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

Soybean Inventory Management at Gesit Tahu Factory Using the Economic Order Quantity (EOQ) Method

Rahmat Hidayat*, Wahyuda, Farida Djumiati Sitania
Faculty of Engineering, Mulawarman University, Jalan Sambaliung No.9, Samarinda City, East Kalimantan 75119 Indonesia

ARTICLE INFORMATION

Article history:

Received: 5 September 2023
Revised: 29 October 2023
Accepted: 5 January 2024

Category: Research paper

Keywords:
EOQ
Raw materials
Supplies
Efficient
Ordering cost

DOI: 10.22441/ijiem.v5i2.22938

A B S T R A C T

Gesit Tahu is a small-scale factory engaged in the tofu industry, in the production process is closely related to the supply of the main raw material, namely soybeans. Gesit Tahu has not been optimal in controlling the level of raw material inventory where this factory has experienced a shortage of soybean inventory due to high demand, so it requires a method that can optimize raw material purchases and minimize inventory costs, the right method in solving this problem is using the Economic Order Quantity (EOQ) method. The purpose of this study is to determine the inventory control of Gesit Tahu soybean raw materials by comparing the current inventory management policy at the factory and using the EOQ method. The results of this study that inventory control is more efficient using the EOQ method, it is proven that it can make savings from the cost factor that must be incurred, it can be seen that if the Gesit Tahu factory applies the EOQ method, namely IDR 2,223,077,461, it is a minimum compared to the factory policy method within one year, which is IDR 2,223,619,662. The optimal order quantity for soybean needs is 72.87 sacks (73 sacks) for one order. The frequency of ordering soybean needs is 43.49 or 44 times/year. The calculation of safety stock to anticipate unexpected shortages is 1.64 sacks or 2 sacks. The calculation of the reorder point obtained to determine the point at which the order is placed again so that the ordered goods arrive on time before the inventory runs out is 21.93 sacks or 22 sacks.

Corresponding Author
Rahmat Hidayat
E-mail: rh28012001@gmail.com

1. INTRODUCTION

Inventories are materials or goods that are stored to fulfill a specific purpose, for example for use in the production or assembly process, for resale, or for spare parts of equipment or machinery. Inventory can be in the form of raw materials, auxiliary materials, work-in-progress, and finished goods (Rusdiana, 2014).

Tofu is a semi-finished material that is a clot of soy protein from the filtering of soybeans that have been ground with the addition of water. In making tofu, the pulp and liquid from the clumping of tofu are obtained as by-products. The Central Statistics Agency (BPS) noted that the average consumption of tofu per capita in Indonesia was 0,148 kilograms (kg) every week

in 2022. This amount is less than 2021 which amounted to 0,158 kg every week. Tofu and tempeh makers said the price of tofu will start to increase in the future. One of the factors is the increase in the price of imported soybeans, which is already quite high (Badan Pusat Statistik, 2022). Soybean, which is the main soybean of tofu making, is one of the legumes and the world's main source of protein and vegetable oil. Soybean consumption by the people of Indonesia will certainly continue to increase every year given several considerations such as increasing population, increasing per capita income, public awareness of food nutrition. The increasing need for soybeans can be attributed to the increasing public consumption of tofu and tempeh, as well as for the supply of the soy sauce industry (Aldillah, 2015). Gesit Tahu is a small-scale factory engaged in the tofu industry and sells it to traditional markets or modern markets. Gesit Tahu is located in Sekurau Jaya Village, Sekurau Jaya Village, Long Ikis District, Paser Regency. Gesit Tahu has 15 workers, of which 6 people are in charge of tofu production, 4 people are in charge of packaging, and 5 people are in charge of selling or delivering tofu to consumers. The tofu production rate at Gesit Tahu per day can reach an average of 4-5 quintals/day. The production of Gesit Tahu is white tofu which is packaged and sold using plastic and using cans. The sales or marketing of tofu carried out by Gesit Tahu reaches the entire Long Ikis sub-district, and often also reaches the neighboring sub-districts. The Gesit Tahu factory has never and does not have a control system for the main soybean, so because of this Gesit Tahu has experienced a shortage of soybean inventory due to high demand. This also made Gesit Tahu have to reorder soybeans to prevent losing customers but caused the demand cost to increase. Soybean demand orders made by Gesit Tahu are usually made once a month with requests that vary depending on their needs, namely 13 tons, 14 tons, and 15 tons.

Optimal availability of soybeans at an optimal cost requires an analysis of inventory management and control using inventory methods. The inventory method used is the EOQ (Economic Order Quantity) method. The EOQ method is used to determine the most economical order quantity and optimal order frequency that can be done to match demand requirements. This method is also used to prevent the occurrence of inventory shortages in terms of production so as to save the Company's soybean inventory costs.

2. LITERATURE REVIEW

Supplies

Inventories are materials or goods that are stored to fulfill a specific purpose, for example for use in the production or assembly process, for resale, or for spare parts of equipment or machinery. Inventories can be in the form of raw materials, auxiliary materials, work-in-progress, finished goods, or spare parts. Inventory is the main part of working capital and activities that change at any time. It can be concluded that inventory is an asset that must be available in the company when needed to ensure the smooth running of the company (Rusdiana, 2014). According to Heizer and Render (2010) in Lahu and Sumaraw (2017), states that based on the production process, inventory is divided into four types, namely: (1) Raw material inventory is materials that have been purchased but not yet processed. Materials can be sourced from natural sources or purchased from suppliers (soybean producers), (2) Work in process inventories are components or raw materials that have gone through a production process / have gone through several processes of change, but have not yet been completed or will be processed back into finished goods, (3) Maintenance supplies (maintenance, repair, operating) are supplies provided for maintenance, repair, and operations needed to keep machines and processes productive, and (4) Finished good inventory is a product that has been completed in production or processed and is ready for sale.

Inventory Control

According to Assauri (2005) in Vikaliana et al. (2020), inventory control is one of the activities that are in close sequence with each other in the company's entire production operation, in accordance with what has been planned in advance in terms of time, quantity, quantity, and cost. The objectives of inventory control in detail can be stated as follows: (1) Keeping the

company from running out of inventory so as to stop production activities, (2) Keeping the formation of inventory by the company is not too large or excessive so that the costs arising from inventory are not too large, and (3) Keeping purchases small can be avoided as this will increase ordering costs.

Inventory Costs

Inventory management is one of the concerns of company management. According to Heizer and Render (2015) in Susanti and Arief (2021), there are three categories related to inventory control costs, namely: (1) Holding Cost. Holding costs are costs associated with storage for a certain period of time. These costs consist of rental costs (building, insurance, taxes, etc.), raw material handling costs (depreciation, equipment, electricity, etc.), labor costs (receiving, warehouse, security, etc.), and investment costs (borrowing costs, taxes, inventory insurance, etc.). (2) Ordering Cost. Ordering costs consist of costs incurred by the company to obtain supplies, such as telephone and administrative costs, form and stamp fees, transportation and shipping costs, and other costs to process orders.

Demand Variablity

The nature of demand consists of static and dynamic which is measured by looking at the demand variability coefficient. Demand is said to be static when it has a value of $V < 0.25$ and dynamic when it has a value of $V \geq 0.25$. Silver and Peterson suggested that when the value of $V < 0.25$, the lot sizing calculation can use Economic Order Quantity (EOQ), while when the value of $V \geq 0.25$, the lot sizing calculation uses dynamic lot sizing (Rabbani et al., 2022).

$$V = \frac{n \sum_{t=1}^{n} Dt^2}{(\sum_{t=1}^{n} Dt^2)} - 1 \qquad (1)$$

Description
V = coefficient of variability
N = number of periods of demand data
Dt = total demand in period n

Forecasting

Forecasting is the process of estimating what future needs include needs in terms of quantity, quality, time and location needed in order to meet demand for goods or services. Forecasting is an activity of estimating or predicting future events of course with the help of preparing a plan in advance, where this plan is made based on the capacity and ability of demand / production that has been carried out in the company (Lusiana and Yuliarty, 2020). According to Makridarkis et al., (1995) forecasting can be used if there are the following 3 conditions: (1) Availability of information about the past, (2) Certain information can be quantified in the form of numerical data, and (3) It can be assumed that some aspects of past patterns will continue in the foreseeable future.

This last condition is known as the assumption of continuity. This assumption is the underlying premise of all forecasting methods and many other forecasting methods, regardless of how advanced they are. Forecasting techniques are very diverse, each technique has its own sfat, accuracy and cost that must be considered in choosing a particular method. An additional dimension to classify forecasting methods is to pay attention to the underlying model. There are two main types of forecasting models, namely periodic series models (time series) and regression models (causal). In time series, future estimation is done based on the past value of a variable or past error. The purpose of this method is to find patterns in historical time series and extrapolate those patterns to the future. While the causal model assumes that the factors foreseen indicate a cause and effect relationship with one or more independent variables. The purpose of a causal model is to find the shape of the relationship and use it to predict future value. According to Makridakis et al. (1995), an important step in choosing the right forecasting model is to consider the type of data pattern, so that the most appropriate method with this pattern can be tested. Data patterns can be divided into four types, namely: (1) Stationary data pattern, this data pattern occurs if there is data that fluctuates around a constant average value, (2) Seasonal data patterns, this data pattern occurs if there is a data series that is influenced by seasonal factors, (3) Cyclical data patterns, this data pattern occurs if there is data that is influenced by long-term economic fluctuations such as those related to the business cycle, and (4) Trend data pattern, this data pattern occurs when there is a long-term secular increase or

decrease in the data.

Time Series Forecasting Method

According to Hendikawati (2014) in Wiharja and Ningrum (2020), time series is one of the statistical procedures applied to forecast the probabilistic structure of circumstances that occur in the future in the context of decision making for a particular plan. The forecasting methods included in the time series model, namely: (1) Naive method is a forecasting technique that assumes the demand of the next period is the same as the demand of the last period, (2) The moving average method is obtained by averaging the demand based on some past data, (3) The exponential smoothing method is a development of the moving averages method. This method is called exponential because it uses exponentially decreasing weighting of older observation values, and (4) The trend projection method is used by fitting a trend line to a series of historical data points and then projecting that line into a medium- to long-term forecast.

Forecasting Error Test

According to Aman et al. (2023), in forecasting there are many methods that can be used, but not all methods can be suitable for the existing case. The forecasting error test is used by comparing the forecasting results with the actual data. The smaller the error value, the higher the level of forecasting accuracy, and vice versa. The amount of forecasting error can be calculated using several calculation methods, namely:

1. MAD (Mean Absolute Deviation), is the average absolute error over a given period regardless of whether the forecasting result is greater or smaller than reality.

$$MAD = \sum \left| \frac{A_t - F_t}{n} \right| \qquad (2)$$

2. MSE (Mean Square Error), is a calculation used to calculate the average rank error.

$$MSE = \sum \frac{(A_t - F_t)^2}{n} \qquad (3)$$

3. MAPE (Mean Absolute Percentage Error), is the average absolute error over a certain period multiplied by 100% in order to get a percentage result and determine the accuracy of forecasting.

$$MAPE = \left(\frac{100}{n}\right) \sum \left| A_t - \frac{F_t}{A_t} \right| \qquad (4)$$

Table 1. MAPE range value

No.	MAPE Range	Description
1	<10%	Excellent Forecasting Model Ability
2	10-20%	Good Forecasting Model Capability
3	20-50%	Viable Forecasting Model Capability
4	>50%	Poor Forecasting Model Ability

Economic Order Quantity

EOQ is a method to determine the number of products or goods that should be ordered for each order at the lowest cost. Variable costs are storage costs and ordering costs. Holding costs include warehouse rental costs, electricity costs, taxes, insurance etc. While ordering costs include the cost of delivering goods from the place of order to the warehouse, inspection costs, material handling costs and others (Ryando dan Susanti, 2019).

According to Hendra (2009) in Ryando and Susanti (2019), the advantages of the EOQ method are:

1. Can know how much inventory should be ordered, in this case soybeans, and when the order should be made,
2. Can overcome the uncertainty of demand in the presence of safety supplies, and
3. Easy to apply in mass production process.

According to Bahagia (2006), there are assumptions that can be used in inventory calculations using the EOQ method, namely:

1. The demand for goods over the planning horizon (one year) is known with certainty (D) and will come continuously over time at a constant rate,
2. The ordering lot size (q0) is fixed for each order,
3. The ordered items will arrive simultaneously,
4. The price of goods ordered is independent of the quantity of goods ordered/purchased and the time of day,

5. The order cost is fixed for a single order and the holding cost is proportional to the quantity of goods stored and the price of goods per unit as well as the length of storage time, and
6. There are no limitations, whether related to financial capability, warehouse capacity, and so on.

According to Efendi et al. (2019), below is the calculation of EOQ, frequency, and TIC in inventory control can be done using the following formula:

$$EOQ = \sqrt{\frac{2\,(D.S)}{H}} \quad (5)$$

$$f = \frac{D}{EOQ} \quad (6)$$

Explanation
D = demand
S = order cost
H = borrowing cost
f = order frequency

Safety Stock

Safety stock or often referred to as iron stock is a supply that is reserved as a safety from the continuity of the company's production process. With this safety stock, it is hoped that the production process will not be disrupted by material uncertainty. This safety stock is a certain number of units, where the number of these units will be maintained, even though the soybeans will be replaced with new ones. Standard deviation is used to determine the amount of safety stock with the frequency level of service approach. frequency level of service is the chance of no shortage ofinventory during the waiting time (Daud, 2017).

$$SS = Z \times \sigma\sqrt{L} \quad (7)$$

$$\text{Standard deviation } (\sigma) = \sqrt{\frac{\sum (X - \bar{X})^2}{n}} \quad (8)$$

Explanation
SS = safety stock
Z = safety factor
σ = standard deviation
n = amount of data
x = quantity of material required
$\bar{X}$ = average material requirement
L = lead time

Reorder Point

According to Hudori (2018), safety stock and reoder point models can be classified as being demand and lead time diverse, demand fixed, lead time diverse, demand diverse, but lead time fixed, and demand and lead time fixed. The reorder point is the inventory level where when inventory reaches that level, an order must be placed.

$$ROP = d \times L + SS \quad (9)$$

According to Lahu and Sumaraw (2017), this equation for ROP assumes demand during lead time and lead time itself is constant. Demand per day (d) is calculated by dividing the annual demand (D) by the number of working days in a year.

$$\text{Demand per day} = \frac{D}{\text{number of working days}} \quad (10)$$

Total Inventory Cost (TIC)

According to Bahagia (2006), the total cost of inventory is in principle a model formulation to find the linkage relationship function between performance criteria and independent variables and their parameters.

$$TIC = p \times D + \left(\frac{D \times S}{Q}\right) + OH \times H \quad (11)$$

Keterangan
p = price of goods per unit
D = quantity of goods purchased
S = cost of each order
OH = on hand inventory
H = holding cost per unit per periode

3. RESEARCH METHOD

The research conducted is comparative research. The subject of this research is the Gesit Tahu factory located in Sekurau Jaya village, Sekurau Jaya Village, Long Ikis District, Paser Regency, East Kalimantan. The types of data used in the study are annual raw material requirements, ordering costs, inventory costs. The research steps used in detail are described in the research framework, as in Figure 1.

Figure 1. Research framework

4. RESULT AND DISCUSSION

The process of making tofu consists of various materials used, namely soybeans, water, and vinegar / seeds. In this study, the object of related research is soybean inventory in the warehouse. Regarding soybean inventory data at the beginning and end of each month for the period January 2022-March 2023 owned by the Gesit Tahu factory can be seen in Table 2.

Table 2. Tofu demand data

No	Month	(kg)	Tofu	Tofu Demand/Day
1	Jan 2022	14050	1,124,000	42,231
2	Feb 2022	13650	1,092,000	42,000
3	Mar 2022	11350	908,000	34,923
4	Apr 2022	11750	940,000	36,154
5	May 2022	10750	860,000	33,077
6	Jun 2022	10550	844,000	32,462
7	Jul 2022	14000	1,120,000	43,077
8	Aug 2022	13700	1,096,000	42,154
9	Sept 2022	14350	1,148,000	44,154
10	Oct 2022	14050	1,124,000	43,231
11	Nov 2022	11850	948,000	36,462
12	Dec 2022	13500	1,080,000	41,538
13	Jan 2023	13750	1,100,000	42,308
14	Feb 2023	12500	1,000,000	38,462
15	Mar 2023	13650	1,092,000	42,000
Total		**193,450**	**15,476,000**	**595,231**
Average		**12,897**	**1,031,733**	**39,682**
Standard Deviation			**101.061**	

The purchase cost incurred is the price of soybeans whose per kilogram is IDR 14,000 and per shelf is IDR 700,000 the order cost that must be incurred each time you place an order is IDR 6,440 and the storage cost incurred to deviate raw materials in the warehouse is IDR 3,041,607 per month or IDR 36,499,288 per year.

Determination of Demand Type

Based on the measurement of the demand variance test if the value of $V < 0.25$ then the demand is static, but if the value of $V > 0.25$ then the demand is dynamic. Based on the calculation results it is known that soybeans

have a value of V; 0.009594659 <0.25 so it can be said that demand is static.

Data Pattern Determination

Forecasting is a process to estimate what future needs include needs in terms of quantity, and the time needed in order to fulfill demand related to inventory.

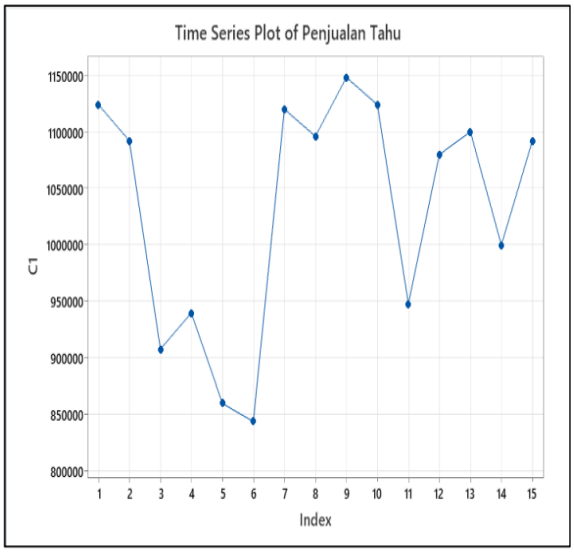

Figure 2. Plot of tofu demand data

Based on Figure 2 regarding the demand for tofu, the data moves around the average value and had experienced a drastic decline in several periods from the 2nd to the 6th. The data moves and fluctuates around the average value so that the possible data pattern formed is a horizontal or stationary pattern.

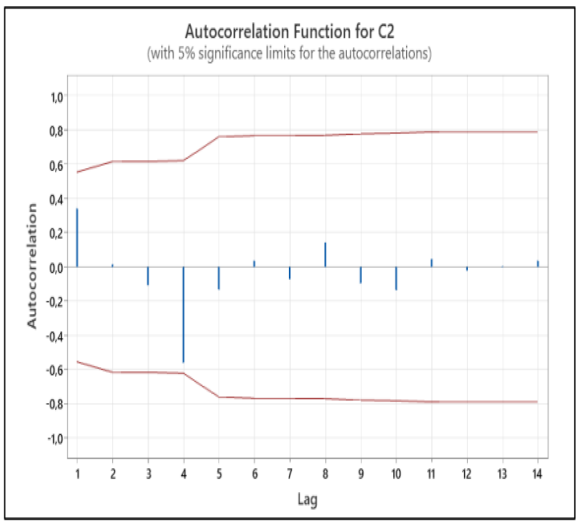

Figure 3. Autocorrelation chart

Based on Figure 3, the range of autocorrelation coefficient is -1 to +1. The horizontal line in the middle of the graph indicates an autocorrelation coefficient of zero. The two red lines show the approximation with 95% confidence level. The horizontal scale of 1 to 14 is the lag which indicates that the ACF value is between ±0.5. According to Heriansyah and Hasibuan (2017), if there is no ACF value that exceeds the red line above or below, it can be concluded that there is no correlation so that it is proven that there is no trend and the data at the same time is stationary (horizontal). Based on the identification that has been done regarding the data pattern of tofu demand, the appropriate method will be selected to be compared. According to Lusiana and Yuliarty (2020), if the data pattern formed is stationary (horizontal) then the single moving average, weighted moving average and single exponential smoothing methods are used to overcome the pattern formed.

Forecasting Method Selection

The selection of forecasting methods is done by comparing forecasting methods according to the data plot formed. Then from several forecasting methods used, the forecaster with the smallest error value will be selected. The criteria for selecting the smallest error value are based on Mean Absolute Deviation (MAD), Mean Square Error (MSE), and Mean Absolute Percentage Error (MAPE) and will be verified by Tracking Signal. Based on the forecasting results that have been carried out with these methods, it is found that the Weighted Moving Average method with an average of 13 months has the smallest MAD, MSE, and MAPE values compared to other forecasting methods. The selected method will be verified by using a tracking signal. If all data/values are within the control limits and there is no data/value outside the control limits, the forecasting method is quite correct.

Tofu Demand Forecasting

Based on the selected time series forecasting method, namely the moving average method, tofu demand forecasting is carried out for the next 12 periods. Regarding tofu demand forecasting for the next 12 periods can be seen in Table 3

Table 3. Tofu forecasting for the next 12 periods

Month	Period	Forecast	≈Tofu
Apr-23	1	1,050,285.71	1,050,286
May-23	2	1,054,612.24	1,054,612
Jun-23	3	1,057,993.27	1,057,993
Jul-23	4	1,060,597.83	1,060,598
Aug-23	5	1,061,398.71	1,061,399
Sep-23	6	1,059,933.81	1,059,934
Oct-23	7	1,058,903.61	1,058,904
Nov-23	8	1,058,122.57	1,058,123
Dec-23	9	1,058,209.04	1,058,209
Jan-24	10	1,059,031.78	1,059,032
Feb-24	11	1,058,760.97	1,058,761
Mar-24	12	1,058,681.90	1,058,682
Total		**12,696,531.47**	**12,696,533**
		158.707 kg/ 3.175 Sacks	

Metode EOQ

Calculation of optimal ordering is carried out using the economic order quantity (EOQ) method based on the results of forecasting for the next 12 periods (months).

$$EOQ = \sqrt{\frac{2\,(3{,}175)(6{,}440)}{(7{,}701)}}$$

$$EOQ = \sqrt{5{,}310.21}$$

$$= 72.87 \text{ sacks} \approx 73 \text{ sacks}$$

Based on the results above, it can be calculated for the frequency of orders for one year.

$$f = \frac{3{,}175}{73}$$

$$= 43.49 \approx 44 \text{ times/year}$$

Safety Stock Calculation

Safety stock or safety inventory is needed in order to anticipate the occurrence of shortages or unexpected inventory runs so that the company can continue productivity and meet the needs of customer demand. The value of the safety factor is assumed to be for the level of service in the fulfillment of demand by 95% and the risk of out of stock by 5%.

$$SS = Z \times \sigma\sqrt{L}$$

$$= 1.645\ (2828.27)\sqrt{2}$$

$$= 1.64 \text{ sacks} \approx 2 \text{ sacks}$$

Reorder Point Calculation

Reorder Point (ROP) is needed in order to know the point at which the order is placed again so that the ordered goods arrive on time before the inventory runs out.

$$ROP = d \times L + SS$$

$$= \frac{3.175}{313}(2) + 1.64$$

$$= 20.28 + 1.64$$

$$= 21.93 \text{ sacks} \approx 22 \text{ sacks}$$

Based on the calculation of the reorder point (ROP), it can be seen that the reorder for soybean needs will be done when the remaining inventory conditions of 21.93 sacks (22 sacks) or 2,100 kg (2.1 tons) of soybeans.

Calculation of Total Inventory Cost

The calculation of the total cost of inventory is carried out to determine the total inventory costs incurred for the next 12 periods. In the calculation, it will be compared which is the smallest between the total cost of inventory using the EOQ method and the total cost of inventory using company policy.

1. Total cost of inventory using the EOQ method

   Purchase Cost = p x D

   = IDR700,000x3175 sack

   = IDR2,222,500,000/year

$$\text{Ordering Cost} = \left(\frac{3{,}175 \text{ x } 6{,}440}{73}\right)$$

= IDR280,096/year

$$\text{Holding Cost} = 14{,}095 \text{ x } \left(\frac{7{,}701}{365}\right)$$

= IDR297,365/year

Inventory Cost = IDR2,223,077,461/year

2. Total cost of inventory with company policy

Purchase Cost = p x D

= IDR700,000x3175 sacks

= IDR2,222,500,000/year

$$\text{Ordering Cost} = \left(\frac{3{,}175 \text{ x } 6{,}440}{280}\right)$$

= IDR73,025/year

$$\text{Holding Cost} = 49{,}610 \text{ x } \left(\frac{7{,}701}{365}\right)$$

= IDR1,046,637/year

Inventory Cost = IDR2,223,619,662/year

Based on the results of calculations that have been done Gesit Tahu factory can implement inventory management by taking into account the order quantity and the optimal order point so as to reduce inventory costs incurred.

5. CONCLUSION

The optimal order quantity for soybean needs is 72.87 sacks (73 sacks) for one order. The frequency of ordering soybean needs is 43.49 or 44 times per year. The calculation of safety stock in order to anticipate an unexpected shortage or exhaustion of inventory is 1,64 sacks or 2 sacks. The calculation of the reorder point obtained to determine the point at which the order is placed again so that the ordered goods arrive on time before the inventory runs out is 21.93 sacks or 22 sacks. The amount of inventory costs if the agile tofu factory applies the Economic Order Quantity (EOQ) method, namely IDR 2,223,077,461 is a minimum compared to the company policy method of IDR 2,223,619,662. The difference in the decrease in inventory costs when using the Economic Order Quantity method is around IDR 542,201 or 0.02% more efficient than the company's policy within one year. Suggestions for further researchers to be able to take into account other factors in determining the value of the company's inventory costs, namely warehouse rental costs and warehouse maintenance costs. In addition further research can use different methods and also add message cost change parameters if possible.

REFERENCES

Aldillah, R. (2015). Proyeksi produksi dan konsumsi kedelai Indonesia. *Jurnal Ekonomi Kuantitatif Terapan*, *8*(1), 44324.

Aman, S., Fitria, H., & Hakim, C. B. (2023). Analisa Peramalan Penjualan Tas Kerajinan Ekspor Dengan Metode Moving Average Di CV. Sindocraft. *Jurnal Teknologi dan Manajemen Industri*, *4*(1), 1-6.

Badan Pusat Statistik Jakarta Pusat. (2022). Rata-Rata Konsumsi Per kapita Seminggu 2007-2022. Retrieved October 1, 2022, from Badan Pusat Statistik website: https://www.bps.go.id/subject/5/konsumsi-dan-pengeluaran.html

Bahagia, S. N. (2006). Sistem Inventor. Bandung: ITB Press.

Daud, M. N. (2017). Analisis Pengendalian Persediaan Bahan Baku Produksi Roti Wilton Kualasimpang. Jurnal Samudra Ekonomi Dan Bisnis, 8(2), 760–774. https://doi.org/10.33059/jseb.v8i2.434

Lahu, E. P. L., & Sumarauw, J. S. B. (2017). Analisis Pengendalian Persediaan Bahan Baku Guna Meminimalkan Biaya Persediaan pada Dunkin Donuts Manado. Jurnal EMBA, 5(3), 4175–4184. https://doi.org/10.35794/emba.5.3.2017.18394

Lusiana, A., & Yuliarty, P. (2020). Penerapan Metode Peramalan (Forecasting) pada Permintaan Atap di PT X. Industri Inovatif : Jurnal Teknik Industri, 10(1), 11–20. https://doi.org/10.36040/industri.v10i1.2530

Hudori, M. (2018). Formulasi Model Safety Stock dan Reorder Point untuk Berbagai Kondisi Persediaan Material. *Jurnal Citra Widya Edukasi*, *10*(3), 217-224.

Makridakis, S., Wheelwright, S. C., & McGee, V. E. (1993). Metode dan Aplikasi Peramalan (2nd ed.; U. S. Andriyanto & A. Basith, Trans.). Jakarta: Erlangga.

Rabbani, K. J., Wahyuda, W., & Sitania, F. D. (2022). Analisis Pengendalian Persediaan Kedelai pada PRIMKOPTI Guna Memenuhi Kebutuhan Produksi Industri Tahu Tempe di Balikpapan. G-Tech, 6(2), 284–294. https://doi.org/10.33379/gtech.v6i2.1709

Rusdiana, A. (2014). Manajemen Operasi (p. 402). Bandung: CV. Pustaka Setia.

Ryando, D., & Susanti, W. (2019). Penerapan Metode Economic Order Quantity (EOQ) untuk menentukan Safety Stock dan Reorder Point (Studi Kasus: PT. Sinar Glassindo Jaya). *Jurnal Mahasiswa Aplikasi Teknologi Komputer dan Informasi (JMApTeKsi)*, *1*(1), 76-84.

Susanti, S., & Arief, K. (2021). Implementasi Just In Time System Dalam Meningkatkan Efisiensi Biaya Persediaan Bahan Baku. Indonesian Accounting Literacy Journal, 1(3), 621–636. https://doi.org/10.35313/ialj.v1i3.3302

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

Wiharja, A. F., & Ningrum, H. F. (2020). Analisis Prediksi Penjualan Produk PT. Joenoes Ikamulya Menggunakan 4 Metode Peramalan Time Series. Jurnal Bisnisman : Riset Bisnis Dan Manajemen, 2(1), 43–51. https://doi.org/10.52005/bisnisman.v2i1.23