *Inventory, Inventory Control, Continuous Review System (Q), Periodic Review System (P).*

1. INTRODUCTION

Retail companies are businesses that have a significant role in providing quality staples to improve people's health status. To achieve the desired goals, retail companies must perform well, from product inventory to marketing distribution. Retail companies do not only compete with national retail companies but also with foreign retail companies such as Carrefour (France), Lotte Mart (Japan) & Metro (Germany), national retail companies such as Transmart Matahari, Superindo, Hypermart, Hero Supermarket, Indomaret, Alfamidi, Alfamart, and Yogya so that the competition is very tight, consumers choose products with competitive prices, quality, and satisfactory service. An example is one of the retail companies that just started running in 2015. The products sold include food, drinks, fruits, cleaning, electronics, seasonal products, fashion, baby gear, glassware, toys, automotive, and accessories. To promote and sell the products sold in the company, the company continues to develop its business through intensive marketing to introduce the company to the public. Examples of products to be researched can be seen in Figure 1 below:

Figure 1 Oil Products 2 liters

Every retail company wants the production inventory control system to run well to meet consumer demand. Suppose the amount of inventory in a retail company is too small. In that case, it will disrupt consumer demand for products that consumers want to buy and lose the opportunity to earn profits if the order is more significant than forecast. Meanwhile, if product inventory exceeds the need for a product, it will cause high costs, and if stock is stored for too long, it will result in damage and expiration [1-7]. Therefore, companies need to make efforts to manage inventory effectively and efficiently.

In the P method, the number of raw materials ordered each fixed period depends on the inventory level at the time of the order P, which remains dependent on the inventory level at the time of ordering and the desired maximum inventory level. In contrast, the inventory will be safe (fulfilled) during the lead time in the Q method. , namely at the inventory level R (Reorder Point) if the inventory ordering point is Sundhari, [8-9] for raw materials so that there is no shortage or excess of raw materials which are at two levels, namely the maximum level and the minimum level [9-13]., Inventory control techniques have been studied previously by Simbolon [13-18]., that the results of calculations using the P method (Periodic Review System) can reduce costs by Rp. 837,291, while the results of calculations using the Q method (Continuous Review System) show that the Q method is optimal, meaning that the company can reduce the total cost of inventory with a cost efficiency of Rp. 3,098,918. In addition, Mahardika's [18-20] research showed that the Periodic Review System (P) method could reduce the total inventory cost by 8.54% lower with an increase in service level of 1.11%. Meanwhile, research was conducted by Kinanthi [21-22].

This company is a company engaged in the retail sector. The company resells high-quality products for its staple product line. This retail company is one of the companies that need to have a goods control system to maintain the continuity of its products, sell quality products, and finally compete with other national retail companies and overseas retail companies. In the procurement of goods, the company places an order based on previous inventory data. This retail company has customer demand that changes every time (fluctuating), which causes problems in predicting the purchase of goods. Oil products are the most widely used products for various household and business needs; the following is the oil demand which varies from January 2020 - to December 2020. The data for the variation in order can be seen in Figure 2 below.

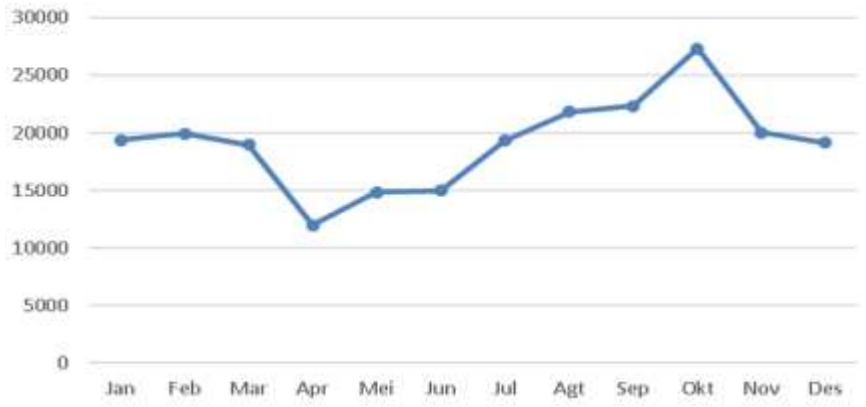

Figure 2: Demand Variance Graph

The problem that often occurs in oil products is very high inventory costs. Therefore, companies need to manage inventories effectively and efficiently because oil products are the most purchased products in large quantities. Following 3 indicates 3 Inventory Graph of vegetable oil products January 2020.

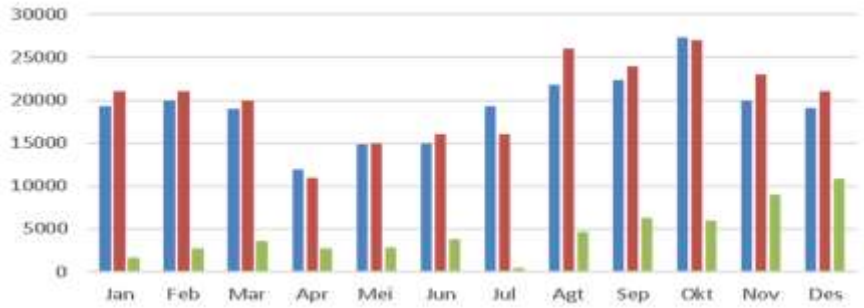

Figure 3 Inventory Graph of vegetable oil products January 2020 - December 2020

This happened to overcome lost sales or unfulfilled customer requests; this retail company made a policy to increase the size of orders to suppliers and determine the amount of inventory. This measure can reduce lost sales and cover the soaring demand at certain times. Based on the above background, to conduct research on the problem of inventory control to control the inventory of vegetable oil products with minimum total cost criteria and because the demand for goods is probabilistic due to varying demand for goods, the authors conduct research using the Continuous Review System (Q) method. And the Periodic Review System (P)

DOI: 10.54756/IJSAR.2022.V2.i4.2

method. The results of the study are made in the final project entitled "Analysis of Vegetable Oil Product Inventory Control Using an Approach Using the Continuous Review System (Q) Method and the Pariodic Review System (P) Method in Retail Companies."

2. RESEARCH METHOD

This study uses the continuous review system (Q) inventory control method and the periodic review system (P) method by comparing the order quantity of each method and the minimum total cost of each method. So it requires several steps, namely:

1. Analysis of stock needs in supporting the retail store sales process.

   At this stage perform an analysis of the request order/product needs Vegetable to oil many order quantities. In the analysis of the need for the use of Vegetable Oil Products, the research defines:

   a. How much is the need for Vegetable Oil Sales
   b. What is the lead time of Vegetable Oil Products
   c. How much is the safety stock of Vegetable Oil Products

2. Analysis of the minimum total cost of product inventory costs

   To determine the minimum inventory cost of Vegetable Oil Products based on the total cost criteria, the research requires several steps. The steps taken by the researcher are:

   a. Knowing the cost of ordering vegetable oil products
   b. Knowing the cost of storing vegetable oil products
   c. Knowing and further analyzing the total cost of inventory

3. RESULT

3.1. Method Comparison Results

Based on the results of calculations from inventory management by retail companies, the Q method and the P method for vegetable oil products during 2020 can be seen in the following graph:

Table 1 Comparison of Method and Company Results

Ratio	Actual	Methods	
	Company	Method Q	Mehod P
Order Quantity (pcs)	4817	4662	4990
Order Fee	Rp 19,017,000	Rp 2,982,000	Rp 2,592.000
Purchase Frequency	90	14	16
Storage Fee	Rp 3,913,650	Rp 10,389,600	Rp 10.930.950
Total Inventory Cost/year	Rp 23,083,650	Rp 13,371,600	Rp 13.522.950

3.1.1. Total Company Inventory Cost

From the data on the number of sales of vegetable oil products obtained in the period January 2020 - to December 2020, there were quite significant fluctuations. To meet demand, the company purchased 4817 cartons of vegetable oil products with details of ordering costs of Rp. 19,017,000 and storage expenses of Rp. 3,913,650, and the total inventory cost for January 2020 - December 2020 was Rp. 23,083,650.

3.1.2. Total Cost of Inventory Q . Method

Using the Q method, we get an economic order quantity of 348 cartons; then, with a service level of 99.9%, we get a safety stock of 492 cartons and a reorder point of 564 cartons. To procure 4,872 cartons of vegetable oil products with a purchase frequency of 14 times a year. The details of the costs in the Q method are the ordering costs of Rp. 2,982,000 and the storage costs of Rp. 10,389,600. So from the results of these calculations, the total inventory costs with the Q method are Rp. 13,371,600.

3.1.3. Total Inventory Cost Method P

Using the P method, the optimal ordering period is 0.075 years or 27 days. They then obtained a safety stock of 467 cartons. Then, with a service level of 99.9%, the target for the supply of vegetable oil products is 555 cartons. To procure 4990 cartons of

DOI: 10.54756/IJSAR.2022.V2.i4.2

vegetable oil products with a purchase frequency of 16 times a year. The details of the costs in the P method are the ordering costs of Rp. 2.592,000 and the storage costs of Rp. 10,930,950. So from the results of these calculations, the total inventory costs with the P method are Rp. 13,522,950.

3.2. Comparative Result Analysis

From the results of the comparison method, the company is used as a basis for comparison; the efficiency of inventory costs for vegetable oil products during the period January 2020 - to December 2020 can be seen in Table 2 below:

Table 2 Comparison of Inventory Cost Efficiency Values

Ratio	current	Methods	
	Company	**Method Q**	**Method P**
Order Quantity (pcs)	4817	4662	4990
Order Fee	Rp 19,017,000	Rp 2,982,000	Rp 2.592.000
Purchase Frequency	90	14	16
Storage Fee	Rp 3,913,650	Rp 10,389,600	Rp 10.930.950
Total Inventory Cost	Rp 23,083,650	Rp 13,371,600	Rp 13.522.950
Efficiency		**42%**	**41%**

Based on table 2, the company made purchases 90 times with 4817 cartons of material. If the company uses the Q method, the frequency of purchases is 14 times, with the number of product purchases being 4662 cartons, where each order is 348 cartons. The company can save the total inventory cost of Rp. 9,712,050 or a production efficiency of 42%. The P method produces an efficiency of 41% or can hold the total inventory cost of Rp. 9.560.700. In this study, the criteria for selecting the best method is the method that has the minimum or least total inventory. The data processing that has been carried out in chapter IV shows that the Q method is the method that incurs the least amount of inventory costs for a year in the period January 2020 – to December 2020.

Figure 4 Comparison Graph of Total Inventory Cost

It can be seen in Figure 4 that the comparison graph of the total cost of inventory shows that the total cost of stock when using company data is the highest. The company's data requires more purchasing frequency than Method Q and Method P, even though the service level is the same. So the ordering costs incurred when using company data will be even greater.

4. CONCLUSION

Conclusion

Based on the results of data processing related to inventory management in retail companies, which have been discussed in chapter IV and analyzed in chapter V, the following conclusions are obtained:

1. Based on the results of data processing that Method Q has carried out with the number of economic orders of as many as 348 cartons, safety stock of as many as 492 cartons, and reorder points of as many as 564 cartons, resulting in a total inventory cost of Rp. 13,371,600 with an efficiency of 42% and Method P with an order period of 16 days, safety stock of 467 cartons, and reorder point of 555 cartons, resulting in a total inventory cost of Rp. 13,522,950 with an efficiency of 41%.

DOI: 10.54756/IJSAR.2022.V2.i4.2

2. Based on the comparison results with the criteria for the total inventory cost, the Continuous Review System (Q) method was obtained with the number of economic orders of as many as 348 cartons, the number of safety stock of as much as 492 cartons and the number of reorder points as many as 546 cartons, the method that produces the most optimal inventory level with a minimum total the cost is Rp. 13,812,600 with an efficiency of 42% of the total inventory costs incurred by the company.

Suggestion

The suggestions for the company are as follows:

1. Control of the supply of vegetable oil products in this retail company is recommended using the Continuous Review System (Q) method because this method can save the total inventory cost compared to the P method used in this study.

2. Research on product inventory control in retail companies using the Continuous Review System (Q) method can be continued for other products to manage inventory levels with the criteria of total inventory costs.

REFERENCES

1. Haekal, J., Hanum, B., & Adi Prasetio, D. E. 2020. Analysis of Operator Body Posture Packaging Using Rapid Entire Body Assessment (REBA) Method: A Case Study of Pharmaceutical Company in Bogor, Indonesia. *International Journal of Engineering Research and Advanced Technology - IJERAT (ISSN: 2454-6135)*, *6*(7), 27-36.
2. Hanum, B., Haekal, J., & Adi Prasetio, D. E. . 2020. The Analysis of Implementation of Enterprise Resource Planning in the Warehouse Division of Trading and Service Companies, Indonesia . *International Journal of Engineering Research and Advanced Technology - IJERAT (ISSN: 2454-6135)*, *6*(7), 37-50.
3. Kholil, M., Haekal, J., Eko Adi Prasetio, D. ., & Sulaiman Hasan. 2020. The Lean Manufacturing Design For Improving Production Scheduling Using Product Wheel Method in Chemical Manufacturing Company, Indonesia. *International Journal of Engineering Research and Advanced Technology - IJERAT (ISSN: 2454-6135)*, *6*(8), 12-18.
4. Haekal, J., & Setio, H. 2017. Selection of Raw Material Suppliers Using Analytical Hierarchy Process in Food and Beverage Company, South Jakarta. *ComTech: Computer, Mathematics and Engineering Applications*, *8*(2), 63-68.
5. HAEKAL, J. (2018). *PERANCANGAN DAN EVALUASI IMPLEMENTASI SISTEM MANAJEMEN MUTU ISO 9001: 2015 MELALUI KEPUASAN PELANGGAN DI UNIVERSITAS ISLAM AS-SYAFI'IYAH* (Doctoral dissertation, Universitas Mercu Buana Jakarta).
6. Kholil, M., Haekal, J. H, Sulaiman. 2020. Lean Manufacturing Design to Reduce Waste in Gear Production Process Using VSM and Kaizen Method Approaches (Case Study: Gear Primary Driven K56 Product). *Journal of Scientific and Engineering Research.* 7(8), 1-9
7. Haekal, J., & Prasetio, D. E. A. Planning Of Production Facilities Layouts In Home Industry With The Systematic Layout Planning Method.
8. haekal, J., & Setiawan, I. (2020). Comparative Analysis of Raw Materials Control Using JIT and EOQ method For Cost Efficiency of Raw Material Supply in Automotive Components Company Bekasi, Indonesia. *International Journal of Engineering Research and Advanced Technology (ijerat)*, *6*(10), 76-82. https://doi.org/10.31695/IJERAT.2020.3661
9. Haekal, J., Hanum, B., & Adi Prasetio, D. E. 2020. Application of Quantitative Strategic Planning Matrix (QSPM) For Determination of Alternative Strategies in Food and Beverage SMES in Bogor Indonesia. *Journal of Scientific and Engineering Research.* 7(7), 137-145
10. Hanum, B., Haekal, J., & Adi Prasetio, D. E. . 2020. SPHC Material Inventory Control Analysis in Project VL01 Centralized by the EOQ Method in Automotive Company Indonesia. *Journal of Scientific and Engineering Research.* 7(7), 130-136
11. Haekal, J. . 2021. Application of Lean Six Sigma Approach to Reduce Worker Fatigue in Racking Areas Using DMAIC, VSM, FMEA and ProModel Simulation Methods in Sub Logistic Companies: A Case Study of Indonesia. *International Journal of Engineering Research and Advanced Technology (ijerat) (E-ISSN 2454-6135) DOI: 10.31695/IJERAT*, *7*(6), 1–11. https://doi.org/10.31695/IJERAT.2021.3716
12. Indra Almahdy, Muhammad Kholil, Jakfat Haekal, Arie Firmansyah, & Dede Rukmayadi. 2021. Implementation of Lean Manufacturing to Reduce Waste in the Maintenance Section in National Automotive Sub Companies of Indonesia . *International Journal of Engineering Research and Advanced Technology (ijerat) (E-ISSN 2454-6135) DOI: 10.31695/IJERAT*, *7*(9), 5–12. https://doi.org/10.31695/IJERAT.2021.3729
13. Atep Afia Hidayat, Muhammad Kholil, Jakfat Haekal, Wahyu Erka Sandra, & Dede Rukmayadi. 2021. Lean Manufacturing Design to Reduce Waste in Customer Complaint Services Using Lean Principles in Coil Industry Companies, of Indonesia. *International Journal of Engineering Research and Advanced Technology (ijerat) (E-ISSN 2454-6135) DOI: 10.31695/IJERAT*, *7*(9), 13–22. https://doi.org/10.31695/IJERAT.2021.3728
14. Muhammad Kholil, Jakfat Haekal, Adizty Suparno, Muhammad Rizki, & Tri Widodo. (2021). Integration of Lean Six sigma in Reducing Waste in the Cutting Disk Process with the DMAIC, VSM, and VALSAT Method Approach in Manufacturing Companies. *International Journal of Engineering Research and Advanced Technology (ijerat) (E-ISSN 2454-6135) DOI: 10.31695/IJERAT*, *7*(9), 26–42. https://doi.org/10.31695/IJERAT.2021.3730
15. Kholil, M., Haekal, J., Suparno, A., Savira, D., Widodo, T. 2021. Lean Six sigma Integration to Reduce Waste in Tablet coating Production with DMAIC and VSM Approach in Production Lines of Manufacturing Companies. *International Journal of Scientific Advances ISSN: 2708-7972*. 2 (5), 719-726

DOI: 10.54756/IJSAR.2022.V2.i4.2

16. Almahdy, I., Kholil, M., Haekal, J., Widodo, T. 2021. Control Analysis of Medicine Inventories Using ABC, VEN, and EOQ Approach in Pharmaceutical Companies. *International Journal of Scientific Advances ISSN: 2708-7972.* 2 (5), 708-712
17. Haekal, J. 2021. Improving Work Efficiency and Productivity with Line Balancing and TPS Approach and Promodel Simulation on Brush Sub Assy Line in Automotive Companies. International Journal of Scientific Advances ISSN: 2708-7972. 2 (3), 387 - 397
18. Kholil, M., Alfa, B.N., Maulana, I., Hendri and Hidayat, A.A., 2018, November. Quality analysis of trolley shopping cart with six sigma approach. In *AIP Conference Proceedings* (Vol. 2030, No. 1, p. 020306). AIP Publishing LLC.
19. Koeswara, S., Kholil, M. and Pratama, Z., 2018, November. Evaluation on Application of Queuing Theory On Payment System in the Supermarket "Saga" Padang Pariaman West Sumatra. In *IOP Conference Series: Materials Science and Engineering* (Vol. 453, No. 1, p. 012045). IOP Publishing.
20. Hidayat, A.A. and Kholil, M., 2018, November. The Implementation of FTA (Fault Tree Analysis) and FMEA (Failure Mode And Effect Analysis) Methods to Improve the Quality of Jumbo Roll Products. In *IOP Conference Series: Materials Science and Engineering* (Vol. 453, No. 1, p. 012019). IOP Publishing.
21. Almahdy, I., Kholil, M. and Yasin, M.Y., 2018, November. A Case of Study on Correlation between Age, Noise Level, and Productivity at Barge in Oil Industry. In *IOP Conference Series: Materials Science and Engineering* (Vol. 453, No. 1, p. 012009). IOP Publishing.
22. Kholil, M., Alfa, B.N. and Hariadi, M., 2018, April. Scheduling of house development projects with CPM and PERT method for time efficiency (Case study: House type 36). In *IOP Conference Series: Earth and Environmental Science* (Vol. 140, No. 1, p. 012010). IOP Publishing.

C. Author mail: muhammad_kholil@mercubuana.ac.id

DOI: 10.54756/IJSAR.2022.V2.i4.2